Year 9 Knowledge Book 2023-2024

Saint Benedict
A Catholic Voluntary Academy

Sticker Name

Love, Belief, Integrity, Knowledge

Saint Benedict
Catholic Voluntary Academy

OUR VALUES

BE WHO GOD MEANT YOU TO BE AND YOU WILL SET THE WORLD ON FIRE.

LOVE

As we know we are loved by God, we will learn to love ourselves and care for our own body mind and soul.

We will show love to one another by being patient and kind, not by being rude, boastful or proud.

As one body in Christ, we will ensure that no member of our community is left out or left behind

BELIEF

We will encourage one another and build each other up.

We will let our light shine, making the world a better place for all.

KNOWLEDGE

We will value knowledge: intelligent hearts acquire knowledge, the ears of the wise seek knowledge.

INTEGRITY

We will always strive to make the right choice even when this is the harder path to take.

We will live and work sustainably.

AT SAINT BENEDICT WE DEVELOP THE CHARACTER OF OUR COMMUNITY THROUGH OUR CURRICULUM AND CULTURE.

Saint Benedict

MY EQUIPMENT PLEDGE

To succeed you must be prepared. Every night before school, you need to check your school bag to ensure that you have all the correct equipment.

Here is the list of equipment you need for every lesson:

- ❑ Black or blue pens
- ❑ Red pens (one or two)
- ❑ A ruler
- ❑ A pencil
- ❑ A scientific calculator (CASIO)
- ❑ A rubber
- ❑ A protractor
- ❑ Colouring pencils
- ❑ A sharpener
- ❑ Glue stick
- ❑ Your KNOWLEDGE BOOK

I pledge that I will always bring the correct equipment to class so that I can effectively learn.

Your signature:	Parent/carer's signature:	Form tutor's signature:
.....	.....	.....

Respect

What is Respect?

Showing respect is an important part of life, and how you maintain relationships.

Three types of respect:

1. Respect Yourself
2. Respect Others
3. Respect the Planet

Why is respect important?

Receiving respect from others is important because it helps us to feel safe and to express ourselves. Respecting others helps maintain a peaceful world and encourages others to be better people. Showing respect to our planet allows us to maintain it for future generations.

Key words	Definitions
Respect	Due regard for the feelings, wishes and rights of others
Honour	The quality of knowing and doing what is morally right
Dignity	Sense of pride and self respect
Relationships	The way two or more people or groups connect and behave towards each other
Worthiness	The quality of being good enough

Rules and Sanctions

Build up a loving community

Key word	
Conduct	The way in which a person behaves.
Unacceptable	Something that is not suitable or appropriate.
Boundaries	The limits of something.
Sanction	A penalty or action taken when a rule or law has been broken.
Consistent	Acting in the same way overtime to be fair.

Behaviour

Rules and sanctions are things which guide our behaviour. We follow rules and regulations to be fair and consistent. Sanctions occur if we do not follow rules or deliberately break them.

Preparation for life

All aspects of life require us to follow rules. There are rules in school; rules in your family and home; rules to follow when crossing the road and using the bus and so on. Structure and rules allow us all to know what is acceptable and how to conduct ourselves. Rules reassure us

The law

We are all bound by the rules of the law. If we break the law, we face a raft of different sanctions. Ultimately, having rules in schools is about a lifelong understanding about what is right and what is wrong.

Kindness

Key word	
Empathy	Understand and share feelings of others
Compassion	Concern for misfortune of others
Compliment	Praise or congratulate others
Considerate	Thoughtfulness and sensitivity to others
Generous	Being liberal with things

Treat others how you would want to be treated yourself.

What is Kindness?

The quality of being friendly, generous and considerate

What does it mean to be kind?

To have empathy/sympathy, be compassionate, looking for good in people.

Why is it important to be kind?

Makes you feel happy, feel good about yourself

Builds strong relationships

Inspires others

How can we show kindness?

Smile

Hold the door open for somebody

Say something nice (compliment)

Invite somebody sat on their own to join you

Manners

Listen to somebody

Emotions

Key Words	
Feelings	An emotional state or reaction.
Relationships	The state of being connected with someone else.
Instinct	A fixed pattern of behaviour.
Intuitive	Using what you feel to be true even without conscious reasoning.
Reaction	Something done, felt or thought in response to a situation or event.
Identification	The act or process of identifying someone or something.

Work and play in harmony

What are emotions?

Emotions are biological states associated with the nervous system.

Thoughts, feelings, behavioural responses, and relationships all generate emotions.

An instinct or, intuitive reaction or feeling can create emotions

Identifying feelings

Making sense of what and how you feel is not always easy. To do this, we need to regularly check in with ourselves, making time to think about the feelings we are having and naming them. To do this, we need to think about our daily lives which may help us to see patterns of behaviour.

Not all feelings or emotions are bad or negative!

It is important to recognise when you feel happy; relaxed and good about yourself. Knowing what has led to these feelings can help us identify things we do not like which may cause us negative feelings.

Verbal Communication

Treat each other with dignity and justice

Key Words	
Clarity	Vocal clarity means you do not speak too fast or too slowly. You consider carefully the words you mean and whether your listener can understand you.
Honesty	Honesty is speaking the truth.
Respect	Respect means that you accept somebody for who they are, even when they are different from you or you do not agree with them.
Appropriate	fitting the practical or social requirements of the situation.
Tone	a quality in the voice that expresses your feelings or thou ghts, often towards the person being spoken to or the subject being spoken about
Courtesy	politeness, good manners, or consideration for other people.

What is verbal communication?
Verbal communication is the use of words to share information with other people.

What does it mean to communicate effectively?
Every time you verbally interact with someone you are aiming to develop your understanding of the world; you may be wishing to obtain information, respond to a request or offer support or guidance to another. In every one of these exchanges you are representing your tutor, your family and most importantly yourself.

Why is it important to communicate effectively?
All young people need to develop good speech, language and communication skills to reach their full potential.

Speech, language and communication underpin the basic skills of literacy and numeracy and are essential for you to understand and achieve in all subjects.

How can we communicate effectively?
Make eye contact
Speak honestly
Consider your role within the school
Consider the role of the person you are speaking to
Think carefully why you need to speak to the person you are addressing
Where necessary adapt as your conversation develops

Manners

Key Words	
Manners	A person's words or way of behaving towards others.
Respect	A regard for the feelings, wishes, or rights of others.
Listen	To take in what you hear.
Harmony	A time of behaving in one way to produce a pleasing effect.
Vocabulary	The range of words that we know and use.
Gratitude	The quality of being thankful; readiness to show appreciation for and to return kindness.

Loving...harmony...dignity

Treat your neighbour as yourself
The way in which we behave and speak towards others, reflects in their actions and words towards us.

Show the best side of yourself
When you speak to others, always show respect; be polite and thankful. Use the words 'please, thank you, sorry and pardon' when communicating with others.

Manners are for every situation
Every interaction has space for the use of manners: speech, emails, messages. Often when we get upset or angry we don't use manners.
However it does calm a situation if you do.

Change

Key Words	Definition
Change	Make or become different
Organised	Make arrangements or preparations for an event or activity
Opportunity	A time set of circumstances that make it possible to do something
Coping	To deal effectively with something difficult
Embrace	Accept (a belief, theory or change) willing and enthusiastically
Strategies	A plan of action designed to achieve a long term or overall aim

Develop potential to the full

Find the positive

Don't allow yourself to become negative about the changes in your life. Change is good, keep repeating it.

Feeling vulnerable

Facing change can be very overwhelming, leaving you feeling very emotional. Make it your mission to be proactive and respond to it positively.

Talk about it

It's good to talk about change in your life. Focus on problems, solutions and the positives that change will bring. Try to avoid focussing on the negatives and letting emotions take over.

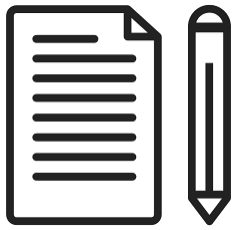
Study Skills – Ways to **learn and remember**

Self quizzing (look, cover, write)

Read through the information in the knowledge book that you want to learn

Cover the information up

Write down as much as you can remember



Use the knowledge book to;

a) Correct any mistakes
b) Add any information that you forgot

Study Skills – Ways to **learn and remember**

Spacing

Complete a self quiz of the information you want to learn

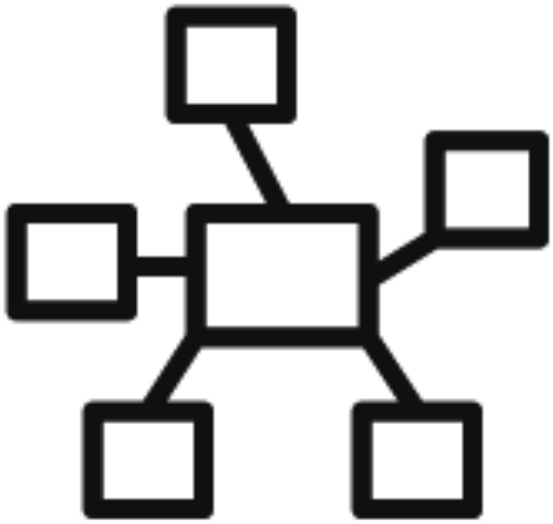
Wait for a day or 2 (depending on the deadline)

Repeat the self quiz.

The more times you can repeat this process, the more you will be able to remember without the book

Study Skills – Ways to **learn and remember**

Elaboration



Think about the topic that you are studying

Ask questions such as who, what , why , where , when how. Try to find the answers

See how these ideas connect - a mind map will be useful for this

Study Skills – Ways to **learn and remember**

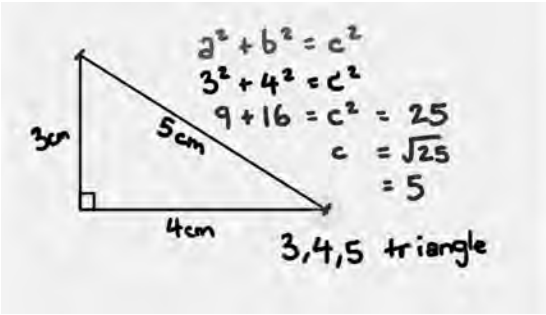
Concrete Examples

A concrete example is an clear example of an abstract idea

Pythagoras theorem example

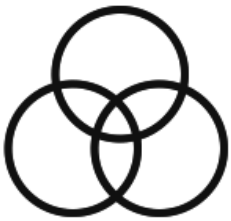
If you tried to explain Pythagoras's theorem to someone verbally, it would be quite hard to understand.

By using a concrete example that shows exactly how to use Pythagoras theorem, it is much easier to remember, understand and use



Study Skills – Ways to **learn and remember**

Interleaving



Research says we will actually learn more effectively if we mix our study skills up rather than using the same techniques all the time

1. Try to use different study skills rather than just one technique.

2. When revising for exams, prepare a revision timetable and try to revise more than one subject during a session

Study Skills – Ways to **learn and remember**

Dual Coding

As well as **writing** information down, **create an icon/ drawing** too for individual facts. This helps your brain to remember the information

INDEPENDENCE: DIAGNOSE

NAME: CLASS:

SUBJECT:

Be clear about what you know and what you don't know before you begin.

First, use a contents page or a topic list for the subject you are going to revise.

Then, fill in the following table – the topics, and how well you know them.

Next, prioritise. Which topics will you revise first? Spend time studying the topics which will make the biggest difference to your results.

Topic	Knowledge	Priority
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	
	Know it/Sort of know it/Don't know it	

Finally, use the **diagnosis – therapy – test** worksheet to plan your independent study.

INDEPENDENCE: DIAGNOSIS – THERAPY - TEST

NAME: CLASS:

TOPIC:

DIAGNOSIS: The thing I don't understand

THERAPY: Where am I going to learn about this?

Which of the templates will I use to transform the information?

TEST: 5 questions someone can ask me about my new understanding.

You can download this template from the school website: www.saintben.sch.uk/content/independence

INDEPENDENCE: RANKING TRIANGLE

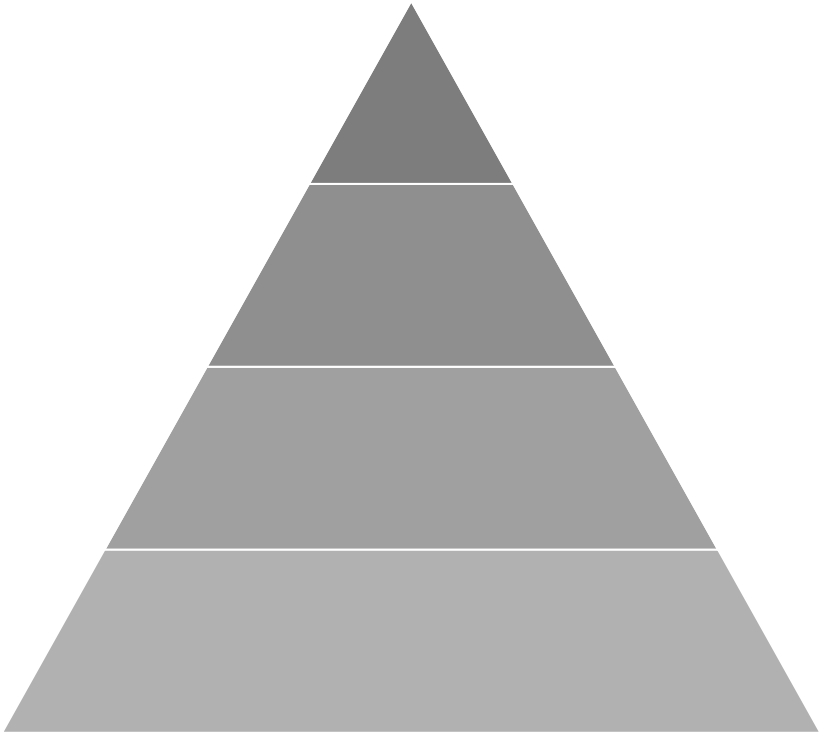
NAME: CLASS:

TOPIC:

The most important information goes at the top.

The least important information goes at the bottom.

Justify WHY. Why is it the most important? Why is it the least important?



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You can download this template from the school website: www.saintben.sch.uk/content/independence

INDEPENDENCE: PRIORITISE, REDUCE, CATEGORISE, EXTEND

NAME: CLASS:

TOPIC:

Take a section of text and do the following:

Prioritise: write out the three most important sentences. Rank 1-3 in terms of importance. Justify your decision.
Reduce: reduce the key information to 20 words.
Categorise: sort out the information into three categories. Give each category a title which sums up the information.
Extend: write down three questions you would like to ask an expert in this subject.

You can download this template from the school website: www.saintben.sch.uk/content/independence

INDEPENDENCE: BOXING UP

NAME: CLASS:

TOPIC:

Take a section of text. Read it and put your thoughts about the text into different boxes.

Needs a boost: 3 things I did not know:
Almost there: 3 things I understand better now:
I've got these: 3 things I already knew:

You can download this template from the school website: www.saintben.sch.uk/content/independence

INDEPENDENCE: QUIZZING

NAME: CLASS:

TOPIC:

Read the text and transform it into 10 questions to ask someone.

	Question	Answer
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Question stems:

State…	Explain…	Suggest…
Describe…	Evaluate…	Compare…

You can download this template from the school website: www.saintben.sch.uk/content/independence

INDEPENDENCE: PICTIONARY

NAME: CLASS:

TOPIC:

Transform the material into 6 pictures – one per paragraph or one per key piece of information. The pictures should represent the information so that they can act as a reminder of what the text said. Underneath each picture, explain your thinking.

1.	2.	3.

4.	5.	6.

INDEPENDENCE: OTHER IDEAS

Steps → flow chart Transform a sequence of steps into a flow chart or a diagram.

Flow chart → steps Transform a flow chart or a diagram into a sequence of steps.

Look, cover, write, check Cover a list of key words. Write them down. Check which ones you have got right. Repeat until you get them all right.

Link key words Take three words from a topic. Link them together in a sentence or a diagram. Repeat until all the key words have been linked.

You can download this template from the school website: www.saintben.sch.uk/content/independence

Year 9 Personal Development Curriculum

Contents

Year 9 Personal Development Curriculum

Topic; Friendship – what makes a good friend?

Key Vocabulary	
Friend	A person with whom one has a bond of mutual affection, typically one exclusive of sexual or family relations
Positive	Happy or hopeful, or giving cause for happiness or hope
Respect	The feeling you show when you accept that different customs or cultures are different from your own and behave towards them in a way that would not cause offence
Help	To make it possible or easier for someone to do something, by doing part of the work yourself or by providing advice, money, support etc.
Qualities	A characteristic or feature of someone or something
Peer pressure	The strong influence of a group, especially of children, on members of that group to behave as everyone else does

Key Knowledge

The fundamentals of a good friendship are;

Acceptance (be yourself)
Respect (value your opinions)
Listening (care about what is being said and not talking over someone)
Trust (being able to confide in someone)
Honesty (but be mindful of someone's feelings)

Friendships change and evolve over time

5 ways to make your friendships last;

Be flexible. Be open to the fact that your friendships will change and grow over time.

Stay committed. Commit to staying connected with your friends even when you are far apart.

Be patient with your friends.

Communicate with your friends.

Maintain balance.

Year 9 Personal Development Curriculum

Topic; Health and well being
Relationship between habit and dependence

Key Vocabulary	
Habit	A regular activity that is repeated and is hard to give up
Dependence	The state of being reliant or influence by something
Addiction	A condition of being addicted to a particular substance or activity
Symptoms	A feature of a medical and physical condition
Side -effects	An effect form drug or medical treatment
Reliance	Dependant on someone of something

Key Knowledge

How do you know if you have developed an unhealthy habit or if you are actually suffering from addiction? Determining the difference between the two can be difficult, since both grow out of repeated behaviours.

One notable difference between habit and the disease of addiction is the amount of time and effort required to change the behaviour. Altering habits requires minimal effort, time, and attention.

Addiction is more complex. The disease of substance abuse manifests symptoms of intense craving, loss of impulse control, and behavioural flexibility. Addictions are physiologically developed and reinforced in the brain each time we use drugs or alcohol.

Energy Drinks

An energy addiction involves drinking excessive amounts of these beverages without being able to moderate your intake. It may be characterized by addictive symptoms similar to those of a drug addiction, and it's linked to various health issues.

Year 9 Personal Development Curriculum

Topic: Being assertive in friendships

Key Vocabulary	
Assertive	Having and/or showing a confident and somewhat forceful personality.
Passive - aggressive	Denoting a type of behaviour or personality characterized by indirect resistance to the demands of others and an avoidance of direct confrontation.
Confidence	Having faith and belief in someone / something.
Self - assured	Having faith in your own abilities and character.
Communication	Being able to speak confidently and exchange information through speaking, writing and any other medium.
Aggressive	Not being an approachable individual and reacting to situations often through violent behaviours or confrontation.
Friendships	Friendly relation, or attachment, to a person, or between persons; affection arising from mutual esteem and good will; friendliness; amity; good will.

Key Knowledge

What Is Assertive Communication?

Assertive communication is defined as "*the ability to speak and interact in a manner that considers and respects the rights and opinions of others while also standing up for your rights, needs, and personal boundaries*"

Assertiveness is an effective and non-confrontational way of expressing one's disagreement with a particular situation or concept.

Know how to stand up for yourself and others in relevant situations:
- justify and make relevant decisions
- understand two view points
- make your point known without being rude or dismissive.

The 3 C's when it comes to being assertive:
confidence
clear
controlled.

Create distance from unhealthy friendships and be a good listener.

Year 9 Personal Development Curriculum

Topic: The influence of peers

Key Vocabulary	Definition
Peer	A person of the same age, status, or ability as another specified person.
Pressure	The use of persuasion or intimidation to make someone do something.
Peer pressure	The influence from members of the peer group that cause the individual to feel pressure to behave in a certain way.
Influence	The ability to have an effect on the character, development, or behaviour of someone else.
Consequences	a result or effect, typically one that is unwelcome or unpleasant
Persuasion	Convincing someone to do or believe something.
Intimidation	The action of threatening or scaring someone.

Key Knowledge

It is important to recognise that friendships and peers can have an influence on your behaviour.

You can develop strategies to help cope with peer pressure, managing it in person and online.

Peers can play a role in supporting one another to resist pressure and influence.

It is important to seek supportive friendship groups as peer approval can generate feelings of pressure and lead to increased risk-taking; which is harmful.

Positive effects of peer pressure include:

a sense of belonging and support
increased self-confidence
introduction to positive hobbies and interests
reinforcement of positive habits and attitudes.

Negative effects of peer pressure include:

pressure to use alcohol, cigarettes or drugs
pressure to engage in risk taking behaviours
distraction from schoolwork
distance between family and existing friends
drastic changes in behaviour and attitudes.

Year 9 Personal Development Curriculum

Substance Misuse

Key Vocabulary	Definition
Drugs	A medicine or other substance which has a physiological effect when eaten or otherwise introduced into the body.
Recreational drugs	Chemical substances taken for enjoyment, or leisure purposes, rather than for medical reasons.
Substance misuse	Refers to the use of psychoactive substances in a way that is harmful or hazardous to health.
Legal high	A substance with stimulant or mood-altering properties whose sale or use is not banned by the law.
Possession	The crime of having one or more illegal drugs in one's **possession**, either for personal use, distribution, sale or otherwise.
Supply	"Knowingly taking part in" a wide range of activities involved in the **distribution**, provision and/or sale of illegal **drugs**

Where to get help:
Talk to Frank: **0330 123 6600**
https://www.talktofrank.com/

Key Knowledge

Which are the most commonly used drugs in the UK?
Caffeine is the UK's favourite drug- it is contained in tea, coffee, many soft drinks and colas, some confectionery and included in many medicines.

The most commonly used drug is **alcohol**, followed by the **nicotine** in cigarettes and other tobacco based products.

When it comes to illegal drugs, the most commonly tried drug by far is **cannabis.** This is followed by **cocaine** and **ecstasy**.

What to do when you feel pressured to take drugs:
Remember that you're not alone.

Work out where you stand on issues like drugs and alcohol.

Think about how you'd like to respond when someone offers you drugs so you know what to say.

Try to understand who's offering you the drugs and why.

Say no firmly but clearly and don't feel like you need to change your mind.

Take a look around- you'll soon see that you're not the only one worrying about what other people think of you.

If you are worried about your friends being pressured, don't keep it to yourself, talk to them, or someone you trust.

If you're finding it hard to be yourself within your group, take a step back, and think about whether it's time to find a new crowd to hang out with.

Year 9 Personal Development Curriculum

Topic; Medicinal & Recreational Drugs

Key Vocabulary	
Drug	A chemical substance that affects the way that your body works
Medicinal drug	A drug used to cure illness or relieve symptoms.
Recreational drug	A drug used to for pleasure
Illegal	Doing something that is forbidden in law
Addictive	A substance or activity that will cause people to become addicted (dependent on it)
Stimulants	A substance that raises levels of physiological or nervous activity in the body.
Sedatives	A drug taken for its calming or sleep-inducing effect.

Key Knowledge

Recreational drugs are chemical substances taken for enjoyment, or leisure purposes, rather than for medical reasons.

Alcohol, tobacco and caffeine can be classed as recreational drugs.

Recreational drugs are usually started to provide pleasure or improve life in some way. However, they can lead to addiction, to health and social problems and to crime.

Most are illegal, so their use comes with all the consequences of breaking the law. If you, or someone you know, have a problem with drugs, there are lots of ways to obtain help

Drugs are very addictive and can have various impacts on the body such as stimulants, depressives & pain relief.

Taking drugs can lead to serious illnesses such as:

Respiratory depression,
constricted pupils
nausea.
slow and shallow breathing,
clammy skin,
convulsions,
coma,
possible death.

Year 9 Personal Development Curriculum

Topic; Risks of tobacco, nicotine and e-cigarettes & alcohol

Key Vocabulary	
Addiction	Means not having control over doing, taking or using something harmful.
Passive smoking	Is also known as second-hand smoke (SHS) or Environmental smoke.
Lung cancer	Uncontrolled cell growth (a tumour) in the lungs
Emphysema	Chronic lung disease also known as lung rot
Heart attack	When a part of the heart muscle dies
Stroke	Blood clot in the brain
Gangrene	When a part of the body becomes starved of oxygen and starts to rot
Unit	An alcoholic unit of measurement
Depressant	The effect alcohol has on your system
Intoxication	When the body is poisoned and the person's physical and mental control is reduced.
Alcohol abuse	Excessive use of alcohol
Binge drinking	Drinking 5 or more alcoholic units in one go

Key Knowledge

Smoking and alcohol are both legal but extremely addictive.

Smoking can cause:

Lung disease
Cancer
Emphysema
Gangrene
Stroke
Heart disease

Alcohol
Is also very addictive and is a depressant.

Men should drink no more than 3-4 units per day
Women should drink no more than 2-3 units per day

The negative impact of alcohol can include:

Anti-social behaviour
Throat cancer
Cirrhosis of the liver
Alcoholism
Debt
Injuries
Family breakdown
Stress
Underage sex
Violence

Year 9 Personal Development Curriculum

Gang Exploitation

Key Vocabulary	Definition
Exploitation	The act of selfishly taking advantage of someone or a group of people in order to profit from them
Grooming	When someone builds a relationship, trust and emotional connection with a child or young person so they can manipulate, exploit and abuse them
County lines	Where illegal drugs are transported from one area to another, often across police and local authority boundaries

Where to get help:
NSPCC: https://www.nspcc.org.uk/what-is-child-abuse/types-of-abuse/gangs-criminal-exploitation/
Childline – 0800 1111 www.childline.org.uk
#knifefree website - www.knifefree.co.uk
Fearless (crime stoppers) – www.fearless.org
Victim support – www.victimsupport.org.uk

Key Knowledge

What is a gang?
Some gangs take part in criminal activity and might try to get you involved with them.
Sometimes you can be forced to commit a crime or do things that are unsafe.

Why do people join gangs?
fitting in with friends and other gang members
having the same interests as other people, like sports or music
feeling respected and important
to be protected from bullying or from other gangs
making money from crime or drugs
gaining status and feeling powerful

Is it illegal being in a gang?
Being in a gang isn't against the law.
But being involved with illegal activities (that some gangs do) could be an offence.
You could go to prison or end up with a criminal record if you're involved with:

gun and knife crime
violence or harassment
turf wars or postcode wars
carrying, using or selling drugs
theft or other illegal activities
assault of others.

If you have a criminal record you might not be:
accepted into a university, college or higher education
able to get a job, internship or do work experience
allowed to travel to some countries, like the USA.

Year 9 Personal Development Curriculum

Setting goals/ what are my goals?

Key Vocabulary	Definition
Talent	A good or beneficial quality or attribute of a person or thing."
Quality	Advantage, asset, talent, gift, skill, specialty.
Strength	The ability to be able to do something well
Motivation	A reason or reasons for acting or behaving in a particular way.
Attitude	A settled way of thinking or feeling about something

Key Knowledge

Personal goals are the expressions of the things you want to achieve for yourself in life, whether those are business goals, family goals, or lifestyle goals. When you think about what you want to achieve in life and set goals towards achieving them, you will become more self-motivated and positive.

List of strengths;

Able to handle conflict
Able to make decisions
Adaptable and willing to change
Using IT
Creative Writer
Artistic
Committed
Competitive
Organised
Creative
Determined
Enthusiastic
Able to use initiative
Clear judgement
Quick thinking
Confident
Sensitive to other people and situations
Has strength of will
Manage money
Athletic
Punctual
Speak another language

Year 9 Personal Development Curriculum

Topic: Goal Setting for GCSEs

Key Vocabulary	
GCSE	The **General Certificate of Secondary Education** (**GCSE**) is an academic qualification in a particular subject, taken in England, Wales, and Northern Ireland.
Goal	the object of a person's ambition or effort; an aim or desired result.
Attainable	achievable.
Relevant	closely connected or appropriate to what is being done or considered.
Prepared	to be ready.
Ambition	desire and determination to achieve success.
Organisation	planning and arranging.
Qualification	a pass of an examination after completing a course.
Obstacle	a barrier that prevents progress.

Key Knowledge

GCSE is an academic grading criteria and it holds a total of 9 grades.

They are classed as Level 2 Qualifications

GCSEs are calculated by a mixture of coursework and exams and the grades have to be specific in order to opt for a better career! (The Parent Point)

There are almost 50 different subjects offered in GCSE courses to choose from.

GCSE was originally introduced back in 1986, as a replacement for the previous O levels and CSE systems by merging both of these together.

Universities and employers will look at look at GCSE grades in Maths, English and, sometimes, Science.

Year 9 Personal Development Curriculum

Topic: Post 16 opportunities

Key Vocabulary	
Vocation -	A strong feeling of suitability for a particular career or occupation.
Career -	An occupation undertaken for a significant period of a person's life and with opportunities for progress
Job	A paid position, not necessarily part of or leading to a career.
Apprenticeship	An **apprenticeship** is a real job where you learn, gain experience and get paid. You're an employee with a contract of employment and holiday leave
A-levels	Academic qualifications you can complete at college or 6th form.
Vocational Qualifications	**Vocational qualifications** are work-related **qualifications that can be studies at 6th Form or college in subjects such as Business, Construction, Health and Social care etc.**

Key Knowledge

Post 16 opportunities refers to your plans for education or career opportunities after you have left school.
The main post 16 options are:

Full time education at a school or college e.g. A Levels or Vocational Qualifications;

A 'T Level'- New two year Level 3 qualifications - equivalent to 3 x A levels, delivered in college and related to a job role

An apprenticeship or traineeship
Part time education or training - this must be in addition to employment, self-employment or volunteering for a minimum of 20 hours per week.

Links to support

https://www.bbc.co.uk/bitesize/careers

https://www.careerpilot.org.uk/

Additional Videos

https://www.bbc.co.uk/bitesize/careers

Year 9 Personal Development Curriculum

Topic: What is Marriage

Key Vocabulary	
Marriage	A legal Union between a man and a woman (same sex couples in England / Wales / Scotland / Northern Ireland)
Forced marriage	a marriage where one or both people do not consent to the marriage and pressure abuse is used.
Arranged marriage	A marriage planned or agreed by families or guardians of the couple concerned, to which both individuals' consent.
Nullified	Make legally null and void; invalidate

Key Knowledge

Marriage is legally binding

The legal age of marriage is 18

A couple / individual can get married at the age of1 6, with parental or legal guardian's consent

Forced marriage is illegal

Arranged marriage is legal

A couple or person in a civil partnership cannot remarry or enter another civil partnership without having it legally nullified.

A marriage should always be entered into freely.

Reasons to get married – love / friendship / to build a family / happiness / share a life together

Reasons not to get married – getting too old / because of unplanned pregnancy / to prove something / to take care of someone / feel self-worth.

A marriage should be entered into freely – with consent, with choice, legally, with trust and your decision.

Different Types of relationships

Importance of marriage in the Catholic Church

Marriage is a sacrament

An outward way of showing your love and commitment to another person

For Catholics sex should only occur within a marriage as humans are in God's image it makes the act sacred and essential to the marriage

Vows are taken before God

Allows for a stable environment for children to be brought into the relationship

Same Sex Marriage/Civil Partnership

Civil Partnership

Civil Partnership came into law in England and Wales in 2004

A Civil partnership is a legally recognised union with similar rights to marriage for same sex couples

Same Sex Marriage

Same Sex Marriage came into law in 2013 but the first marriages did not take place until March 2014

It allows Religious Organisations to opt into same sex marriage

It also protects Religious Organisations from legal action if they do not want to perform same sex marriage

It allows those with civil partnerships to change to married status

It allows one married partner to change their legal gender without having to end their marriage

Contraception

Key Words	
Conception	The moment that a pregnancy begins The fertilization of an egg.
Contraception	Something used to prevent pregnancy from occurring
Contrary	Totally against an idea or belief
STI	Sexually Transmitted Infection. An infection that is easily passed from one to another through sexual activity

Key Knowledge

Contraception is the name given to any method used to prevent becoming pregnant or 'conceiving' from sexual relationships

Contraception is used to prevent accidental or unwanted pregnancy

Some contraception is used to prevent passing on of STI's

Contraception is about reducing the risk of sexual activity to enable its use more for pleasure than for reproduction

No method of contraception is 100% effective

Some contraception is designed to prevent any sperm from being able to penetrate and fertilise the egg.

Some contraception is designed to prevent egg production

Some contraception is designed to prevent the fertilised egg attaching to the womb.

Most contraception is temporary but some are permanent

It is **contrary** to the idea of **conception**

Contraception - Types

Type	How it works
Abstinence	Not engaging in any sexual activity
Cap / Diaphragm	A circular dome made of thin, soft silicone that's inserted into the vagina before sex. Covers the cervix so sperm cannot get into the womb to fertilise an egg.
Combined Pill	Often just called "the pill" Contains artificial versions of female hormones oestrogen and progesterone, which are produced naturally in the ovaries.
Condoms	The only type of contraception that can both prevent pregnancy and protect against STI's There are 2 types: external condoms, worn on the penis – sometimes called male condoms female condoms, worn inside the vagina – sometimes called female condoms Made from very thin latex, designed to stop semen from coming into any contact with the other person.
Contraceptive Implant	A small flexible plastic rod placed under the skin in your upper arm by a doctor or nurse. Releases the hormone progestogen into your blood to prevent pregnancy lasts for 3 years
Contraceptive Patch	A small sticky patch that releases hormones into your body through your skin to prevent pregnancy
Contraceptive implant	Releases progestogen into your bloodstream to prevent pregnancy. Lasts for 8 - 13 weeks depending on type

Contraception - Types

Type	How it works
Intrauterine device (IUD) "Coil or Copper-coil"	A small T-shaped plastic and copper device that's put into the womb by a doctor or nurse. It releases copper to stop you getting pregnant, and protects against pregnancy. Lasts between 5 and 10 years. It's sometimes called a "coil" or "copper coil".
Intrauterine system (IUS)	A small, T-shaped plastic device that's put into the womb by a doctor or nurse. It releases the hormone progestogen to stop you getting pregnant. It lasts for 3 to 5 years, depending on the brand.
Natural Family Planning	A method of contraception where a woman monitors and records different fertility signals during her menstrual cycle to work out when she's likely to get pregnant.
Progestogen-only pill	Prevents pregnancy by thickening the mucus in the cervix to stop sperm reaching an egg. One brand can also stop ovulation. Needs to be taken every day for it to work.
Vaginal Ring	Inserted in the vagina and releases hormones into the blood stream to prevent pregnancy
Female Sterilisation	An operation to permanently prevent pregnancy. The fallopian tubes are blocked or sealed to prevent the eggs reaching the sperm
Male Sterilisation "Vasectomy"	A surgical procedure to cut or seal the tubes that carry a man's sperm.

STI's – Sexually Transmitted Infections

Keywords	
Common STI's	Types of infections that are caught through sexual contact
Chlamydia	A bacterial infection. The bacteria are usually spread through sex or contact with infected genital fluids
Gonorrhoea	Gonorrhoea is a sexually transmitted infection (STI) caused by bacteria called Neisseria gonorrhoeae or gonococcus**.**
Genital Warts	Are small fleshy growths, bumps or skin changes that appear on or around the genital or anal area
Genital Herpes	Asexually transmitted infection (STI) passed on through vaginal , anal and oral sex.
Pubic Lice	**Pubic lice**, also known as **crabs**, are very small insects that infest your genital area
Scabies	Intense itching, especially at night; a raised rash or spots
Syphilis	The main symptom is a small, painless sore or ulcer called a chancre that you might not notice

Key Knowledge

STI is a Sexually Transmitted Infection
This is an infectious disease that is often spread through sexual activity

What I need to know

Anyone who is sexually active is at risk of STI's
The risk of getting an STI can be reduced by:

- Limiting sexual partners and activity
- Using Barrier contraception e.g condoms
- Abstaining from Sexual activity outside of a stable relationship

If you have an STI you need to:

- Stop engaging in sexual activity until you are free from infection
- Seek medical advice and treatment
- Inform previous sexual partners who may have been infected.

Contraception – Religious view

The Catholic Church

The Catholic Church **does not** support the use of artificial contraception
The Catholic Church **does accept** Natural Family Planning and abstinence as ways to control pregnancy
All sexual activity is **naturally driven to procreation** and not towards self satisfaction.
To prevent what is a natural outcome prevents the Will of God.

The Church teaches that any act of sexual activity that is not open to new life is a misuse of love.

Any sexual activity outside of married life is considered by the church as **promiscuous.**

The Church teaches that sexual love is between married persons with the intention to bring new life onto the earth.

> "When couples turn to contraception … they manipulate and degrade human sexuality – and with it themselves and their married partner – by altering its value of total self-giving…
> …This leads not only to a positive refusal to be open to life but also a falsification of the inner truth of conjugal love, which is called upon to give itself in personal totality."
>
> **Pope John Paul II**
> **Familiaris Consortio**

Contraception – Religious view

The Church of England

The Church of England and wider Anglican community **do not promote, but do accept** the use of artificial contraception.

This has only been **since the 1930's**, before this they were also against its use.

Although they accept its use, **they uphold the Christian principles** of sexual activity being for the main purpose of life.

> The Conference agrees that other methods may be used, provided that this is done in the light of Christian principles.
>
> **Lambeth Conference, 1930**

Islam

Islam is fundamentally **pro-family**, and regards **children as a gift from God.**

Islamic teaching forbids sexual activity outside of marriage, and should only **understand its contraception laws within the confines of marriage.**

Most Islamic thinking permits the use of contraception within marriage

Islamic Law forbids the permanent types of contraception

Islamic law **forbids the use of early abortion** as a form of contraception

Different Types of Relationship

How the media portrays sex

There are many types of media that young people are influenced by today;

TV and Film

Represents sex and sexual encounters in many different ways

However within the film and TV industry there is a huge difference between the way male and female nudity is shown

Social Media

With access to social media anywhere on mobile devices people can post and send items that are not reflective of either the male or female body

This can also lead to misinformation and unrealistic expectations

Legal rites of marriage and long term partnerships

Marriage

If one partner dies before making a will some or all of the estate will go to the living partner

Responsibly to support each other financially

You have the right to stay in the marital home until a court tells you otherwise

Items belong to both partners

Married couples can claim a marriage allowance

Living Together

If one partner dies before making a will you may have to go to court to claim some of the estate or it may be passed onto other family

No responsibly to look after the other financially

If your partner owns the house and asks you to leave you may have no right to stay

Items usually belong to the person who purchased them

Year 9 Personal Development Curriculum

Topic; The family Unit

Key Vocabulary	
Family unit	A group of one or more parents and their children living together as a unit
Single parent family	a **parent** who lives with a child or children and no husband, wife, or partner.
Civil partnership family	- is a legal relationship which can be registered by two people who aren't related to each other (same or opposite sex) who are bringing up a child or children together
Cohabiting family -	couple would be defined as a couple who aren't married but who are living together and raising a child or children together.
Parental Responsibility	**-** attempts to focus on the **parent's duties** towards their child rather than the **parent's** rights over their child

Key Knowledge

What is the role and responsibility of a parent?

Parental responsibility means the legal rights, **duties**, powers, **responsibilities** and authority a **parent** has for a child and the child's property.

A person who has **parental responsibility** for a child has the right to make decisions about their care and upbringing.

What does successful parenting look like ?

Being a **good parent** means you need to teach your child the moral in what is right and what is wrong. Setting limits and being consistent are the keys to **good** discipline.
Be kind and firm when enforcing those rules. Focus on the reason behind the child's behaviour

Year 9 Personal Development Curriculum

Topic; Homelessness

Key Vocabulary	
Homelessness	Lacks a fixed, regular, and adequate night-time residence
Sofa Surfing	The practice of staying temporarily with various friends and relatives while attempting to find permanent accommodation

Key Knowledge

Kinds of situations why you can become homeless – they don't have to be all negative – a lot of famous people have had periods of their life, to pursue their career. moving in with partner, pursuing a career, moving out to continue education, separation, job loss.

Why might a young person become homeless – or... choose to leave their family home away from parent or guardian. To take on an apprenticeship, live with partner, education, family fall out, separation or divorce and move of house. Cramped living conditions or volatile parent / child relationship.

Benefits of a young person leaving the home – being more independent / apprenticeships / education or scholarships / moving in with a partner

Challenge of a young person leaving the home – financially difficult, who is going to pay for the necessity's food, phone, housing or rent, leaving themselves vulnerable if they have nowhere to stay and being on the streets.

Year 9 Personal Development Curriculum

Topic; Conflict

Key Vocabulary	
Conflict	Is a disagreement where there is tension. A disagreement becomes 'conflict' when the two people get tense and take a position. For example, starting to argue.
Disagreement	A dispute, where there is a lack of agreement and a difference of opinion. Not all disagreements lead to conflict.
Inevitable	A situation which is certain to happen, it is unavoidable. Conflict is an inevitable part of our lives.

Key Knowledge

Kinds of situations why you can become homeless – they don't have to be all negative – a lot of famous people have had periods of their life, to pursue their career. moving in with partner, pursuing a career, moving out to continue education, separation, job loss.

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Year 9 Personal Development Curriculum

Topic – Health and Wellbeing (Mental Health)

Key Vocabulary	
Mental Health	A person's condition with regard to their psychological and emotional well-being.
Emotional Wellbeing	Your ability to understand the value of your emotions and use them to move your life forward in positive directions. It involves identifying, building upon, and operating from your strengths rather than focusing on fixing problems or weaknesses.
Misconceptions	a view or opinion that is incorrect because based on faulty thinking or understanding.
Discrimination	**T**he unjust or prejudicial treatment of different categories of people, especially on the grounds of race, age, sex, or disability.

Key Knowledge

One in four people experience a mental health problem each year.

This shows that mental health problems are more common that you may think.

The same statistic for children is one in eight which is less common, although this figure is growing

Most treatment for people with mental health conditions is community based, including talking therapy, group counselling or medication.

Some mental health conditions require treatment in a specialised treatment centre or hospital, but these are almost always voluntarily chosen by the person involved or their family

Year 9 Personal Development Curriculum

Topic – Health and Wellbeing (Diet)

Key Vocabulary	
Health	A person's mental or physical condition
Healthy behaviours	Actions taken by individuals to aid their health
Self-esteem	Your own feelings about your sense of worth, value or ability.
Body image	How you see yourself when you look in the mirror. How you picture yourself in your mind.
Advertising	The activity or profession which produces materials to persuade people to be influenced often to buy products
Social media	Websites and Apps which allow users to create/share content and participate in social networking
Influence(s)	The ability to have an effect on the behaviour of someone or something
Peer Pressure	The influence from people your own age. This can be positive and negative.

Key Knowledge

There are **seven** essential factors for a **balanced diet**. They are carbohydrates, protein, fat, fibre, vitamins, minerals and water

We should eat at least 5 portions of a variety of fruit and vegetables every day

It is harder to make healthy food choices if they are not offered. Often junk food is advertised exclusively. This increases the chance of someone selecting unhealthy options, as people need to actively avoid junk food when it is offered, instead of choosing healthier options.

Advertisers often use the need for peer approval to sell products. Products that are advertised may be more popular and young people can feel pressure to buy these products.

This pressure in itself can be damaging to health. It can also mean we compromise our health in other ways, as we have less income available for the things which support our health.

Money cannot make a person healthy (e.g. overwork to attain more, overindulgent lifestyle). However, lack of funds to ensure good accommodation, food to eat, the ability to engage in health-promoting leisure activities etc. does have an impact. Improved employment prospects, thereby reduce health inequalities.

Hobbies and interests can have a positive or negative impact on body image and mental health. For example, hobbies can provide self-esteem if we do well at them and/or enjoy them with friends.

Year 9 Personal Development Curriculum

Topic – Health and Wellbeing (Healthy Choices Community Level)

Key Vocabulary	
Health	A person's mental or physical condition
Healthy behaviours	Actions taken by individuals to aid their health
Health Promotion	An activity that seeks to improve a person's or population's health by providing information about and increasing awareness of at-risk behaviours associated with various diseases, to reduce those behaviours.
Strategies	A plan of action to achieve something
Social Action	Individual or group behaviour that involves interaction with other individuals or groups, especially organised action toward social reform
Social Reform	When individuals and groups seek to change the social and political views of groups who appear to be treated unfairly.

Key Knowledge

Social action and legislation can make a difference to local and national communities.

The Middlesbrough literacy project - high levels of literacy linked to improved communication which increases self-esteem and provides better ability to access opportunities (e.g. better jobs and housing) which in turn promotes better health. http://www.health.org.uk/blog/building-literacy-better-health-middlesbrough

Sugary drinks tax to be paid by soft drinks companies on their products from April 2018.

https://www.gov.uk/guidance/soft-drinks-industry-levy

Year 9 Personal Development Curriculum

Topic – Health and Wellbeing (Sleep)

Key Vocabulary	
Health	A person's mental or physical condition
Sleep	A state marked by reduced consciousness and activity of the skeletal muscles, and depressed metabolism. People normally experience sleep in patterns that follow four observable, progressive stages.
Rest	To stop work or movement in order to relax, sleep, or recover strength.
Relax	Rest from work or to engage in an enjoyable activity so as to become less tired or anxious
Routine	A regular sequence of actions that you follow. For example, your school routine, your timetable, lunch sittings. Sleep routine – when you sleep and wake
Bedtime	The usual time you go to bed
Caffeine	Usually a drink which is made from tea/coffee plants. These drinks stimulate (fuel) the nervous system.
Habit	Something you do which is hard to give up

Key Knowledge

Teenagers need approximately 9 hours of sleep per night.

Many are averaging approximately 7 hours.

After puberty, the internal clock of an adolescent undergoes a biological shift of up to 2 hours later.

The time that teenagers naturally wake up also shifts by up to 2 hours later.

Teenagers will benefit from a regular sleep schedule.

The time before bed (at least 60 minutes) should allow for winding down and must avoid screen use (e.g. TV, phones, tablets etc.).

Teenagers should avoid caffeinated or high-sugar products such as fizzy drinks, tea or coffee and sweets.

Spending time outdoors every day (especially in the morning) can be beneficial to sleep.

Year 9 Personal Development Curriculum

Topic – Health and Wellbeing

(Lock the phone away)

Key Vocabulary	
Teen Tendonitis	A condition which causes pain in the hands, back and neck
Stress	A state of mental or emotional strain or tension resulting from adverse or very demanding circumstances
Anxiety	A feeling of worry, nervousness, or unease, typically about an imminent event or something with an uncertain outcome
Cyber-bullying	the use of electronic communication to bully a person, typically by sending messages of an intimidating or threatening nature

Key Knowledge

Excess messaging can lead to Teen Tendonitis (TTT). It causes pain in the hands, back, and neck due to poor posture. According to a five-year cohort study, excessive mobile phone usage is known to result in bone disorders

You can spend all day talking or texting instead of doing productive things. Studies have proven that teens who spend too much of their time with their mobile phones are more prone to stress, anxiety, and depression.

Research has also found that excessive use of smartphones may result in an increased risk of mental health problems.

Keeping mobile phones nearby while sleeping to respond to texts and calls and remain reachable around the clock. This may lead to sleep interruption and disruption.

Relying on texting as a primary mode of communication can increase anxiety in teens. Texting is instantly gratifying, but it also produces anxiety. The instant reply by a friend can bring joy and elation. But in case of delayed response or no response, this same pleasure can turn into disappointment.

It can turn into an obsession to check messages and reply immediately. It may also increase anxiety by creating an illusion that they had received a message even when there was no message, making them frequently check their phones

Year 9 Personal Development Curriculum

Topic – Health and Wellbeing (First Aid)

Key Vocabulary	
First Aid	Help given to a sick or injured person until full medical treatment is available.
First Aid Kit	A small box containing items such as bandages, plasters, and antiseptic wipes for use in giving help to a sick or injured person until full medical treatment is available
Preserve	To keep something as it is, especially in order to prevent it from decaying or being damaged or destroyed.
Prevent	To stop something from happening or someone from doing something
Protect	To keep someone or something safe from injury, damage or loss
Defibrillator	A **defibrillator** is a device that gives a high energy electric shock to the heart of someone who is in cardiac arrest

https://www.bhf.org.uk/how-you-can-help/how-to-save-a-life/defibrillators

Key Knowledge

The three main aims of First Aid are (The Three Ps) to;

Preserve Life,

Prevent the condition getting worse and

Promote Recovery.

The Roles and Responsibilities of the First Aider are;

Manage the incident and ensure the continuing safety of themselves, bystanders and the patient

Assess victims and find out the nature & cause of their injuries

Arrange for further medical help or other emergency services to attend

If trained, prioritise casualties based upon medical need

Provide appropriate first aid treatment as trained

If able, make notes/observations of casualties

Fill out any paperwork as required

Provide a handover when further medical help arrives

Defibrillators can be found in all public buildings (including schools) - you can find locations in here:

https://www.heartsafe.org.uk/aed-locations

Year 9 Personal Development Curriculum

Topic – Relationships and Expectations (Intimate Relationships)

Key Vocabulary	
Relationship	The way in which two or more people or things are connected, or the state of being connected
Intimate Relationship	An intimate relationship is personal relationship that involves physical or emotional intimacy. Although an intimate relationship may be a sexual relationship, it may also be a non-sexual relationship involving family, friends, or people you just know.
Assertive	Someone who is assertive behaves confidently and is not frightened to say what they want or believe.

Key Knowledge

Saying No assertively is ok.

Remember that you always have a right to say 'no'.

You are saying "no" to the request – not rejecting the person

If the request takes you by surprise or you need more information you should ask.

If you are feeling pressured, start your reply with a clear, firm 'no' or something similar e.g. 'I don't want to' or 'whoa, stop'

Reflect the feelings of the other person if you want to (e.g. I can see you're angry/upset/surprised but….)

Do not feel you need to justify your choice. If they argue about your reasons, just say they may disagree but it's your decision.

Don't leave the situation open, change the subject, walk away, continue with what you are doing etc

Remember you can be kind without giving false hope that you'll change your mind.

"I'd love to go out with you but I don't date classmates in case things get complicated."

Or

"Thank you for thinking of me but I don't see us as a good fit together. I hope you find someone else to take to the cinema."

Year 9 Personal Development Curriculum

Topic – Relationships and Expectations

(Media Portrayal of Relationships)

Key Vocabulary	
Media	The main means of mass communication (broadcasting, publishing, and the internet) regarded collectively.
Media Portrayal	The way the Media represents particular groups, communities, experiences, ideas, or topics.
Indecent Images	Private images/videos often online without the consent of the individual in the image
Pressure to conform	The direct influence on people by peers, or the effect on an individual who is encouraged and wants to follow their peers by changing their attitudes, values or behaviours to conform to those of the influencing group or individual.

Key Knowledge – Effect of the Media on Relationships

We are ignoring each other in person.

If we don't want these special moments with our partners to disappear, we should be making a conscious effort to put our phones down and engage in conversation with our loved ones.

'Fake' relationships are making us feel inadequate.

The problem with social media is that everybody wants to come across as if they are perfect; they want us to think they have the perfect job, the perfect relationship, and an all-round perfect life. They appear almost too good to be true, leaving many feeling inadequate and unsatisfied with their own reality.

We are stalking each other.

People are becoming obsessed with 'stalking' their love interests, whether in a relationship with them or not. Information about people's whereabouts and when they were last 'active' is so readily available that people are checking up on their partners' every move.

If you don't love yourself, how can you expect someone else to?

Many studies have shown that there has been a correlation between the rise in depression and the increase in social media use. It is affecting our self-esteem and teaching us to constantly compare the way we are to others online.'

Exposure to photo-shopped and filtered photos has left many people questioning their own appearance. Unfortunately, this has impacted on the way that they are in relationships.

Year 9 Personal Development Curriculum

Topic – Relationships and Expectations

(Attraction to others)

Key Vocabulary	
Attraction	The action of liking someone/something
Rejection	Turning down someone's affections
Self-Esteem	A person's idea of their own self-worth
Possessive	Demanding someone's total attention and love
Obsessive	Being totally focussed on someone/something

Key Knowledge – Spotting toxic friends and partners

Your partner is possessive

Even if your friend/partner is incredibly nice, they might still be controlling to an unhealthy point. Sometimes, teens who are jealous make demands such as a partner no longer use social media or no longer wear certain types of clothing that might attract attention.

You change your habits

It's never bad to grow as a person or try to eliminate bad habits. However, it's not healthy for a person to change who they are for someone else. If you giving up some of their favourite hobbies, changing the way you dress, or altering your personality, it could be a sign that your partner doesn't appreciate you for who you are. Without appropriate intervention, you might lose your sense of identity.

Unexplained injuries

Never be embarrassed, afraid, or protective of your partner to come forward if he/she is physically or mentally harming you.

Constantly checking in

Technology is changing teen romance and friendship, and not always in a healthy way. Insecurity and jealousy may lead a teen to demand a partner check in all the time. If you don't respond to a text message right away, and your partner calls you incessantly. This is not healthy.

Smartphones make it easy for teen relationships to become unhealthy, as a partner may insist on constant text message contact or frequent social media updates

Year 9 Personal Development Curriculum

Topic – Relationships and Expectations (Consent)

Key Vocabulary	
Consent	Is when you give permission or agreement
Choice	The act of choosing, making a decision
Freedom	The condition or right of being able or allowed to say, think what you want to without being controlled or limited.
Capacity to Consent	Whether someone is able to consent to a situation if s/he was under the influence of drink or drugs; s/he suffers from a medical condition which limits their ability to consent or communicate consent; s/he has a mental health problem or learning disabilities; s/he was asleep or unconscious.
Manipulation	Controlling someone to your own advantage, unfairly or dishonestly
Assume	To accept something to be true, without question or proof

Key Knowledge – Consent

Intoxication: Being intoxicated can mean that someone is more vulnerable. However, this in no way excuses someone who takes advantage of another's vulnerability for their own purposes.

Being intoxicated also means someone is less able to recognise the signs of non-consent.

Getting someone drunk (or intoxicated using any substance) for the purpose of sex is illegal.

Taking advantage of another's vulnerability, regardless of the cause, for the purpose of sex is also illegal. Lies and withheld information:

Telling lies which lead to someone else engaging in sexual activity with you is manipulation and can be a very serious criminal offence.

While people may not always share everything about themselves with their partners, withholding information about something which one could reasonably expect would change the other's mind about engaging in a sexual activity is wrong and could be a serious criminal offence.

Bribery and manipulation: It is a serious criminal offence to manipulate a person into engaging in sexual activity through bribery or threats.

Year 9 Personal Development Curriculum

Topic – Relationships and Expectations

(Sharing of Sexual Images)

Key Vocabulary	
Sexting	Sexting means sending indecent images (pictures and/or videos) of **yourself** or **others** or sending sexually explicit messages.
Intimate Images	Images of female/male genitals, breasts and bottoms
Indecent Images	As above, but mainly in relation to children. These images are downloaded and stored. This is illegal.

Key Knowledge – Sexual Images

In the UK the age of consent for sexual intercourse is 16. However, it is an offence to make, distribute, possess or show any indecent images of anyone aged under 18, even if the content was created with the consent of that young person. The law is contained in **section 1 Protection of Children Act 1978**.

If you've sent a nude and you're worried about what might happen, there are things you can do:

Ask for the message to be deleted
Explain that you're not comfortable with them keeping the picture and ask them to delete it.

Don't reply to threats
Don't reply to someone trying to threaten or blackmail you, and don't send more photos. It can be scary, but it can help you to keep in control

Talk to someone you trust

Talking can be scary, especially if you're being threatened. But it can also help you get support and stay in control.

Report what's happened
If you're under 18 and you're worried or being threatened you can make a report to CEOP. Making a report isn't confidential but it does mean that they can help to stop what's happening.

Get help with how you're feeling
Having a nude shared by other people or being threatened isn't your fault. If you're struggling to cope or you don't know what to do talk to a trusted adult.

Year 9 Personal Development Curriculum

Topic – Relationships and Expectations (Personal/Emotional Boundaries)

Key Vocabulary	
Emotion	A strong feeling that comes from the situation you are in, your mood and relationships with others.
Boundary	A line which marks the limits of something. A boundary has been crossed for example, when you tell someone "You have crossed the line".
Emotional Boundary	An emotional boundary is a limit we establish to protect ourselves from being hurt, manipulated, or used by others. It is an expression of self-worth that helps people understand who we are, what we think, and how we feel. Boundaries create needed emotional space between us and others.

Key Knowledge – Personal and Emotional Boundaries

Learning how to set and maintain emotional boundaries is an important part of growing up.

It is also a key to developing relationships that are supportive, caring, and respectful.

These kinds of positive relationships create the foundation for lifelong happiness.

Healthy emotional boundaries are essential to healthy relationships. It means we know and understand our limits and those limits are clearly and honestly communicated.

Setting healthy boundaries helps preserve one's integrity and increases resilience.

Communicating a boundary does not mean "I'm right and you are wrong." It simply means, "This is what I need to feel positive about myself and respected by you."

Year 9 Personal Development Curriculum

Topic – Employability Skills (Employability & Online Presence)

Key Vocabulary	
Online profile	An individual's **online presence** is the combined content about them online. This could include their own social media profiles and websites, or references to them in content created by other people.
Personal strengths	Strengths are tasks or actions you can do well. These include knowledge, skills, and talents. People use their traits and abilities to complete work, relate with others, and achieve goals.

Key Knowledge

What someone is comfortable with sharing online will vary from person to person. For example, sharing political opinions can be both positive or harmful depending upon how and where these opinions are expressed, the nature of the opinion and whether it matches with the reader's own views.

It is important to realise that people will often disagree with the opinions of others, that disagreements can be managed respectfully and that there are safe ways to report discriminatory, inappropriate, or upsetting content.

Social media can be used whilst still maintaining an element of privacy.

Be careful with social media accounts to keep control over personal information that is shared with the outside world, including with potential clients or employers.

Making accounts that share personal information private can limit the audience different material reaches, however you should note that this could still be shared to a wider audience by members of groups or people they connect with through these accounts.

Year 9 Personal Development Curriculum

Topic – Employability Skills (Employability & Online Presence)

Key Vocabulary	
Views	A particular way of considering or regarding something; an attitude or opinion
Values	A person's principles or standards of behaviour; one's judgment of what is important in life
Online Reputation	An online reputation, or e-reputation, is the reputation of a company, person, product, service or any other element on the Internet and digital platforms.
Digital Footprint	The information about a particular person that exists on the internet as a result of their online activity

Key Knowledge

A person's views and values expressed through social media can contribute to their online reputation in both a positive and negative manner.

Sharing memes or posts about social issues can create the impression that a person holds a particular value and these values can be reflective of that person's personality or work ethos.

Sharing material now can affect a person in the future, in terms of their career.

Posts and media shared now can still be found online years later.

Once material has been shared, it leaves the person's control and becomes part of their 'digital footprint' which is trackable and contains everything about that person online, including pictures, posts, messages or other content.

Students should bear in mind that this content might be misunderstood or taken out of context, or their views may change, so the old content no longer reflects their values or opinions.

Individuals sharing views on social media can affect how the employer they work for is perceived.

Students should consider how the posts from the candidates may have reflected on their previous employers.

Year 9 Personal Development Curriculum

Topic – Employability Skills

(The connection between values and goals)

Key Vocabulary	
Values	A person's principles or standards of behaviour; one's judgment of what is important in life
Intrinsic Values	Values which help us to survive modern life, such as making connections with others and developing knowledge
Extrinsic Values	When you think that something only has value when you compare it to what someone else does/has. Having the best trainers, best phone
Values informing career choice	What you choose to pursue as a career may reflect your values. Love animals, concerned about animal values, become a vet.

Key Knowledge

Values about supporting ourselves and others

These are called **intrinsic values** and they help us to fulfil our needs. For example, connecting with others in a community or healthy relationship, or developing our knowledge and skills.

They support our wellbeing and that of others by helping us to learn and grow or connect with each other and our wider world.

Values about comparing an individual to others

These are called **extrinsic values** and they only have value when compared to something external, such as how much money someone has or what clothes they wear.

They often involve competition, and while a little competition can be healthy, too much focus on this can be less helpful to our wellbeing and even damage the environment.

Sometimes people can hold similar values but can act on these in different ways. They may act on these through their career choice, or through other actions in their daily lives.

Year 9 Personal Development Curriculum

Topic – Employability Skills

(The connection between values and goals)

Key Vocabulary	
Values	A person's principles or standards of behaviour; one's judgment of what is important in life
Intrinsic Values	Values which help us to survive modern life, such as making connections with others and developing knowledge
Extrinsic Values	When you think that something only has value when you compare it to what someone else does/has. Having the best trainers, best phone
Values informing career choice	What you choose to pursue as a career may reflect your values. Love animals, concerned about animal values, become a vet.

Key Knowledge

We know that people hold a variety of values as individuals, but communities and organisations can hold **shared values** too.

Sometimes when we share values, we feel more motivated and positive about our work.

When looking for a job, people can consider whether an organisation has values that match with their own.

People might find that they feel more motivated in a career that has values that they agree with.

People might get along well with colleagues that share similar values. They could work well as a team or make lasting friendships at work.

Shared values are one of a number of considerations people have when looking for a job. For example, they will also need to consider:

Whether they have the right skills for the job

If the money they will be paid meets their needs

What values would you expect, or look for, in an organisation you would want to work for?

Year 9 Personal Development Curriculum

Topic – Employability Skills (Transition to KS4 Poem)

How do you think the author of the poem is feeling?

What are their key concerns?

What is there to look forward to about starting key stage 4?

I don't know what I expected,
But this wasn't it at all.
The girls just want to be skinny,
The boys, to be fit and tall.

We've only been gone for one summer,
But just about *everything's* changed;
We're all starting to look a bit different,
And everyone's acting so strange.

Mark's going out with Miranda,
Annabel fancies my mate,
Everything's suddenly harder
Than it was in Year 9 or Year 8.

The teachers keep giving us homework,
And wittering on about grades,
My Mum and my Dad are no better,
Summer memories rapidly fade.

But there are some things I like a bit more now,
We got to pick subjects to drop,
I'm doing more maths (which I love) now,
But art (which I hate) has now stopped.

And I like that we get some more freedom,
Time to learn in a way that we choose,
But it's all a great big shift from last term,
And it's making me slightly confused.

Year 9 Personal Development Curriculum

Topic – Employability Skills

(Choosing a Career)

Key Vocabulary	
Career	An occupation undertaken for a significant period of a person's life and with opportunities for progress.
Career Quiz	There are a number of career quizzes you can complete online. These will help you to find a career that will suit your interests, personality and skill set

Key Knowledge

When we ask people about the most meaningful parts of their life, family, health and work often rank as the top three. Choosing the type of work you'll do, therefore, is arguably one of the most important decisions you can make.

You can begin choosing a career by taking the following steps:

Perform a self-assessment.

Identify your must-haves.

Make a list of jobs to explore.

Research jobs and employers.

Get training (if you need it) and update your resume.

Find and apply for jobs.

Continue growing and learning

Year 9 English Knowledge Organiser

Full academic year

Grammar Skills

Full academic year

CONTENTS

TERM 1

A simple sentence is a complete piece of information. It contains a subject, a verb and sometimes an object.

The pen fell on the floor.

A compound sentence contains two main clauses (like two simple sentences). These are joined with a conjunction: *and, but, so, because*.

Miss Kelly was tired, so she bought a large coffee.

A complex sentence contains a main clause and a subordinate clause.

Whilst it was raining, Mr Thornhill enjoyed a cup of tea in his office.

TERM 2

A comma indicates a pause between parts of a sentence or separates items in a list.

I went to Morrisons and bought linguine, king prawns, garlic and chilli flakes.

A semi-colon can be used between two closely related independent clauses, provided they are not already joined by a coordinating conjunction.

Miss Kureczko was busy; she wouldn't even answer the phone.

A colon is used to precede a list of items, a quotation, or an expansion or explanation.

Monday: the worst day of the week.

ISPACE indicates the various ways you can start a sentence. It stands for –ING verbs, Simile, Preposition, Adverb, Connective, -ED verbs.

–ING verb	-ING verb example: Flying proudly in the wind, the flag reigned over the castle
Simile	Simile example: Like a predator, the child caught the escaping balloon.
Preposition	Preposition example: Turning to my right, I saw the corridor I was meant to walk down.
Adverb	Adverb example: Nervously, the cat padded its way across the room.
Connective	Connective example: Finally, she arrived at her front door.
-ED verb	-ED verb example: Withered, the trees stood like ancient guards.

An apostrophe is used to indicate either possession or the omission of letters.

Apostrophes for possession	Using an apostrophe + s ('s) shows that one person/thing owns or is a member of something.	Recce's ballet class Iqra's bike Jake's pen Jess' room
Apostrophes for contractions	When you combine two words to make a contraction, you will always take out some letters. In their place, use an apostrophe.	they + have = they've are + not = aren't they + will = they'll

A paragraph is a distinct section of a piece of writing, usually dealing with a single theme and indicated by a new line.

New paragraphs should start with a topic sentence, and information within the paragraph should stay focused on that topic.

A helpful way to remember when to start a new paragraph is to learn TiPToP.

Ti - stands for **Time**, so start a new paragraph for a different time period.

P - stands for **Place**, so start a new paragraph for each new place.

To - stands for **Topic**, so start a new paragraph for each new topic, idea or subject.

P - stands for **Person**, so start a new paragraph for each new person or change of speaker in a dialogue.

Reading Skills



Full academic year

CONTENT

TIER THREE VOCABULARY

WORD	DEFINITION
Adjective	A word describing or naming an attribute of a noun.
Adverb	A word that describes how a verb is being done.
Alliteration	The repetition of the same sound in a sequence of words beginning with the same letter.
Allusion	A reference to another literary text, event or person.
Foreshadowing	A warning or indication of (a future event).
First person narrative	When a narrator recounts events from their own point of view using the first person such as "I", "us", "our" and "ourselves".
Genre	A style or category of art, music, or literature.

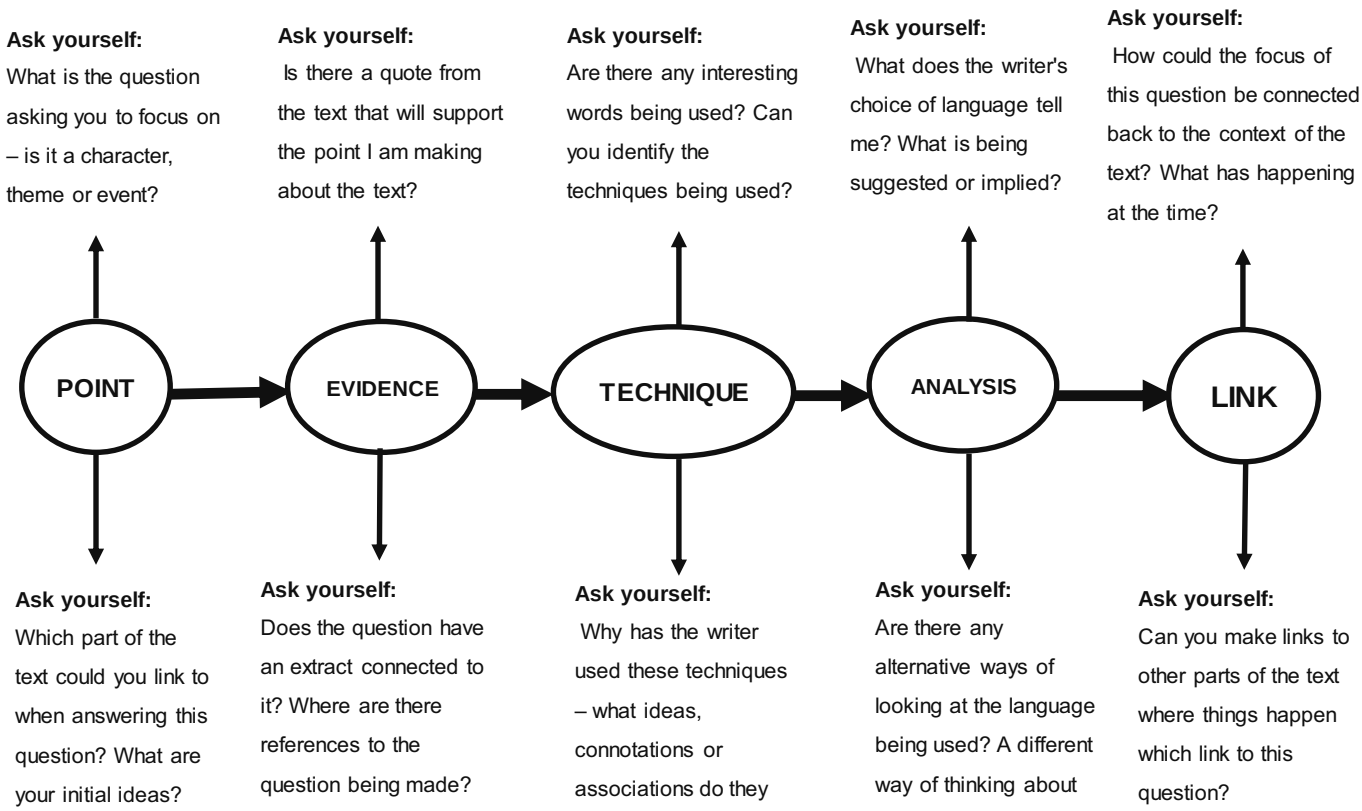
WORD	DEFINITION
Metaphor	A figure of speech in which something is directly compared to something else by saying it is that thing.
Noun	A word used to identify a person, place or thing.
Pathetic fallacy	The use of weather and nature to reflect a character's feelings or the narrative atmosphere.
Personification	The attribution of human feelings and responses to inanimate things or animals.
Simile	A figure of speech involving the comparison of one thing with another thing of a different kind by using 'like' or 'as'.
Symbolism	The use of symbols to represent ideas or qualities.
Third person narrative	When the poet writes about a character who isn't the speaker.
Verb	A word describing an action or how something is done.

TIER THREE VOCABULARY

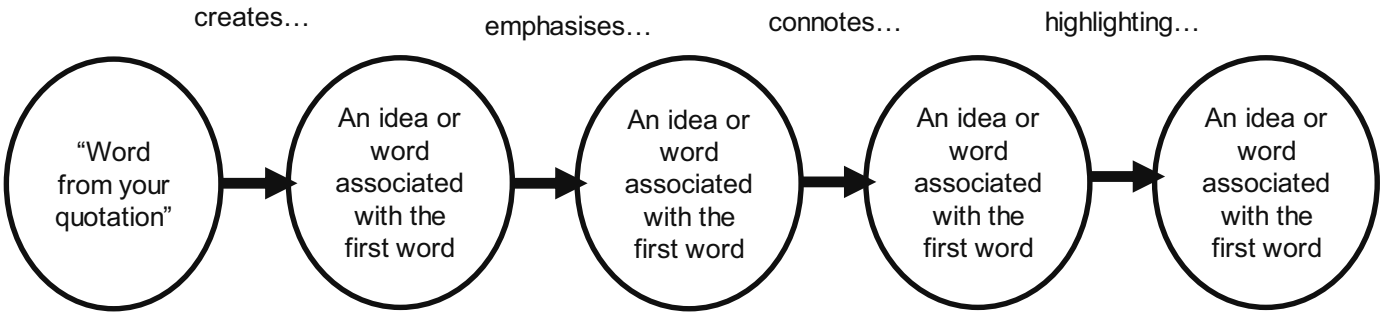
WORD	DEFINITION
Ellipsis	Intentionally leaving out a word, sentence, or whole section from a text for effect.
Emotive language	Words which elicit a powerful emotional response.
Exaggeration	Representing something as being larger, better, or worse than it really is.
Direct address	Referring to the reader directly using the pronouns 'we' or 'you'.
Facts	Something which can be proven to be true.
Knowledge	Knowing the topic/subject you are writing or speaking about.

WORD	DEFINITION
Onomatopoeia	The process of creating a word that phonetically imitates, resembles, or suggests the sound that it describes.
Opinion	A belief which cannot be proven to be true.
Oxymoron	A figure of speech in which apparently contradictory terms appear in conjunction.
Pun	A joke using the different possible meanings of a word or the fact that there are words which sound alike but have different meanings.
Repetition	Where a word or phrase is used more than once across a text for effect.

RESPONDING TO A TEXT



FINDING CONNOTATIONS

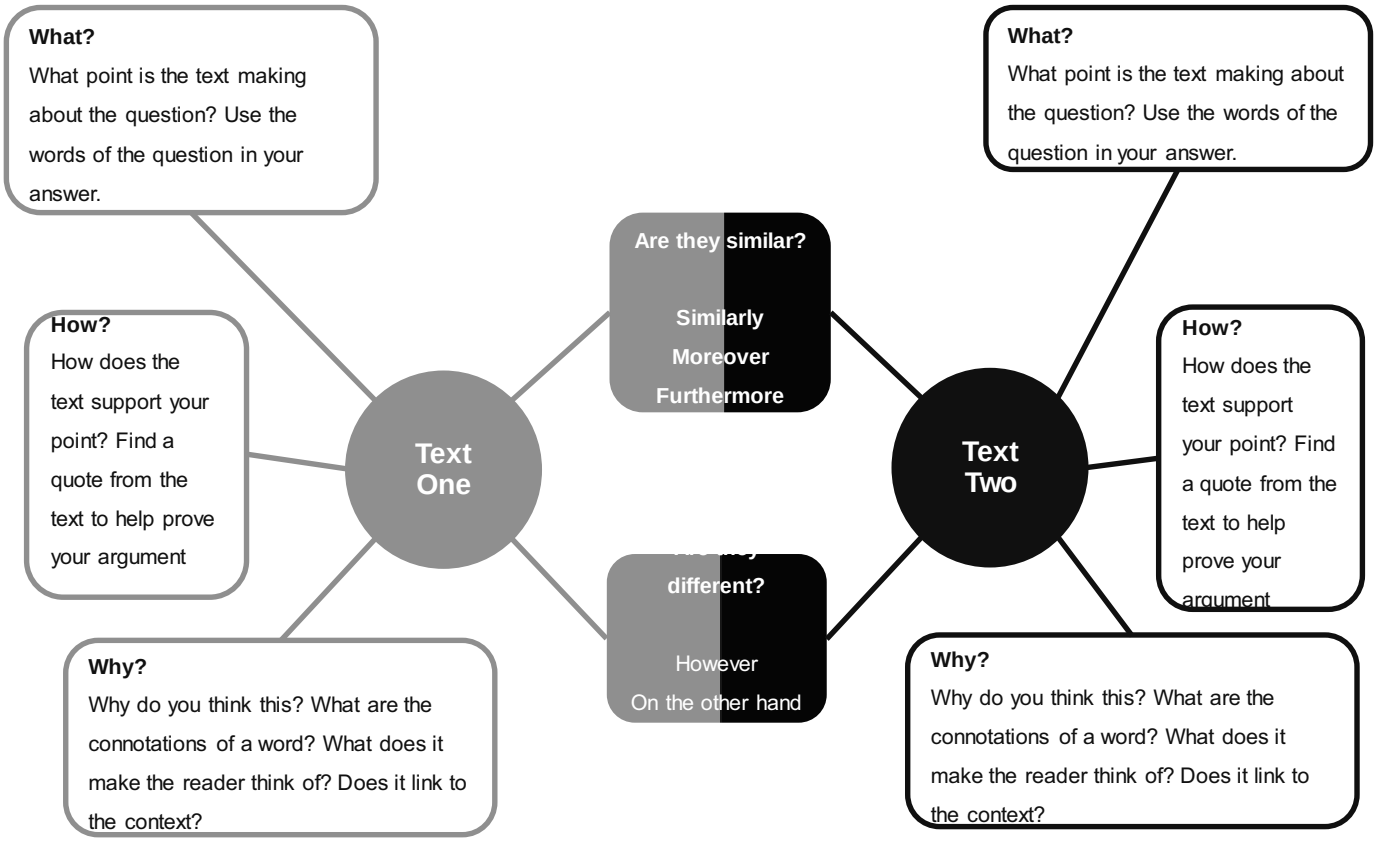


The word "_____" creates an image of _____.

It emphasises _____ because it connotes_____.

This highlights_____ and therefore makes the reader feel _____ about _____.

COMPARING TWO TEXTS



NARRATIVE STRUCTURE

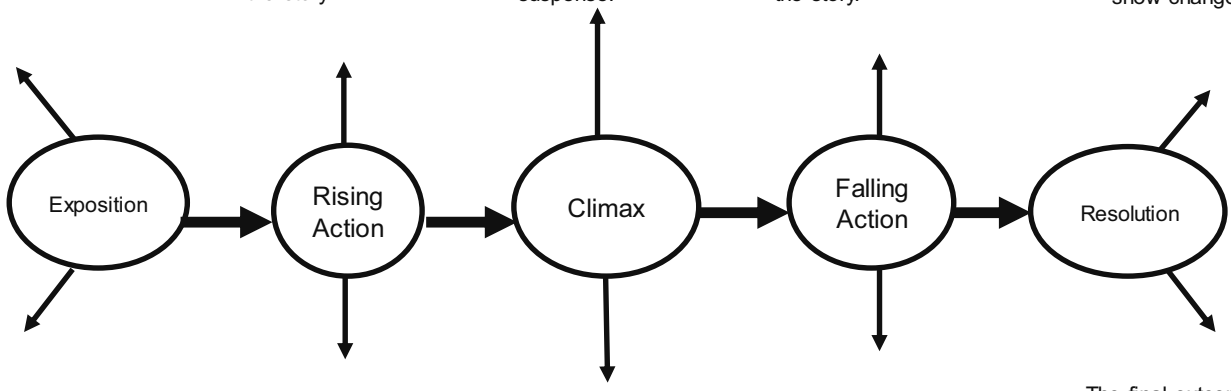
You could use:
Pathetic fallacy to build the atmosphere and foreshadow events.

You could use:
Reflections here which could be revisited later in the story.

You could use:
Short, simple sentences to add to the suspense.

You could use:
Flashbacks or flash forwards to show the possible outcomes of the story.

You could use:
Repetition from the beginning of the story to show change.



Set the scene, introduce characters and the plot.

Introduce a conflict, a new character, or a dilemma to move the story forward.

The peak of interest in the story, when the tension is at its greatest and the action takes place.

The aftermath of the action, what will happen as a result of the events in the climax of the story.

The final outcome of the story, ether all problems have been solved, or the story ends on a cliff-hanger.

Year 9 Texts



Full academic year

Of Mice and Men

Autumn Term 1

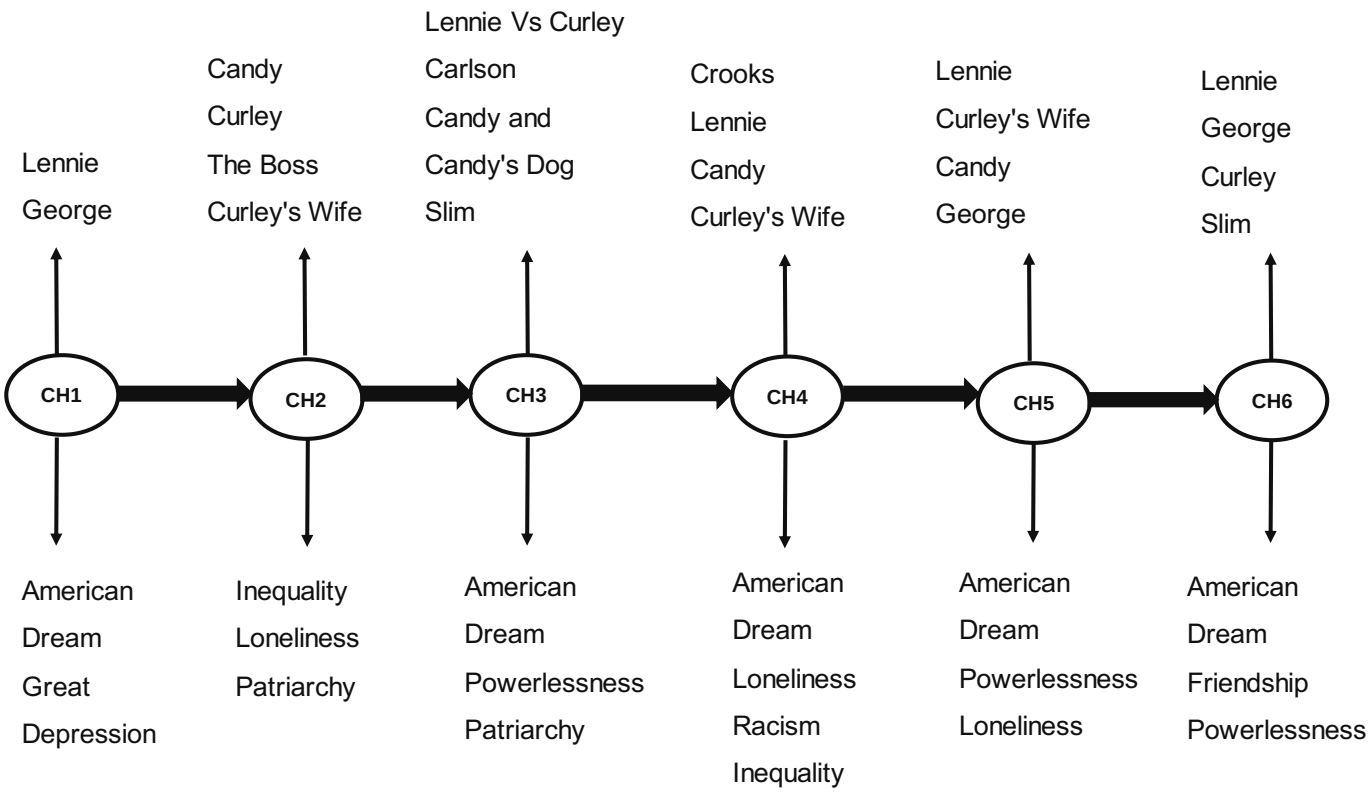
CONTENTS

TIER TWO VOCABULARY

WORD	DEFINITION
Aspirational	Having a strong desire to achieve something.
Dependent	Relying on something or someone else.
Destiny	The hidden power believed to control future events; fate.
Disposable	Intended to be thrown away after use.
Ethical	Morally right or acceptable.
Futility	A total lack of purpose or usefulness.
Idealist	A person who is guided more by ideals than by practical considerations.
Innocent	Not guilty of a crime or offence.
Intelligent	The ability to perceive or infer information, and to retain it as knowledge.
Loneliness	Having no friends or company; isolation.
Malicious	Intending to do harm.

WORD	DEFINITION
Marginalised	To make a group feel isolated or unimportant.
Naïve	Showing a lack of experience, wisdom, or judgement.
Ostracised	Exclude from a society or group.
Pragmatic	Dealing with things sensibly and realistically in a way that is based on practical rather than theoretical considerations.
Promiscuous	Having many short-lived sexual relationships.
Pugnacious	Eager or quick to argue, quarrel, or fight.
Racism	Prejudice against a person or people on the basis of their membership of a particular racial or ethnic group, typically one that is a minority or marginalised.
Secluded	Not seen or visited by many people; sheltered and private.
Solitary	Done or existing alone.
Toil	Working very hard doing unpleasant or tiring tasks.

OF MICE AND MEN CHARACTERS AND THEMES



OF MICE AND MEN STRUCTURE AND THEMES

Steinbeck uses a cyclical structure in 'Of Mice and Men' as Lennie and George return to the riverside. Steinbeck could have done this to emphasise:

The fact that all characters can't escape their gloomy and lonely destinies.

That equality will never be achieved.

There is no hope for the working class/minority groups because they are always easily exploited by those in power.

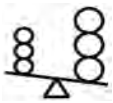
THEMES

Dreams

Each character in the text has their own **dreams** that they live and work for: None of the characters achieve their dream, showing the impossibility of the American Dream.

Loneliness

Loneliness appears to be part of human nature – it is something the characters can't escape.
All of the characters, in some sense, experience loneliness.



Inequality

Of Mice and Men was set in a time in which the laws **favoured** white people, and men held far more rights than women.

Destiny

Characters' **fate** seem to be doomed from the start of the novel. Throughout the novel, Steinbeck shows how men and women are not in control of their destinies.

OF MICE AND MEN CONTEXT 1937

John Steinbeck

John Steinbeck was an American author, who lived between 1902 and 1968.

His works frequently explore the themes of **fate and injustice,** as experienced by **everyman** characters.

Many take place in the Salinas Valley of California.

The American Dream

The American Dream is a national ethos of the United States, which declares that **freedoms, prosperity, success, and social mobility,** can all be achieved through **hard work**.

It implies that society has few barriers preventing anyone from achieving their dreams, should they be willing to put in enough effort.

Racism

Life was tough for black people living in America in the 1930s; there were not yet laws ruling against racial discrimination.

White and black people were **segregated** at the time, and black people were considered 2nd class citizens.

Black people often had to work harder for less money.

The Jim Crow laws of post-1876 strongly reinforced racism.

The Wall Street Crash and The Great Depression :

In the 1920s, the USA had been an enormously prosperous nation. However, in **October 1929** millions of dollars were wiped out in an event that became known as the **Wall Street Crash.**

This triggered the **Great Depression**:
12 and 15 million (one third of the population at the time) became **unemployed,**
many people lost their life savings as banks went bust.

There was no social support system, many families were left to face poverty.

OF MICE AND MEN CHAPTER ONE





PLOT

The story opens in a wooded area around the Salinas River in California. Two men approach: George and Lennie. It becomes clear that Lennie has some additional needs, and that George looks out for him.

George catches Lennie petting a dead mouse and takes it off him, angrily. Lennie swears that he didn't kill it, although it becomes clear that Lennie's enormous strength means that he kills things unintentionally.

George reminds Lennie that they are going to work on a ranch, and he needs to behave. The two eat beans for dinner, with George losing his temper with Lennie for persistently asking for ketchup.

He states that he would get along much better without Lennie. He then feels guilty about getting angry at Lennie.

George reminds Lennie of their dream: one day, they are going to own their own farm. George instructs Lennie to return to the pool if something bad happens. They then settle for the night.

KEY QUOTES

"They had walked in single file down the path, and even in the open one stayed behind the other."

"I wasn't doin' nothing bad with it, George. Jus' strokin' it." **(Lennie to George)**

"You can't keep a job and you lose me ever' job I get." **(George to Lennie)**

"His anger left him suddenly. He looked across the fire at Lennie's anguished face."

"I want you to come right here an' hide in the brush."

OF MICE AND MEN CHAPTER TWO





PLOT

The chapter starts with a description of bunkhouse. This is where the men that work at the ranch stay. They have few material possessions.

The two men arrive at the ranch and meet Candy. He warns them that the 'boss' is cross with them. After being scolded by their new boss, are assigned to a picking team led by Slim.

They also meet Curley, who immediately becomes aggressive towards Lennie. After he leaves, Lennie tells George to stay away from Curley.

Curley's Wife then appears at the bunk, who Lennie finds 'purty' and who flirts with them. George has to tell Lennie to stay away from her.

Slim then enters, who is clearly admired by all. He is friendly with George and Lennie.

KEY QUOTES

"Inside, the walls were whitewashed and the floor unpainted."

"The boss stepped into the room with the short, quick steps of a fat-legged man."

"Curley lashed his body around."

"She had full, rouged lips and wide-spaced eyes, heavily made up. Her fingernails were red."

"he moved with a majesty achieved only by royalty and master craftsmen."

OF MICE AND MEN CHAPTER THREE





PLOT	Slim gives one of his new pups to Lennie. George tells Slim of how they got chased out of the last town – Lennie grabbed hold of a girl's red dress and wouldn't let go.	Carlson begs Candy to let him shoot his old, stinking dog, to which Candy reluctantly agrees. After an awkward silence, the gunshot is heard.	Curley comes in, asking where his wife is. When he learns that she is not there, and neither is Slim, he storms out. The others follow, hoping to see a fight.	Thinking they are left alone, George discusses the dream again with Lennie. Candy overhears, and swears to devote his life savings to it if he can be in.	The other men return, Curley apologising to Slim for false accusations. Curley turns his attention on Lennie, beating him. Lennie only fights back when George tells him to, severely crushing Curley's hand.
KEY QUOTES	"I would of had to drowned most of 'em anyways. No need to thank me about that." **(Slim)**	"Carlson said, "The way I'd shoot him, he wouldn't feel nothing." **(Carlson)**	"Curley burst into the room excitedly. "Any you guys seen my wife?" he demanded."	"George, how long's it gonna be till we get that little place an' live on the fatta the lan'- an' rabbits?" **(Lennie to George)**	"The next minute Curley was flopping like a fish on a line, and his closed fist was lost in Lennie's big hand."

OF MICE AND MEN CHAPTER FOUR





PLOT	Crooks sits in his room alone. We learn that Crooks is educated. Lennie soon wanders in, lonely as the other men have gone out to town.	Crooks initially tells him to go away, saying that he (as a black man) is not allowed in the others' bunk, and so they should not be allowed in his. Lennie persists; Crooks lets him in.	Lennie begins to talk about his and George's dream. Crooks speaks of his own loneliness; he taunts Lennie. Candy enters and begins to speak of their dream.	Curley's Wife interrupts, and taunts the men about being 'the weak ones' left behind. She speaks of her own loneliness.	Crooks asks her to leave, but she threatens that she could easily have him lynched if he says too much more. The other men then return and Curley's Wife leaves.
KEY QUOTES	"his bunk in the harness room; a little shed that leaned off the wall of the barn."	"'Cause I'm black. They play cards in there, but I can't play because I'm black. They say I stink." **(Crooks to Lennie)**	"You guys is just kiddin' yourself. You'll talk about it a hell of a lot, but you won't get no land." **(Crooks to Lennie and Candy)**	"Lennie watched her, fascinated; but Candy and Crooks were scowling down away from her eyes."	"I could get you strung up on a tree so easy it ain't even funny." **(Curley's Wife to Crooks)**

OF MICE AND MEN CHAPTER FIVE

PLOT

Lennie sits in the barn, stroking his dead puppy, questioning why it died. He decides to try and hide the puppy but then gets angry with it for dying and hurls it across the room.

Curley's Wife enters, reassuring him that it is safe to talk to her. She speaks of her loneliness, and her past dreams. She explains that she doesn't like Curley.

She asks Lennie to stroke her hair, but he quickly becomes too excited and holds on too tight. When she cries out, he tries to silence her, and accidentally breaks her neck.

He runs away, towards the clearing that he and George were in at the beginning of the story. Candy finds the body and informs George – they immediately know what has happened.

George asks Candy to pretend that George hasn't seen it, so he can't be implicated. He calls the other guys in. Curley instantly asks for his shotgun, to track down Lennie.

KEY QUOTES

"Why do you got to get killed? You ain't so little as mice. I didn't bounce you hard."

"Why can't I talk to you? I never get to talk to nobody. I get awful lonely."

"he shook her; and her body flopped like a fish."

"I done a real bad thing," he said. "I shouldn't of did that. George'll be mad."

"I'm gonna shoot the guts outa that big bastard myself, even if I only got one hand."

OF MICE AND MEN CHAPTER SIX

PLOT

Lennie appears by the riverside from the start of the novella. He is anxious, but also proud that he has remembered the place that he should come to if he finds himself in trouble.

He has two visions: of his Aunt Clara scolding him for getting into trouble, and a giant rabbit telling him that George will leave him.

George appears, seeming unusually quiet. George tells Lennie that he is not made at him, comforting Lennie. Lennie asks him to talk about the dream again, which George does.

Lennie sits, listening to the story, looking out over the stream, George pulls Carlson's gun from his jacket and shoots Lennie in the back of the head. Lennie immediately dies.

Carlson questions what happens, and George lies that he had to wrestle the gun from Lennie and shoot him with it. Only Slim understands what has truly happened. They walk away.

KEY QUOTES

"Already the sun had left the valley to go climbing up the slopes of the Gabilan Mountains"

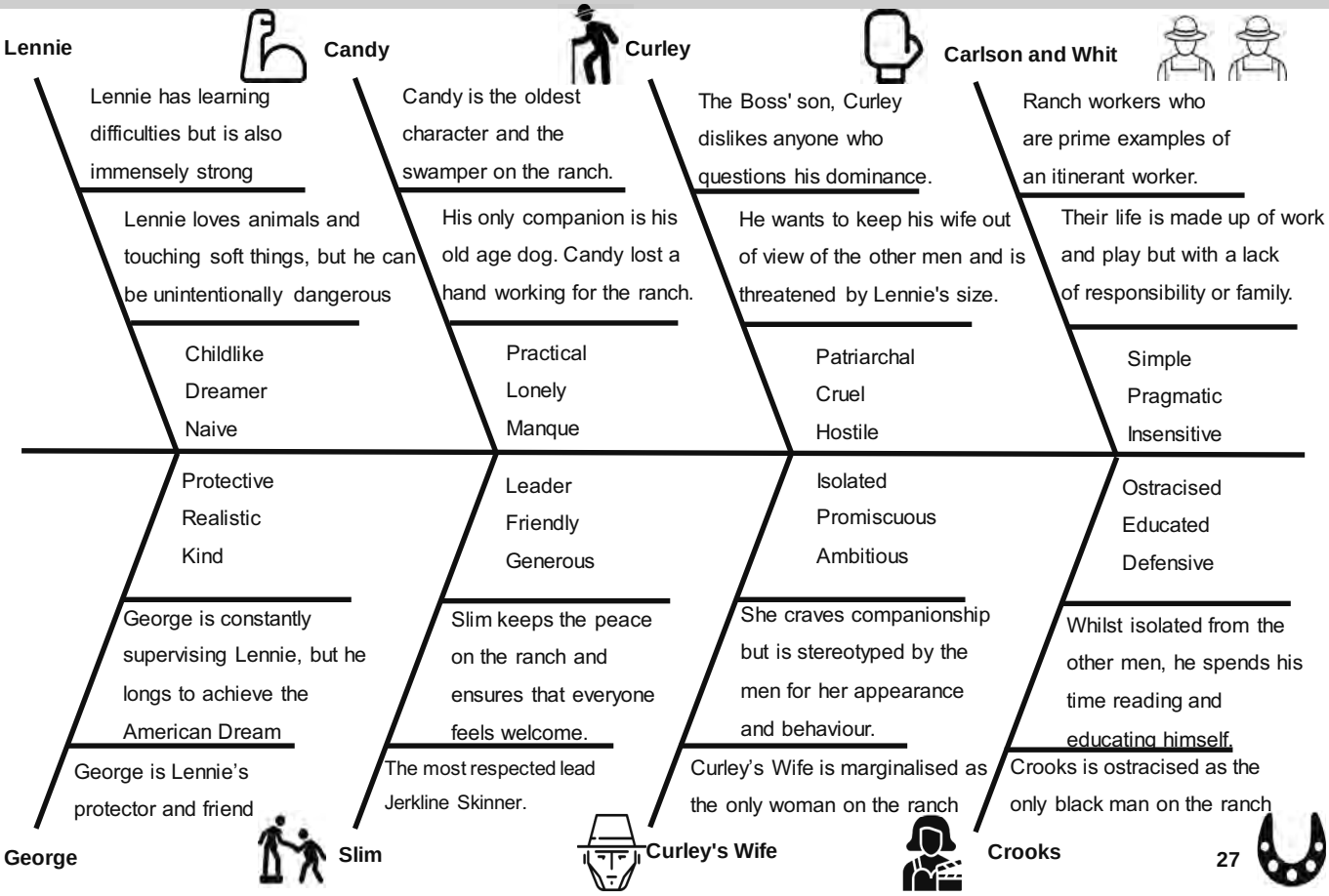
"She stood in front of Lennie and put her hands on her hips, and she frowned disapprovingly at him."

"George came quietly out of the brush and the rabbit scuttled back into Lennie's brain."

"The hand shook violently, but his face set and his hand steadied. He pulled the trigger."

"Slim came directly to George and sat down beside him, sat very close to him."

OF MICE AND MEN CHARACTERS



STEINBECK'S USE OF REPETITION

The death of animals. Aside from Candy's dog, Lennie keeps on killing small, fragile animals. At the start of the novel, he killed a mouse and now he has just killed the puppy.

Light and dark imagery is repeated throughout the novel to symbolise hope and despair.
Each chapter begins with a reference to the sun going down.

Steinbeck describes the **horses' halter chains** rattling several times in the novel. This could be to symbolise how all the characters are trapped.

Animal imagery is repeated throughout the novel. In particular when associated with Lennie it suggests his lack of understanding and inability to see the consequences of his behaviour.

Ghost Boys

Autumn Term 2

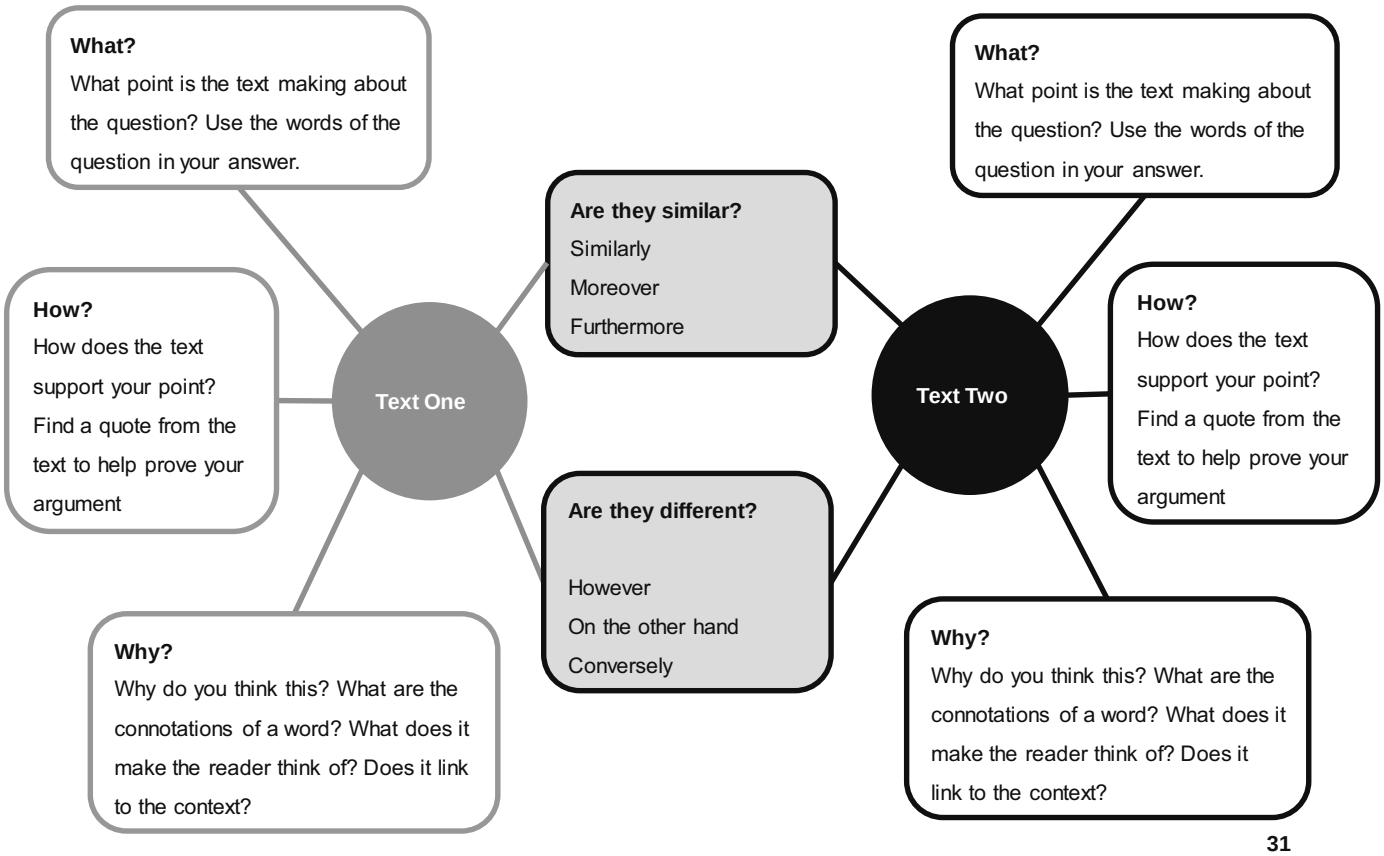
CONTENTS

TIER TWO VOCABULARY

WORD	DEFINITION
Aspirational	Having a strong desire to achieve something.
Dependent	Relying on something or someone else.
Destiny	The hidden power believed to control future events; fate.
Ethical	Morally right or acceptable.
Empower	Make (someone) stronger and more confident, especially in controlling their life and claiming their rights.
Idealist	A person who is guided more by ideals than by practical considerations.
Innocent	Not guilty of a crime or offence.
Justice	Just behaviour or treatment.
Loneliness	Having no friends or company; isolation.

WORD	DEFINITION
Marginalised	To make a group feel isolated or unimportant.
Naïve	Showing a lack of experience, wisdom, or judgement.
Ostracised	Exclude from a society or group.
Pragmatic	Dealing with things sensibly and realistically in a way that is based on practical rather than theoretical considerations.
Segregation	The action or state of setting someone or something apart from others.
Racism	Prejudice against a person or people on the basis of their membership of a particular racial or ethnic group, typically one that is a minority or marginalised.
Secluded	Not seen or visited by many people; sheltered and private
Solitary	Done or existing alone.

COMPARING TWO TEXTS



GHOST BOYS

Civil Rights

American civil rights movement, **mass protest movement against racial segregation and discrimination in the southern United States** that came to national prominence during the mid-1950s. This movement had its roots in the centuries-long efforts of African slaves and their descendants to resist racial oppression and abolish the institution of slavery.

Racial Inequality

Racial inequality is **a disparity in opportunity and treatment that occurs as a result of someone's race.** This type of discrimination is clearly the **domination of one race over another**, which frequently results in favoritism and bias towards people from their race or ethnicity.

Equity and Equality

Equity is **what builds an anti-racist future.** The concept of racial equity recognises that not all races are starting from the same place. Some people and groups have different circumstances and need different resources and opportunities to succeed. Equity is about providing those particular resources to the groups who need them.

Black Lives Matter

Black Lives Matter (**BLM**) is a decentralised political and social movement that seeks to highlight racism, Discrimination, and inequality experienced by black people. When its supporters come together, they do so primarily to protest incidents of police brutality and racially motivated violence against black people.

Othello

Spring Term 1

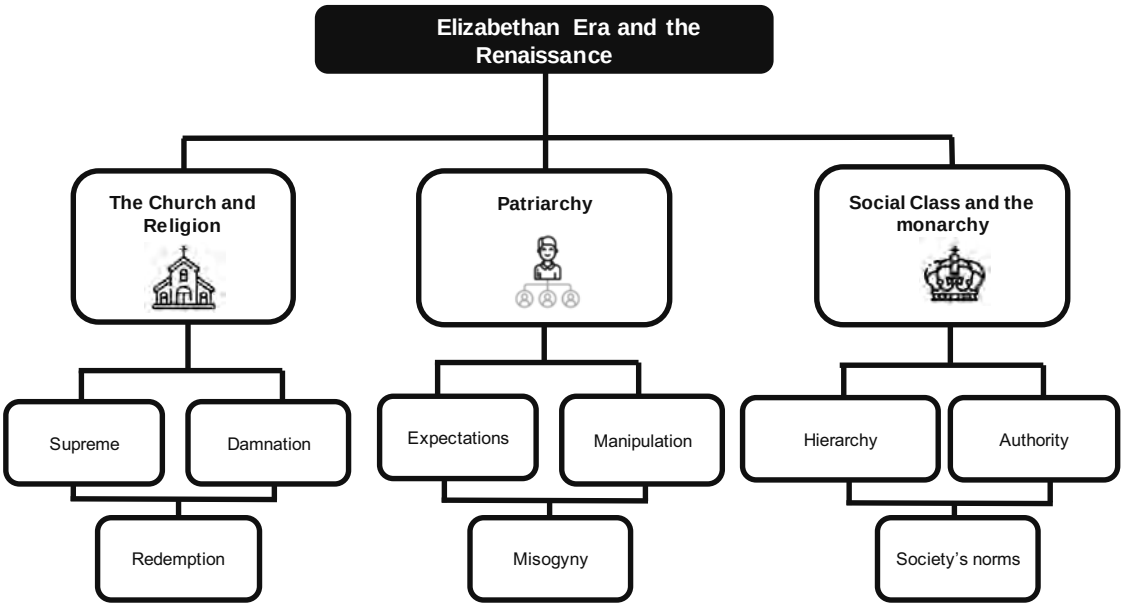
CONTENTS

TIER TWO VOCABULARY

WORD	DEFINITION
Artifice	Clever or cunning devices to trick or deceive others
Bigotry	Extreme prejudice against a particular person or group often based on their race or religion
Bellicose	Demonstrating aggression and willingness to fight
Chaos	Complete disorder and confusion
Confidante	A person with whom one shares a secret or private matter, trusting them not to repeat it to others
Culpable	Deserving of blame
Exploitative	Making use of a situation or treating others unfairly in order to gain an advantage or benefit.
Fiendish	Extremely cruel or unpleasant
Guileful	Having or showing cunning and sly intelligence
Gullible	Easily persuaded to believe something

WORD	DEFINITION
Incandescent	Full of passionate emotion, usually extreme anger
Infidelity	The action or state of being unfaithful to a spouse or other sexual partner:
Machiavellian	Cunning, scheming, and unscrupulous, especially in politics
Manipulation	Having control or clever techniques to make someone do what you want them to
Motivation	A reason for acting or behaving in a certain way
Noble	Having fine personal qualities, high moral principles
Resentment	Feeling extremely bitter at being treated unfairly
Self-effacing	Not wanting attention for achievements, modest
Submissive	Willing to be obedient without question
Turmoil	A state of great disturbance, confusion, or uncertainty

SHAKESPEAREAN CONTEXT



OTHELLO CONTEXT

The Patriarchal Society ♂

Elizabethan society was patriarchal, meaning that men were considered the leaders and women their inferiors. Women were regarded as "the weaker sex", not just in terms of physical strength, but emotionally too. Women were expected to be ruled by men. Men saw women as possessions and fathers expected to choose husbands for their daughters. They were believed to be intellectually inferior to men, incapable of rational thought and rarely received an education.

Assertive and argumentative women were seen as a threat to social order and were often punished. Shakespeare included a large number of parts for strong women in his plays.

Race in Othello

Racism was widespread in Elizabethan England. Black people were an unusual sight and were viewed with suspicion. Elizabeth 1 issued an order that they be removed from England in 1601. Many believed that they were only fit to be slaves. Elizabethans were against mixed race marriage.

Throughout the play Othello is called 'Moor' and there are also many references to the colour of his skin. The term 'Moor' was derived from the name of the North African country Mauritania or possibly the Greek word 'Mauros' meaning dark. The word Moor not only had connotations of race and ethnicity but also an otherness in terms of religion. Prejudice focussed on this perceived sense of otherness. Despite being honoured for his services to the State, Othello experiences this racism when he marries Desdemona who is white.

Venice and historical conflicts

Venice was an important trading city. It was a cultural meeting point and was considered multicultural as traders from across the world met there. It was a popular setting for plays about intrigue, love affairs and revenge. It had a reputation for sophistication and wealth but was also seen as a city of loose morals.

Othello is set during the wars that happened between Venice and Turkey in the latter part of the sixteenth century. Much of the action takes place in Cyprus which was an important outpost for the Turkish Navy at this time.

OTHELLO STRUCTURE AND THEMES

Othello follows a traditional 5 act structure. The story line follows Freytag's Pyramid.

Exposition: The effects of Othello and Desdemona's marriage are felt.
Rising Action: Iago puts his plan to convince Othello that Desdemona is having an affair into action.
Climax: Othello decides he must kill Desdemona.
Falling Action: The aftermath of Othello's murder of Desdemona.
Denouement: Othello kills himself.

THEMES

Prejudice

The main form of prejudice is **racism**, as several characters treat Othello as an outsider or animalistic as he is black. We also see **misogyny** within the play as women are judged.

Jealously

Jealously is a driving motive- Iago and Roderigo's jealously cause their actions. Othello's jealously causes him to act out of character, lose all reason and murder the woman he loves.

Deception

Deception drives the plot- Desdemona deceives her father to marry Othello, Iago deceives Othello to gain revenge and Othello is deceived by his own emotions.

Gender

Masculinity is focused strongly on honour- Othello feels emasculated when he believes Desdemona was unfaithful. Women are initially presented as either a Madonna or a whore. We see later in the play that women are more complicated and these are male enforced stereotypes.

OTHELLO ACT 1

PLOT

Othello and Desdemona have secretly married. Iago, resentful that he didn't get a promotion, encourages Roderigo to tell Desdemona's father, Brabanzio, about the marriage and cause trouble. Brananzio is furious and seeks out Othello.

Iago arrives at Othello's house and warns him about Brabanzio. A group of men approach, but it is a summons from the Duke. Brabanzio then arrives and Othello agrees to put the case before the Duke,

Brabanzio makes his complaint against Othello and accuses him of enchantment. Othello explains Desdemona fell in love with him due to his stories.

Desdemona enters and confirms she loves him. The Duke sends Othello to fight the Turks. Desdemona insists on going with him

Roderigo is manipulated by Iago to raise money and follow the army. Iago plans to use him to get his revenge on Othello. He promises Roderigo to help him win Desdemona.

KEY QUOTES

"I follow him to serve my turn upon him"
Iago
Act 1 i

" Damn'd as thou art, thou hast enchanted her"
Brabanzio Act 1 ii

“She loved me for the dangers I had pass'd,
And I loved her that she did pity them."
Othello Act1 iii

“That I did love the Moor to live with him"
Desdemona Act 1 iii

“Hell and night
Must bring this monstrous birth to the world's light."
Iago Act 1 iii

OTHELLO ACT 2





PLOT

A storm delays arrival in Cyprus. Desdemonda, Iago and Emilia arrive first. Iago criticises all women as deceptive. Cassio takes Desdemona aside to speak to her about Othello

Iago sees this conversation and plots to frame Cassio and Desdemona as having an affair. He resents Cassio as he got the promotion Iago wanted. Othello arrives and he announces a celebration .

Iago persuades Roderigo that Desdemona will choose Cassio after she is bored of Othello. He convinces him to start a fight with Cassio that evening, hoping this will make Cassio lose Othello's favour.

Iago gets Cassio drunk while on guard duty. Roderigo comes and starts a fight. Cassio stabs Montano

Othello breaks up the fight and dismisses Cassio from his service. Iago persuades Cassio to petition Desdemona to get his job back.

KEY QUOTES

"You rise to play and go to bed to work" **Iago Act 2 i**

"with as little a web as this will I ensnare as great a fly as Cassio" **Iago Act 2 i**

"I'll have our Michael Cassio on the hip, Abuse him to the Moor in the rank garb" **Iago Act 2 i**

"Zounds, I bleed still; I am hurt to the death." **Montano Act 2 iii**

"I will beseech the virtuous Desdemona to undertake for me" **Cassio Act 2 iii**

OTHELLO ACT 3





PLOT

Desdemona promises Cassio to help him get his position back. Othello enters so Cassio leaves. Iago remarks he looks guilty. Desdemona asks Othello to forgive Cassio.

Iago implies Desdemona and Cassio are having an affair. Othello fears she no longer loves him. Desdemona drops a handkerchief Othello gave her and Emilia gives it to Iago. He plants it in Cassio's room.

Othello is enraged about the possibility of an affair. Iago lies that he saw Cassio use the handkerchief. Othello swears revenge and promotes Iago .

Othello speaks to Desdemona and demands to see the handkerchief. She cannot produce it which angers Othello. Emilia speculates that Othello is jealous.

Cassio asks about his case; Desdemona goes to speak to Othello. Bianca, Cassio's lover appears. He asks her to copy the embroidery from a handkerchief he found in his room. She gets angry and thinks he has another lover.

KEY QUOTES

"I will have my lord and you again As friendly as you were." **Desdemona Act 3 iii**

"She's gone. I am abused; and my relief Must be to loathe her" **Othello Act 3 iii**

"Arise, black vengeance, from thy hollow cell!" **Othello Act 3 iii**

"Is not this man jealous?" **Emilia Act 3 iv**

"My lord is not my lord; nor should I know him" **Desdemona Act 3 iv**

OTHELLO ACT 4





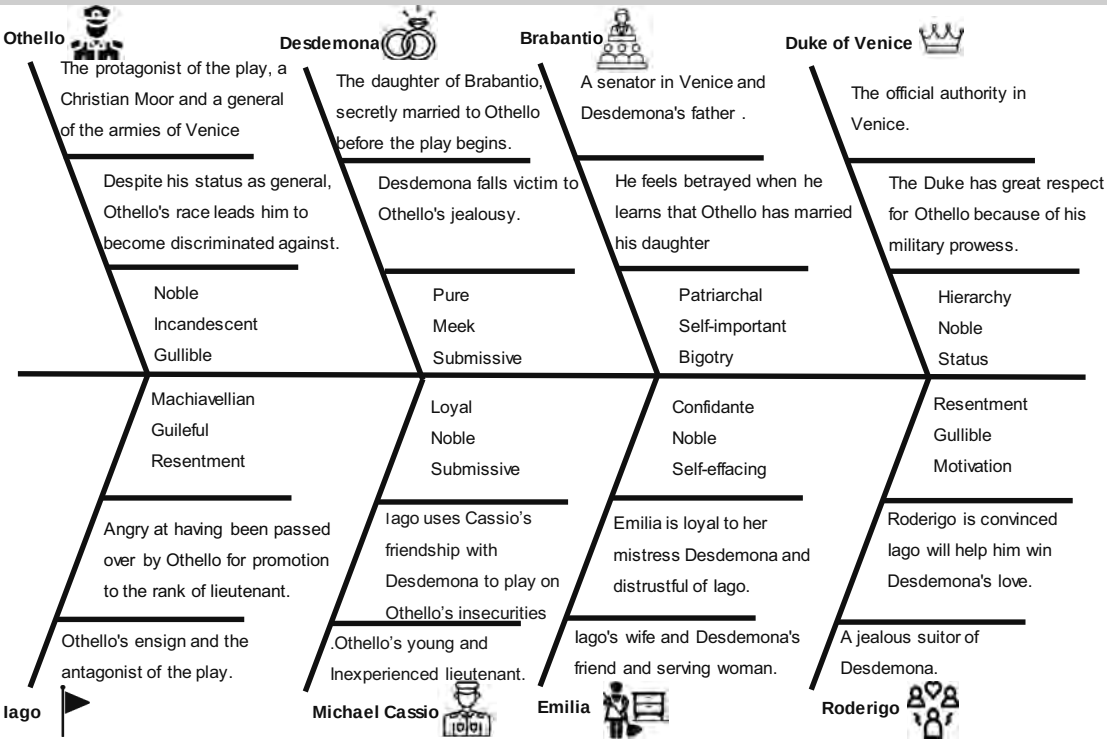
PLOT	Othello falls into a fit from anger. Iago arranges for Othello to overhear Cassio talk about sleeping with Desdemona. However, he tricks them and talks to Cassio about Bianca instead.	Bianca enters with the handkerchief. Othello is even more enraged and vows to kill Desdemonda. Iago promises to arrange Cassio's death,	Desdemona enters with Lodovico, with orders for Othello to leave Cyprus. Desdemona appears happy so Othello hits her and calls her a whore. This shocks Lodovico; he wonders if Othello is mad.	Othello confronts Emilia and Desdemona; both protest innocence. Iago convinces Roderigo the only way to win Desdemona is to kill Cassio.	Desdemona fears her fate and asks Emilia to bury her in her wedding sheets. They discuss adultery and Emilia blames women's disloyalty on the ill treatment of men. Desdemona goes to bed.
KEY QUOTES	"For I will make him tell the tale anew...when He hath, and is again to cope your wife" **Iago Act 4 i**	"Ay, let her rot, and perish, and be damned to-night; for she shall not live" **Othello Act 4 i**	"Is this the noble Moor whom our full senate Call all in all sufficient?" **Lodovico Act 4 i**	"I took you for that cunning whore of Venice That married with Othello." **Othello Act 4 ii**	"But I do think it is their husbands' faults If wives do fall" **Emilia Act 4 iii**

OTHELLO ACT 5




PLOT	Roderigo and Iago ambush Cassio. He is only wounded. Iago then kills Roderigo. He blames the events on Bianca and has her arrested. He sends Emilia to tell Othello what has happened.	Othello prepares to kill Desdemona. She wakes and denies his charges of infidelity He tells her Cassio is dead and then smothers her Emilia enters and informs them Cassio is alive Desdemona wakes for long enough to absolve Othello then dies.	Emilia calls for help. Montano, Graziano and Iago arrive. Emilia reveals the full story and Iago's role in manipulating Othello. Iago stabs her and she dies.	Othello lunges at Iago and stabs him. Iago refuses to talk or to confess his crimes. A letter is found on Roderigo that proves his guilt though. Othello reconciles with Cassio.	Othello, faced with arrest, asks that he be remembered as he was. He then kills himself with a dagger. Iago is sentenced to execution.
KEY QUOTES	"Iago? O, I am spoil'd, undone by villains! Give me some help" **Cassio Act 5 i**	"A guiltless death I die." **Desdemona Act 5 ii**	"For thou hast kill'd the sweetest innocent That e'er did lift up eye." **Emilia Act 5 ii**	"Demand me nothing: what you know, you know: From this time forth I never will speak word." **Iago Act 5 ii**	"Speak of me as I am" **Othello Act 5 ii**

Othello CHARACTERS



'Be who God meant you to be'

Spring Term 2

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TIER TWO VOCABULARY

WORD	DEFINITION
Avarice	Extreme greed or material wealth.
Cruelty	Unkind, harsh behaviour or attitudes.
Discrimination	The unjust or prejudicial treatment of different categories of people.
Egalitarian	Believing in the principle that all people are equal and deserve equal rights and opportunities.

WORD	DEFINITION
Legislation	The process of making or enacting laws.
Parsimonious	Very unwilling to spend money or use resources.
Rural	Relating to the countryside.
Social stratification	A system by which a society ranks categories of people in a hierarchy.
Urban	Relating to the city.

19TH CENTURY CONTEXT- THE INDUSTRIAL REVOLUTION (1750-1900)

Social Class

Class determined your life in society and it was very difficult to move between the classes.

There was an emergence of the middle class - people who made their own wealth.

Inequality
Poverty
Capitalism

Social Injustice

Britain was extremely unequal, and the poor suffered mass exploitation particularly as workers.

Those who were unable to work would be sent to a workhouse as there was little support from the state

Oppression
Pauper
Redemption

Life for the Poor

Poor quality living conditions due to pollution, poor sanitation, and overcrowding meant high mortality rates

Many workers would be expected to work 12-14 hours a day for very low wages.

Malnutrition
Desperation
Welfare

Dilapidated
Despondent
Destitution

With a rising urban population and limited housing, many poor people faced horrible, unsanitary living conditions.

Thousands of people made the move from rural or urban areas in search of work.

Transition from country to city

Despair
Reform
Industrial

The development of steam power and electricity minimised the reliance on human labour.

Improved technologies allowed for developments in travel, and power supplies across cities

Progression of industry

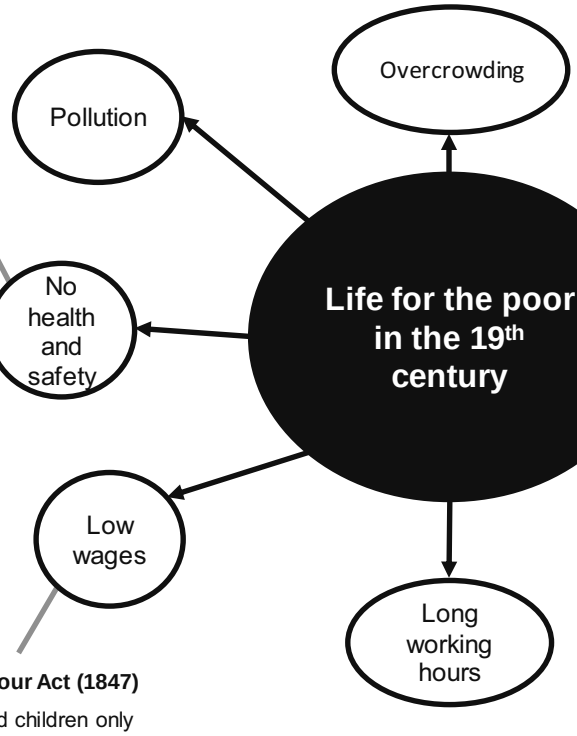
Child labour
Exploitation
Neglect

Public Health began to improve as a result of the Government taking action to protect the working people living in cities.

Many laws were passed towards the end of the 19th century to provide better working conditions.

Social Reform

LIVING CONDITIONS AND LEGISLATION FOR THE POOR



The Factory Act (1833)
Safe regulations in factories for children

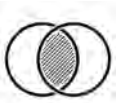
The Mines Act (1842)
Prohibited all females and boys under 10 from working underground in the mines

The Ten Hour Act (1847)
Women and children only worked 10 hours a day in factories

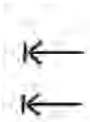
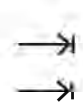
The Public Health Act (1875)
Regulations decreed that each house should be self-contained with its own sanitation and water

Poor Law Amendment Act (1834)
The poor were to be treated as harshly as possible and were forced to enter workhouses if they had no income

COMMON RHETORICAL DEVICES

	**Direct address**	Referring to the reader directly using the pronouns 'we' or 'you'.
	**Alliteration**	The repetition of the same **sound** in a sequence of words beginning with the same letter.
	**Repetition**	Where a word or phrase is used more than once across a text
	**Knowledge**	Knowing the topic/subject you are writing or speaking about.
	**Facts**	Something which can be proven to be true.
	**Opinion**	A belief which cannot be proven to be true.
	**Rhetorical question**	Any question in a piece of writing which does not require an answer.
	**Emotive language**	Words which elicit a powerful emotional response.
	**Similes and metaphors**	A **simile** directly compares one object to another using 'like' or 'as'. A **metaphor** compares two things by stating one is the other.
	**Triplets**	Lists of three things in a sentence.

ADVANCED RHETORICAL DEVICES

	**Allusion**	A reference to an event, place, literary work or person. **Example:** "I can't get changed that quickly, I'm not **Superman**!"
	**Anaphora**	The repetition of a word or phrase **at the start** of successive phrases. **Example:** "**If you** prick us, **do we not** bleed? **If you** tickle us, **do we not** laugh?"
	**Anecdote**	A short amusing or interesting story about a real incident or person. **Example:** "When I was your age, I …"
	**Epistrophe**	The repetition of a word or expression **at the end** of successive phrases, clauses, sentences, or verses especially for rhetorical or poetic effect. **Example:** "of the **people**, by the **people**, for the **people**"
	**Hypophora**	A figure of speech in which a writer raises a question, and then immediately answers it. **Example:** ""What should young people do with their lives today**?** **Many things, obviously**."
	**Hyperbole**	An exaggeration. **Example:** "I have done this **a thousand times**"
	**Parallelism**	The use of words or phrases with a similar structure. **Example:** "Like father, like son"
	**Oxymoron**	A combination of contradictory or unsuitable words. **Example:** "It is a cruel kindness"

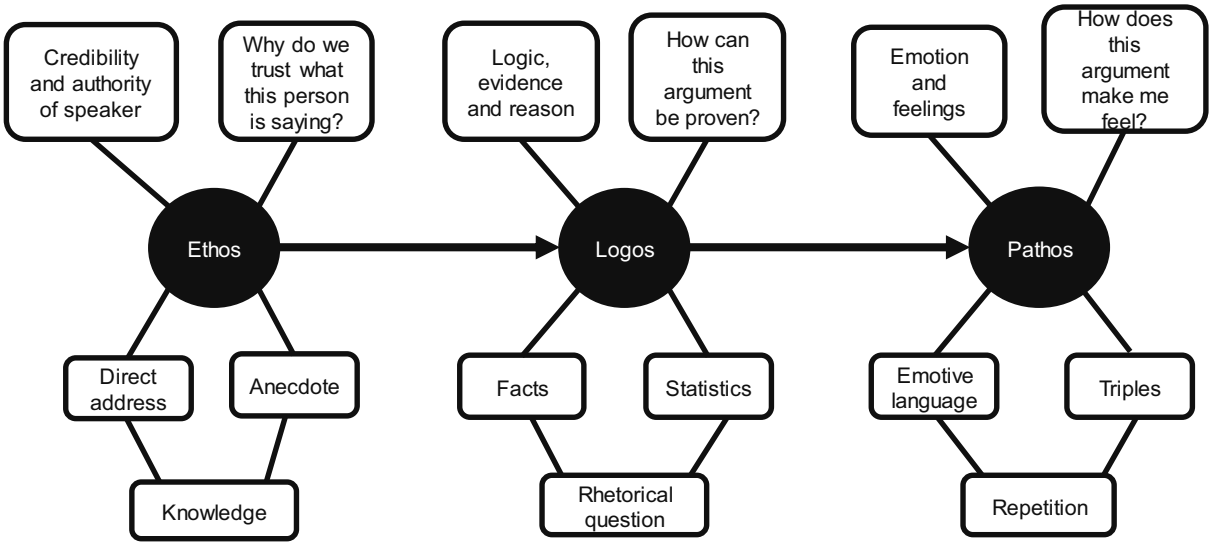
ARISTOTLE'S THREE PILLARS OR PERSUASION

Aristotle

Born in Greece, Aristotle lived from 384 BC to 322 BC.

Instructed on how to best persuade people.

Aristotle was a student of Plato (another Greek philosopher).



HOW TO STRUCTURE AN ARGUMENT

Make your position clear. What is your point of view on how?

Introduce the topic you are writing about. Still make your opinion clear.

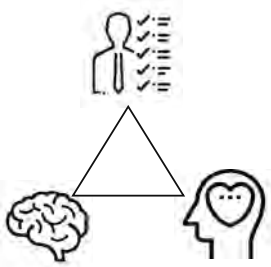
Offer your first point through a topic sentence and identify one issue. Explain your point.

Offer your second point through a topic sentence and identify one issue. Explain your point.

Acknowledge the opposing point of view but then challenge it. Why are those critics wrong and you're right?

Offer solutions for the points you raised: How can we avoid these issues? What are the benefits? Create a sense of urgency.

Repeat your position. This is the last message you want your reader/listener to leave with.



Genre Study

Summer Term

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TIER TWO VOCABULARY

WORD	DEFINITION
Cautionary	Serving to warn.
Conform	To adapt to fit in with new conditions.
Dystopia	A bad place.
Monarchy	An autocracy governed by a monarchy who usually inherits the authority.
Oligarchy	A political system governed by a few people.

WORD	DEFINITION
Post-apocalyptic	Existing or occurring after a catastrophically destructive disaster or having the appearance of this.
Regime	The ruling government of a country.
Surveillance	To be watched.
Totalitarian	Where the government has complete and absolute power over the people.
Tyrannical	Wielding absolute power and authority, often unjustly, cruelly or oppressively.

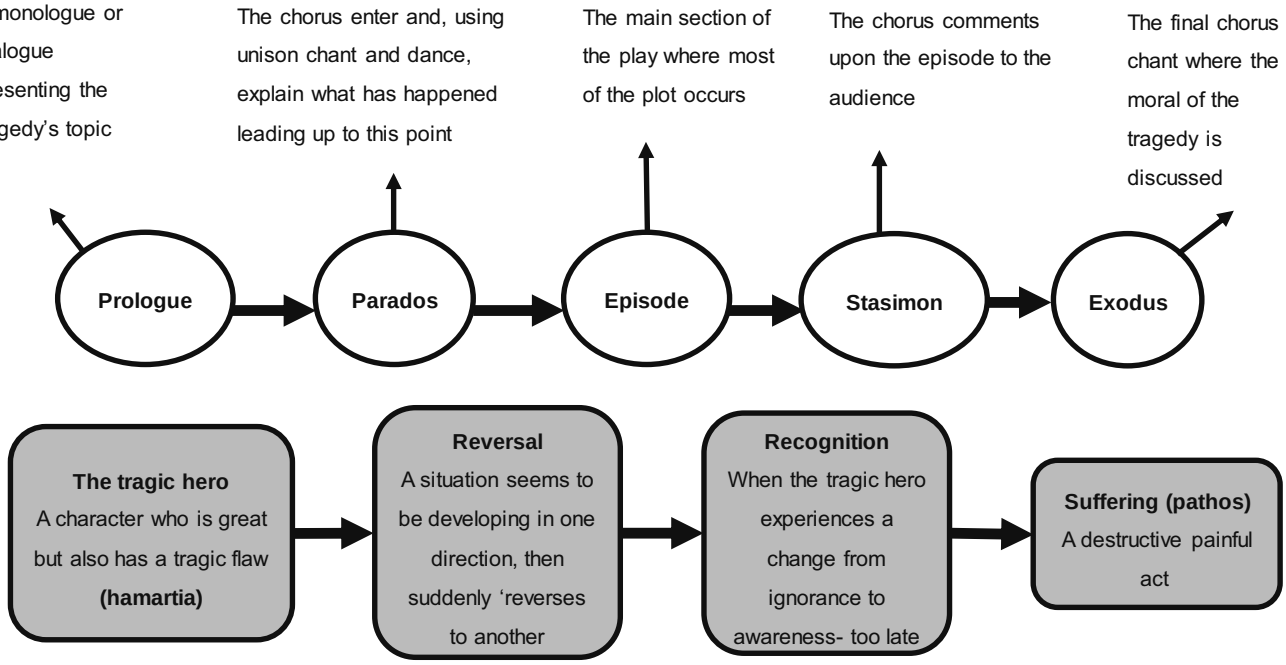
ELEMENTS AND STRUCTURE OF A GREEK TRAGEDY

Greek Tragedy

Aristotle believed tragedies imitated life and that the performance would provoke emotions of 'pity' and 'fear' that would be 'purified' by the end of the play. Aristotle asserts the audience undergoes a cathartic (cleansing) experience.

Examples of Greek Tragedy

- **'Oedipus Rex'** by Sophocles
- **'Medea'** by Euripides



The tragic hero
A character who is great but also has a tragic flaw **(hamartia)**

Reversal
A situation seems to be developing in one direction, then suddenly 'reverses to another

Recognition
When the tragic hero experiences a change from ignorance to awareness- too late

Suffering (pathos)
A destructive painful act

GREEK TRAGEDY SUMMARIES

'Oedipus Rex' by Sophocles

Who was Sophocles?

One of Athens' three great tragic playwrights.
Born in Colonus in 496 – 406.

Summary

'Oedipus Rex' is a Greek tragedy that tells the story of King Oedipus of Thebes, who is fated to kill his father and marry his mother.

Thebes is struck by a plague that will only be lifted if the man who killed the former king is exiled. The prophet Teiresias claims the murderer is Oedipus.

An oracle told Queen Jocasta that her son would kill her husband, so she left her infant child—Oedipus—to die. Oedipus survived and unknowingly killed his father before marrying Jocasta and becoming king.

When they realize the truth, Jocasta hangs herself, and Oedipus blinds (off stage) himself and goes into exile.

'Medea' by Euripides

Who was Euripides?

One of Athens' three great tragic playwrights.
Born in Salamis in 480 - 406 BC

Summary

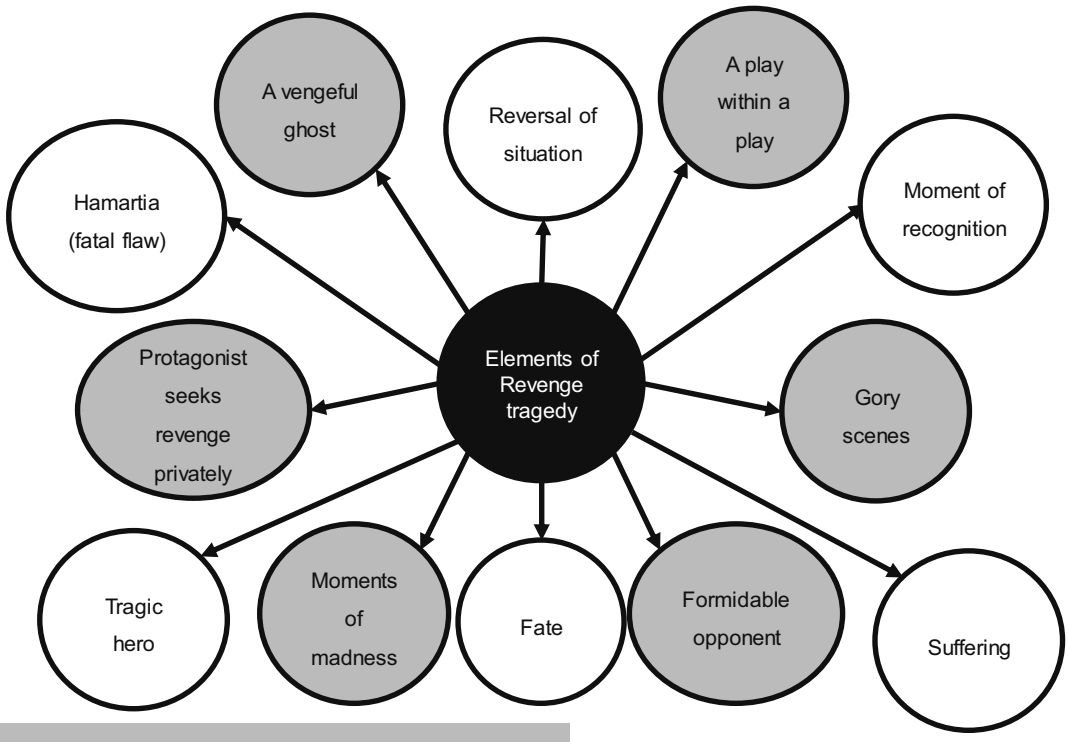
'Medea' is a Greek tragedy based on the myth of Medea and Jason. Medea has been betrayed by her husband and the play focuses on her revenge.

Jason betrays Medea by abandoning her to marry the daughter of King Creon, Glauce.

Creon fearing what Medea will do, tries to send her into exile, but she begs to stay, which he allows. Medea begins to plot her revenge: she will kill Creon, Glauce and her own children.

Glauce is killed by a poisoned dress; Creon dies by the same poison as he tries to help his daughter. Medea murders her children (off stage). At the end of the play, Medea faces a distraught Jason.

REVENGE TRAGEDY



Revenge Tragedy
A drama in which the dominant motive is revenge for a real or imagined injury; it was a favourite form of English tragedy in the Elizabethan and Jacobean eras.

DYSTOPIAN FICTION THEMES AND INFLUENCES

Dystopian Fiction
Stories of utopias that have gone wrong or were flawed to begin with.

- Oppression
  - Regime
  - Conformity
  - Totalitarian
- Surveillance
  - Cautionary
  - Control
  - Restriction
- Inequality
  - Hierarchy
  - Humanity
  - Division

There Will Come Soft Rains

Examination Day

HORROR CONVENTIONS

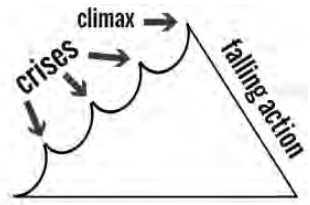
Horror Fiction –
A genre of speculative fiction which is intended to frighten, scare, or disgust

- **Setting**
  - Small communities
  - Isolated places
  - Medieval places (church, castles)
- **Characters**
  - Main hero/ victim
  - Villain
  - Damsel-in-distress
- **Themes**
  - Supernatural
  - The Other
  - Fear

The Masque of the Red Death

The Hitchhiker

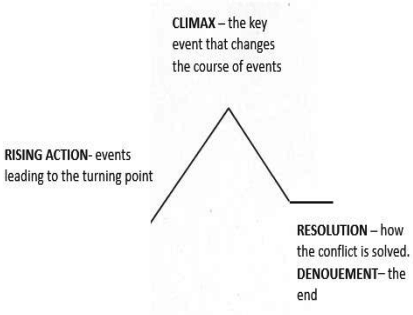
STRUCTURING STORIES



A plot that follows a **Fichtean Curve** start right in the rising action — embedded with exposition and several crises that include their own rising and falling action.

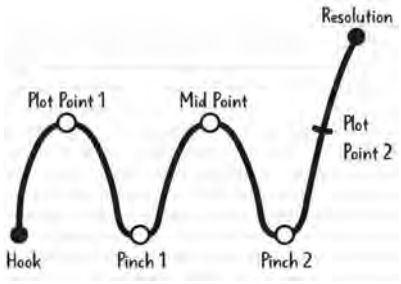
The main points include:

1. Rising Action (including multiple crises)
2. Climax
3. Falling Action



Latin for "into the middle of things," **In Media Res** is a narrative structure that starts midway through the story. It typically includes the following parts:

1. Middle Crisis
2. Rising Action (including exposition, often in the form of flashbacks)
3. Climax
4. Falling Action (including exposition, often in the form of flashbacks)
5. Denouement



A less detailed adaptation of The Hero's Journey, the **Seven-Point Story Structure** focuses specifically on the highs and lows. Writers are encouraged to start by knowing their resolution. The main seven points include:

1. The Hook
2. Plot Point 1
3. Pinch Point 1
4. Midpoint
5. Pinch Point 2
6. Plot Point 2
7. Resolution

Animal Farm

Summer Term

CONTENT

TIER TWO VOCABULARY

WORD	DEFINITION
Autocracy	A political system governed by a single individual.
Brave	Ready to face danger or pain.
Calculating	Acting in a scheming way.
Callous	Being cruel and unfeeling towards others.
Compassionate	Showing sympathy and concern for others.
Corruption	A dishonest action that destroys people's trust.
Cynical	Believing that people are motivated purely by self-interest; distrustful.
Devious	Using successfully dishonest methods to get your own way.
Devoted	Very loving and loyal.

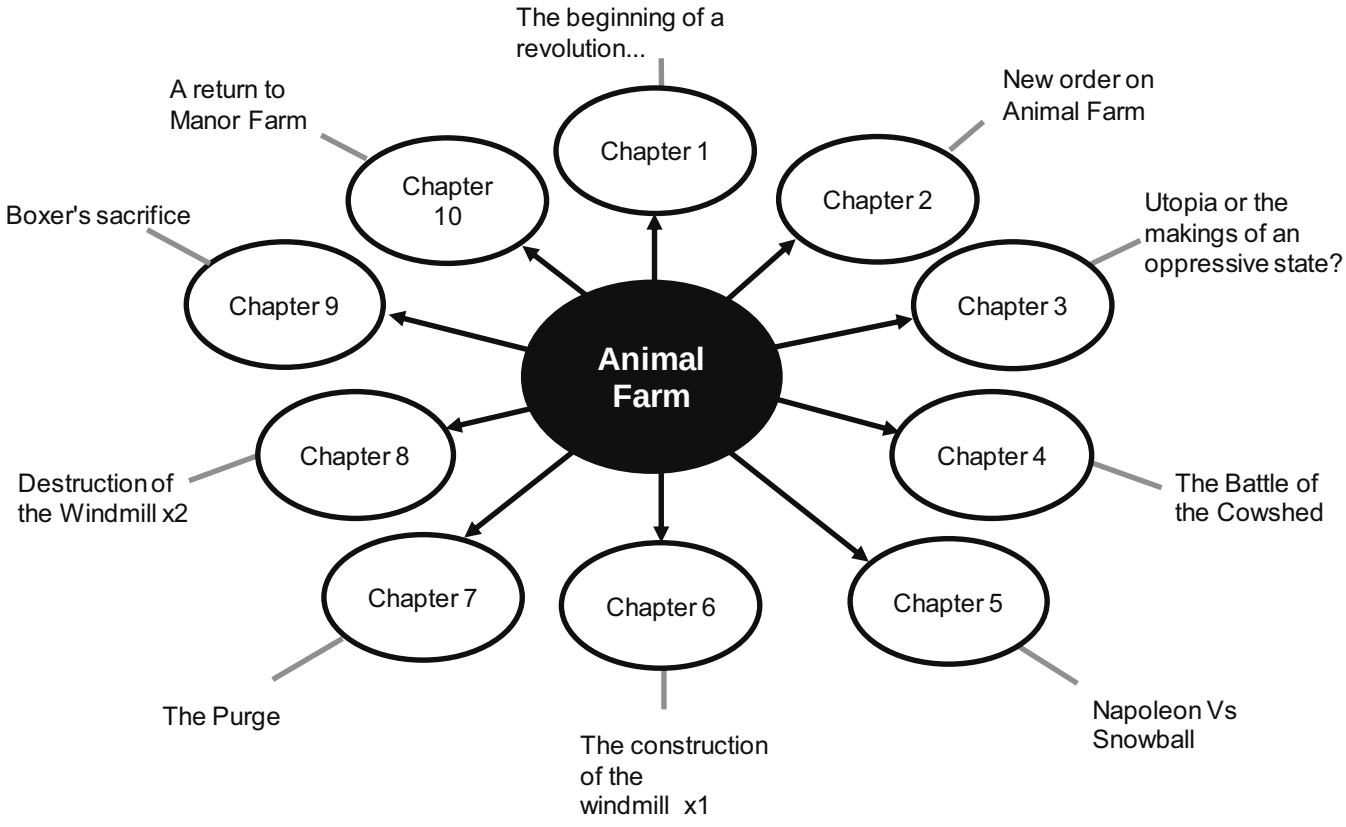
WORD	DEFINITION
Dictatorship	A dictatorship is a government or a social situation where one person makes all the rules and decisions without input from anyone else.
Egocentric	Thinking only of oneself, without regard for the feelings or desires of others.
Eloquent	having or exercising the power of fluent, forceful, and appropriate speech.
Hedonistic	Engaging in the pursuit of pleasure.
Inadequate	Unable to deal with a situation or with life.
Incompetent	Not having the necessary skills to do something successfully.
Inconsiderate	Thoughtlessly causing pain or inconvenience to others.

TIER TWO VOCABULARY

WORD	DEFINITION
Idealism	The unrealistic belief in or pursuit of perfection.
Indifferent	Unconcerned or uninterested.
Ingenuous	Innocent, naïve and unworldly.
Loyal	Giving or showing firm and constant support or allegiance to a person.
Manipulative	Influencing others through deceptive or underhanded tactics.
Naïve	Showing a lack of experience or judgement (Snowball is politically naïve).
Opportunistic	Exploiting immediate opportunities.
Pessimistic	Tending to see the worst aspect of things.

WORD	DEFINITION
Shrewd	To judge a situation accurately and turn it to your own advantage.
Socialist	The idea of collective effort and ownership benefiting all and removing inequality.
Spoilt	Harmed in character by being treated too indulgently.
Steadfast	Dutifully firm and committed to a cause.
Tactical	Relating to actions carefully planned to gain a specific military end.
Tyrannical	Using power in a cruel way or for your own personal gain.
Unscrupulous	Having or showing no moral principles.
Usurp	Seize and take control without authority and possibly with force; take as one's right or possession.

ANIMAL FARM KEY EVENTS



ANIMAL FARM CONTEXT AND EVENTS

Chapter One
The animals are unhappy living at Manor Farm and Old Major gives a speech to inspire the animals to rebel.

Chapter Two
The animals learn Beasts of England and the principles of Animalism.

Chapter Two and Three
Old Major dies and the animals lead a rebellion against Mr Jones. Snowball and Napoleon take charge of the farm.

Chapter Four and Five
Divisions start to form between Snowball and Napoleon during the Battle of the Cowshed. They debate the windmill.




Tzar Nicholas II was the ruler. He was part of the Russian autocracy.

The February and October Revolutions forced Nicholas II to abdicate. Lenin (a Bolshevik) was placed as provisional government.

Lenin ruled for seven years before dying.

The two primary competitors were Stalin and Trotsky. Stalin takes power and becomes a dictator.

Chapter 1

The beginning of a revolution!





PLOT	Famer Jones is introduced as an inadequate leader. He fails to protect the animals and forgets to feed them. The animals hold a secret meeting showing that they are scared of him.	The animals enter in a specific order and Old Major waits to speak to them on a raised platform. The pigs sit at the front. Old Major tells the animals that he has had a dream.	In his speech, Old Major first encourages the animals to question their existence and blames man for all their suffering.	In his speech, Old Major also addresses different animals and comments on how Jones exploits them. He warns Boxer that he will be sold to the butchers.	The meeting ends with the singing of 'Beasts of England'. Farmer Jones is awoken by the uproar and shoots at the barn to quieten the animals.
KEY QUOTES	"Mr Jones, of Manor Farm, […] was too drunk to remember to shut the pop-holes"	"then the pigs, who settled down in the straw immediately in front of the platform"	"Man is the only real enemy we have."	"Boxer, the very day that those great muscles of yours lose their power, Jones will sell you to the knackers"	"The pellets buried themselves in the wall of the barn and the meeting broke up hurriedly."

Chapter 2

Overthrowing the status quo





PLOT	After the death of Old Major, the animals spend their days secretly planning the rebellion and the pigs are placed in charge of educating the animals about Animalism.	Among the pigs, Snowball and Napoleon are the most important to the revolution. Mollie is concerned about her ribbons and Moses speaks about a place called 'Sugarcandy Mountain'.	The rebellion occurs when Jones again falls into a drunken sleep and neglects to feed the animals. The triumphant animals then destroy all traces of Jones.	Snowball changes the sign reading "Manor Farm" to "Animal Farm" and paints the Seven Commandments of Animalism on the wall of the barn.	The cows need milking. The cows then give five buckets of milk, which disappears.
KEY QUOTES	"The work teaching and organising the others fell naturally upon the pigs"	"Comrade," said Snowball, 'those ribbons that you are so devoted to are the badge of slavery."	"Almost before they knew what was happening, the Rebellion had been successfully carried through"	'All animals are equal"	"When they came back in the evening it was noticed that the milk had disappeared."

Chapter 3

Utopia?





PLOT	The animals cooperate to finish the harvest. Boxer distinguishes himself as a strong, tireless worker, admired by all the animals.	The pigs become the supervisors and directors of the animal workers. On Sundays, the animals meet in the big barn to listen to Snowball and Napoleon debate a number of topics.	To help the animals understand the general precepts of Animalism, Snowball reduces the Seven Commandments to a single maxim: "Four legs good, two legs bad."	The animals learn that the cows' milk and windfall apples are mixed every day into the pigs' mash.	When the animals object, Squealer explains that the pigs need the milk and apples to sustain themselves as they work for the benefit of all the other animals.
KEY QUOTES	"How they toiled and sweated to get the hay in!"	"The pigs did not actually work, but directed and supervised others."	"The birds did not understand Snowball's long words, but they accepted his explanations"	"these would be shared out equally:[…] all the windfalls were to be collected […] for the use of the pigs."	"Milk and apples (this has been proven by Science, comrades) contain substances absolutely necessary to the well-being of a pig."

Chapter 4

The Battle of the Cowshed





PLOT

As summer ends, news of the rebellion spreads to other farms. Farmer Jones has spent most of his time at the Red Lion in Willingdon.

Farmer Frederick and Pilkington reluctantly, but out of fear of rebellion in their own farms, decide to help Farmer Jones and his men.

The animals are ready for Farmer Jones to attack. Snowball had studied an old book on Julius Caesar's campaigns. Snowball turns out to be an extraordinary tactician.

During the battle, Napoleon is not mentioned, and Mollie is hiding. Snowball and Boxer are very active in the battle. Snowball is hurt by a bullet and Boxer thinks that he has killed someone.

A sheep dies and is given the honour of 'Animal Hero, Second Class'. The animals then celebrate their victory in what they call "The Battle of the Cowshed." The animals sing 'Beasts of England'.

KEY QUOTES

"[Farmer Jones was] complaining to anyone who would listen of the monstrous injustice he had suffered"

"both [Pilkinton and Frederick] were frightened by the rebellion on Animal Farm"

"Snowball at the head of them"

"I had no intention of doing that. I forgot that I was wearing iron shoes." [Boxer]

"It was decided to set the gun up at the foot of the flagstaff , […] and to fire it twice a year"

Chapter 5

Napoleon seizes power!





PLOT

Winter comes, and Mollie works less and less, and eventually disappears. The pigeons report seeing her standing outside a pub, sporting one of the ribbons that she always coveted.

The pigs increase their influence on the farm, deciding all questions of policy and then offering their decisions to the animals, who must ratify them by a majority vote.

Snowball and Napoleon continue their debates, the greatest of which occurs over the building of a windmill on a knoll. On the Sunday, the plan for the windmill is to be put to a vote.

Napoleon calls out nine ferocious dogs, who chase Snowball off the farm. The animals are terrified.

Napoleon then announces that all debates will stop and institutes a number of other new rules for the farm, but surprises everybody by announcing that the windmill will be built.

KEY QUOTES

"None of the animals ever mentioned Mollie again."

"the pigs occupied themselves with the planning out the work of the coming season."

"they [the animals] always found themselves in agreement with the one who was speaking at the moment"

"Silent and terrified, the animals crept back into the barn. […] They were huge dogs, fierce-looking as wolves."

"but there would be no more debates"

ANIMAL FARM CONTEXT AND EVENTS

Chapter Five and Six
Snowball is chased off the farm by Napoleon's dogs. The animals start to build the windmill according to Napoleon's plans.

Chapter Seven
The pigs announce that the hens will have to sell their eggs which causes the hens to destroy their eggs in protest.
Napoleon forces animals to confess to crimes and has them murdered by the dogs.

Chapter Eight
Napoleon attempts to sell timber to Frederick but learns from Whymper that Frederick's banknotes are fraudulent. Frederick and 14 other men blow up the windmill which leads to The Battle of the Windmill.

Chapter Ten
The sheep learn to chant 'Four legs good, two legs better.' The pigs become indistinguishable from men whilst the other animals live in suffering.

Trotsky is banished from the Soviet Union and Stalin adopts Trotsky's Soviet Five-Year Plan.

Peasants burned crops and slaughtered livestock rather than giving it to the state. NKVD helped Stalin carry out purges.

Molotov-Ribbentrop Pact between Russia and Germany. German invasion of Russia.

Stalin replaces "The Internationale" with the "National Anthem of the Soviet Union".

Chapter 6

The Windmill

PLOT

During the following year, the animals work harder than ever before completing farm work and building the windmill.

Napoleon announces that Animal Farm will begin trading with neighbouring farms and hires Mr. Whymper.

The pigs move into the farmhouse and begin sleeping in beds, which Squealer excuses on the grounds that the pigs need their rest after the daily strain of running the farm.

Boxer works the hardest at ensuring the windmill is built and even works at night time.That November, a storm topples the half-finished windmill.

Napoleon tells the animals that Snowball is responsible for its ruin and then declares that they will begin rebuilding the windmill that very morning.

KEY QUOTES

"All that year the animals worked like slaves."

"He [Mr Whymper] was a sly-looking little man […] The animals watched his coming and going with a kind of dread"

"It was absolutely necessary, he said, that the pigs, who were the brains of the farm, should have a quiet place to work in."

"A terrible sight had met their eyes. The windmill was in ruins."

"Forward, comrades! Long live the windmill! Long live Animal Farm!"

Chapter 7

The Purge





PLOT

The weather gets worse. The animals are led to believe that Snowball is visiting the farm at night and spitefully subverting their labour. He becomes a constant (and imagined) threat to the animals' security.	The animals are facing starvation and Squealer announces that the chickens' eggs will have to be sold. The chickens rebel but their rebellion is swiftly supressed.	Napoleon calls a meeting of all the animals, during which he forces confessions from all those who had questioned him and then has them murdered by the dogs.	The terrible bloodshed leaves the animals deeply shaken and confused. Boxer says that he would never have believed that such a thing could happen on Animal Farm. He blames himself.	Eventually, the singing of "Beasts of England" is outlawed and a new song by Minimus, Napoleon's pig-poet, is instituted. It is a nationalist anthem for Animal Farm.

KEY QUOTES

"It was a bitter winter. The stormy weather was followed by sleet and snow."	"When the hens heard this they raised a terrible outcry."	"Immediately the dogs bounded forward, seized four pigs by the ear and dragged them, squealing with pain and terror"	"These scenes of terror and slaughter were not what they had looked forwards to on that night when Old Major first stirred them to rebellion"	"So 'Beasts of England' was heard no more."

Chapter 8

The Windmill is destroyed (again)





PLOT

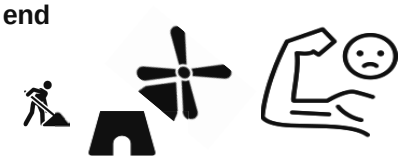
The animals have to work harder than in previous years. Squealer shares with them false figures about the increased production of food on the farm.	Napoleon schemes to sell a pile of timber to Frederick, who tries to pay with a cheque. Napoleon, however, demands cash, which he receives. Whymper then learns that Frederick's banknotes are forgeries.	Frederick and 14 men arrive at Animal Farm and attempt to take it by force. The humans are initially successful, after they blow up the windmill. The animals are completely enraged and drive the men from the farm.	Squealer explains to the bleeding animals that they were actually victorious in what will hereafter be called "The Battle of the Windmill." Boxer is severely injured during the battle.	The pigs find a case of whiskey in Jones' cellar. Napoleon gets ill from it and it is thought he had been poisoned. Napoleon gets better. The pigs change the commandment about drinking.

KEY QUOTES

"Throughout that year the animals worked in the previous year."	"The bank-notes were forgeries! Frederick had got the timber for nothing."	"they did not heed the cruel pellets that swept over them like hail. It was a savage battle."	"In the general rejoicing the unfortunate affair of the bank-notes was forgotten."	"'No animal shall drink alcohol', but there were two words that they had forgotten […] 'to excess'"

Chapter 9

Boxer's end



PLOT

The animals begin building a new windmill. Their efforts are again led by Boxer who, despite his split hoof, insists on working harder and getting the windmill started before he retires.

One day, however, he collapses because of a lung ailment. After he is helped back to his stall, Squealer informs them that Napoleon has sent for the veterinarian at Willingdon to treat him.

The van arrives to take Boxer to the hospital; however, Benjamin reads its side and learns that Boxer is actually being taken to a knacker, or butcher.

Clover screams to Boxer to escape, but he is too weak. Boxer is never seen again. Squealer speaks of Boxer's honourable service and devotion to 'Animal Farm' and Napoleon.

The chapter ends with a grocer's van delivering a crate of whisky to the pigs, who drink it all and do not arise until after noon the following day.

KEY QUOTES

"For a horse, it was said, the pension would be five pounds of corn a day […] possibly an apple on public holiday."

"His eyes were glazed, his sides matted with sweat."

"'Fools! Fools!' shouted Benjamin […] 'Do you not see what is written on the side of the van?'"

"'I was ate his beside at the very last.[…] He whispered […] that his sole sorrow was to have passed on before the windmill was finished.'"

"the pigs had acquired the money to buy themselves another case of whisky."

Chapter 10

The ultimate betrayal

PLOT

Years pass. Many animals age and die, and few recall the days before the Rebellion. The farm seems to have grown richer, but only the many pigs and dogs live comfortable lives.

Squealer takes the sheep off to a remote spot to teach them a new chant. Squealer walks toward the animals on his hind legs.

Napoleon soon appears walking upright; he carries a whip. Before the other animals have a chance to react to the change, the sheep begin to chant: "Four legs good, two legs better!"

Only the last commandment remains: "all animals are equal." However, it now carries an addition: "but some animals are more equal than others."

The farmers praise the pigs and express their regret for past "misunderstandings." Napoleon announces the change of the farm's name back to 'Manor Farm'. The pigs and men fall out. The animals look confused.

KEY QUOTES

"They [the animals] were generally hungry, they slept on straw […] in winter they were troubled by the cold, and in summer by the flies."

"He [Squealer] was teaching them [the sheep] to sing a new song"

"Napoleon himself, majestically upright […] He carried a whip in his trotter."

"All animals are equal but some animals are more equal than others."

"The creatures outside looked from pig to man […] but already it was impossible to say which was which."

ANIMAL FARM CHARACTERS- THE PIGS

Snowball

One of the leading pigs who challenges Napoleon for leadership of the farm after the rebellion

Wants to educate the animals and spread the ideals of the revolution to other farms

Naïve
Brave
Tactical

Opposition in politics

Passionate about communism

Symbolic of: **Leon Trotsky**

Napoleon

The pig who emerges as the leader of the farm after the rebellion

Uses violence and intimidation to get his own way

Shrewd
Tyrannical
Callous

Manipulative and dangerous dictators

Violence and the corruptive nature of power

Symbolic of: **Joseph Stalin**

Squealer

Napoleon's mouthpiece who spreads news and lies around the farm

Able to manipulate the animals using hollow yet convincing rhetoric

Devious
Calculating
Eloquent

Propaganda machine

The control of information and the media in the Soviet Union

Symbolic of: **Soviet press**

ANIMAL FARM CHARACTERS- THE HORSES

Mollie

A vain horse who prefers ribbons and sugar over ideas and rebellion

Lured of the farm with the promises of a comfortable life

Egocentric
Spoilt
Hedonistic

The upper classes who fled from Russia a few years after the Russian Revolution

Interested in material wealth and looks

Symbolic of: **the bourgeoisie**

Boxer

A dedicated but dim-witted horse

Is crucial in the building of the windmill

Devoted
Ingenuous
Steadfast

Peasants of the Soviet Union

Hard-working and committed to the cause

Symbolic of: **the male working classes**

Clover

A motherly horse who is friends with Boxer

Silently questions some of Napoleon's decisions and one of the only animals who can read

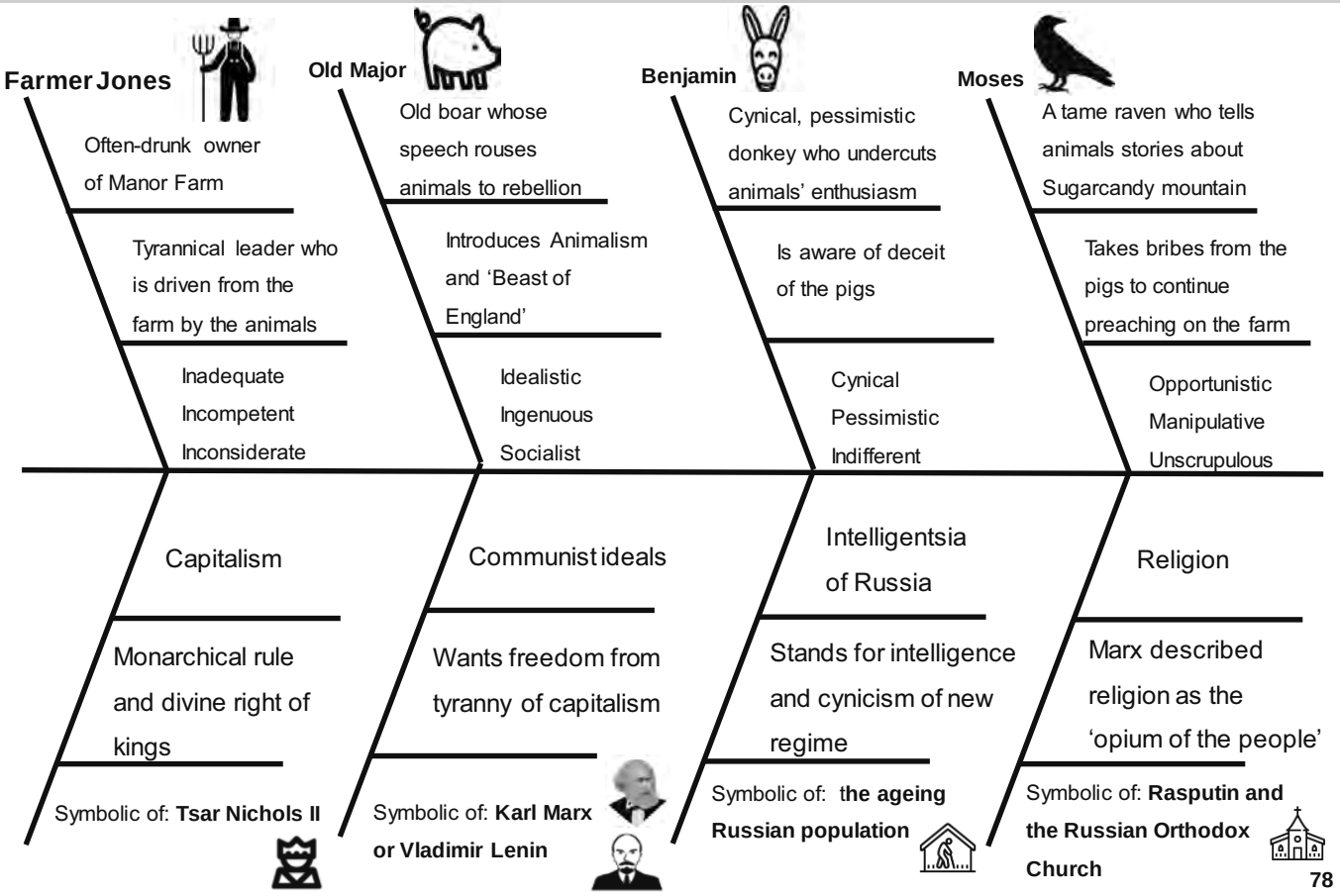
Compassionate
Concerned
Loyal

Peasants of the Soviet Union

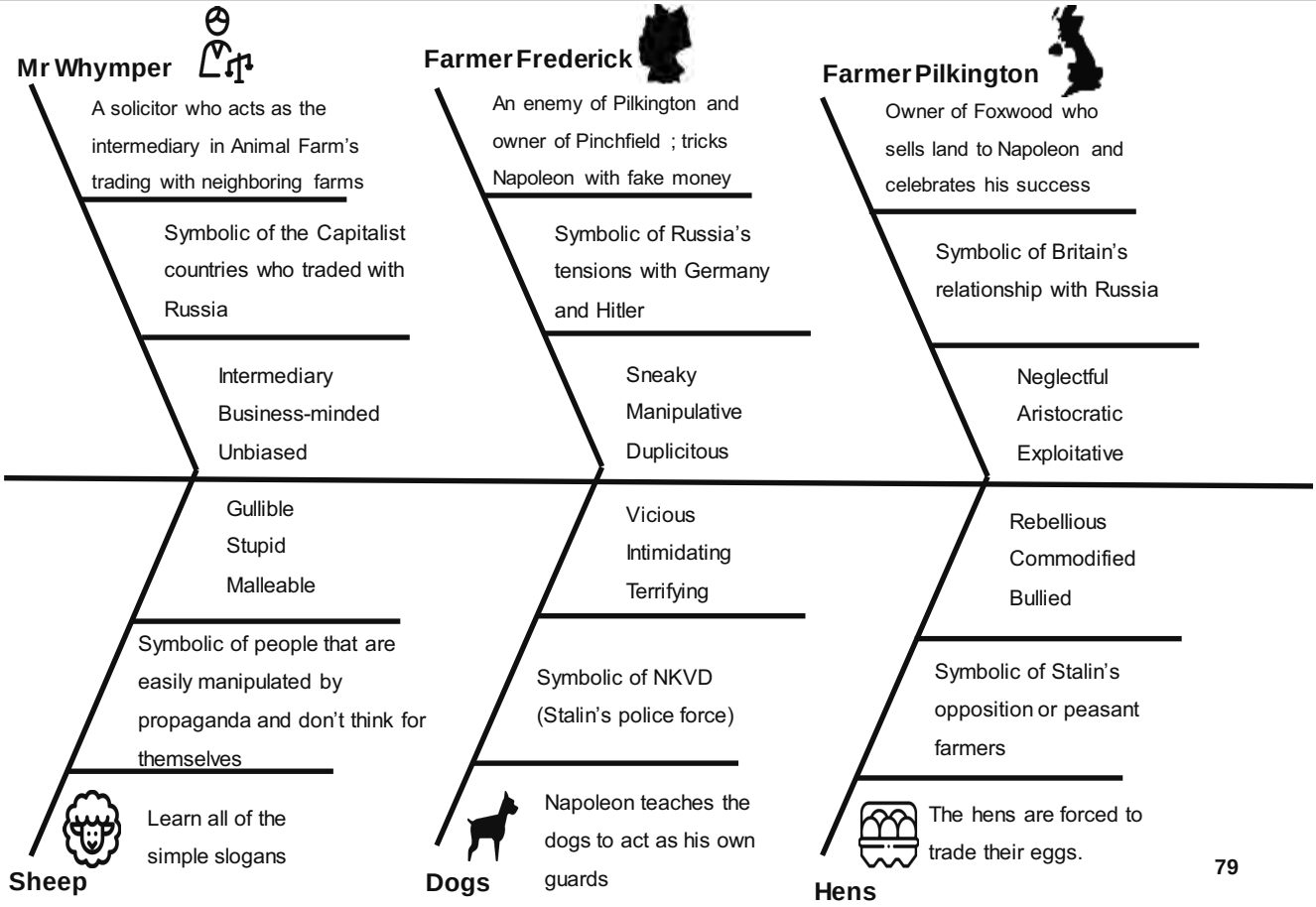
Maternal and gentle

Symbolic of: **the female working classes**

ANIMAL FARM CHARACTERS- OTHER ANIMALS



ANIMAL FARM CHARACTERS- MINOR CHARACTERS



Vocabulary Bank

Full academic year

CONTENTS

YEAR 7 TIER TWO VOCABULARY RECALL

William Blake

WORD	DEFINITION
Inequality	A lack of equality.
Revolution	A forcible overthrow of a government or social order, in favour of a new system.
Childhood	The state of being a child.
Industrial	Relating to or characterized by industry.
Morality	Principles concerning the distinction between right and wrong or good and bad behaviour.
Poverty	The state of being extremely poor.
Vengeance	Getting revenge on someone who has wronged you
Romanticism	An artistic and philosophical movement that redefined the ways people think about themselves and the world.
Misogyny	A hatred towards women.

Women's Literature

WORD	DEFINITION
Empowerment	The process of becoming stronger and more confident, especially in controlling one's life and claiming one's rights.
Prejudice	A preconceived opinion that is not based on reason or actual experience.
Society's norms	The informal rules that govern behaviour in groups and societies.
Suffrage	The right to vote.
Feminism	The belief in women's rights on the ground of the equality of the sexes
Discrimination	The unjust or prejudicial treatment of different categories of people, especially on the grounds of race, age, sex, or disability
Equality	The state of being equal, especially in status, rights, or opportunities
Patriarchy	A society where men have more power than women

YEAR 7 TIER TWO VOCABULARY RECALL

Private Peaceful

WORD	DEFINITION
Justice	Fair behaviour or treatment.
Society	People living together in a more or less ordered community.
Alliance	A union or association formed for mutual benefit, especially between countries
Nationalism	A person who strongly identifies with their own nation and supports its interests to the exclusion of other nations
Patriotism	A person who has or expresses devotion to and support of their country
Conflict	A serious disagreement or argument.
Cowardice	A lack of bravery.
Nostalgia	A sentimental longing or wistful affection for a period in the past.

Shakespearian Comedy

WORD	DEFINITION
Gender	Gender is the range of characteristics relating to, and differentiating between, femininity and masculinity.
Patriarchy	A society in which men hold more power than women.
Expectation	A strong belief that something will happen or be the case.
Hierarchy	A system in which members of an organization or society are ranked according to relative status or authority.
Stereotype	A widely held but fixed and oversimplified image or idea of a particular type of person or thing.
Renaissance	The revival of European art and literature under the influence of classical models in the 14th–16th centuries.

YEAR 8 TIER TWO VOCABULARY RECAP

Life, Labour and Loss

WORD	DEFINITION
Capitalism	An economic or political system where a country's trade and industry is controlled by private owners for profit not the state.
Capital Punishment	The legally authorised killing of someone as punishment for a crime.
Charity	The voluntary giving of help, typically in the form of money, to those in need.
Child Labour	The employment of children in an industry or business.
Control	The power to influence or direct people's behaviour or the course of events.
Corporal Punishment	Physical punishment, such as caning or flogging.
Despair	The complete loss or absence of hope.

WORD	DEFINITION
Desperation	A state of despair, typically one which results in rash or extreme behaviour.
Despondent	In low spirits from a loss of hope or courage.
Destitution	Extremely poor and lacking the means to provide for oneself.
Dilapidated	In a state of disrepair or ruin as a result of age or neglect.
Exploration	The action or fact of treating someone unfairly in order to benefit from their work.
Industrial	Economic activity concerned with the processing of raw materials and manufacture of goods in factories.
Inequality	Lack of equality.

Life, Labour and Loss

WORD	DEFINITION
Labour	Employment in an industry or business.
Malnutrition	Lacking proper nutrition.
Neglect	The failure to provide care for property.
Oppression	The prolonged cruel or unjust treatment or exercise of authority.
Pauper	A recipient of relief under the provisions of the Poor Law or public charity.
Poverty	The state of being extremely poor.

WORD	DEFINITION
Redemption	The action of saving or being saved from sin, error or evil.
Reform	Make changes in (something, especially an institution or practice) in order to improve it.
Superiority	Higher ranking in status or quality.
Voracious	Wanting great quantities of food.
Welfare	The statuary procedure and social effort designed to promote the basic physical and material well-being of people in need.

Pride Not Prejudice

WORD	DEFINITION
Bilingual	The ability to speak two languages fluently.
Culture	The ideas, customs, and social behaviour of a particular people or society.
Discrimination	The unfair or prejudicial treatment of people and groups based on characteristics such as race, gender, age or sexual orientation.
Empowerment	The process of becoming stronger and more confident.
Ethnicity	The state of belonging to a social group that has a common national or cultural tradition.
Expectations	A strong belief that something will happen or be the case.

	DEFINITION
Family	A group of people related by blood or marriage.
Gender	The range of characteristics pertaining to, and differentiating between, masculinity and femininity.
Hierarchy	A system in which members of an organization or society are ranked according to relative status or authority.
History	The whole series of past events connected with a particular person or thing.
Justice	Fair behaviour or treatment.
Language	The method of human communication, either spoken or written, consisting of the use of words in a structured and conventional way.

YEAR 8 TIER TWO VOCABULARY RECAP

Pride Not Prejudice

WORD	DEFINITION
Memory	Something remembered from the past.
Morality	The difference between right and wrong.
Mother tongue	The language which a person has grown up speaking from early childhood.
Nationality	The status of belonging to a particular nation.
Region	An area, especially part of a country or the world having definable characteristics, but not always fixed boundaries.
Revolution	A forcible overthrow of a government or social order, in favour of a new system.

WORD	DEFINITION
Patriarchy	A society where men hold more power than women.
Sexuality	A person's sexual orientation or preference.
Society's norms	The informal rules which govern people's behaviour in groups.
Stereotypes	A widely held but fixed and oversimplified image or idea of a particular type of person or thing.
Tradition	The transmission of customs or beliefs from generation to generation, or the fact of being passed on in this way.

TIER TWO VOCABULARY The Lie Tree

WORD	DEFINITION
Curiosity	A strong desire to know or learn something.
Femme Fatale	An attractive and seductive woman, especially one who is likely to cause distress or disaster for a man who becomes involved with her.
Gothic	A genre of literature and film that combines fiction and horror, death and, at times, romance.
Grotesque	Comically or repulsively ugly or distorted.
Injustice	Lack of fairness or justice.
Isolation	Being on your own away from others.

WORD	DEFINITION
Monstrous	Having the ugly or frightening appearance of a monster.
Neglect	Failure to care for property or people.
Paranormal	Denoting to events or phenomena which are beyond the scope or normal scientific understanding.
Resurrection	The action or fact of rising from the dead.
Supernatural	Manifestations or events considered to be of supernatural origin, such as ghosts.
Telepathic	Able to read the minds of other people.

Shakespearean Histories

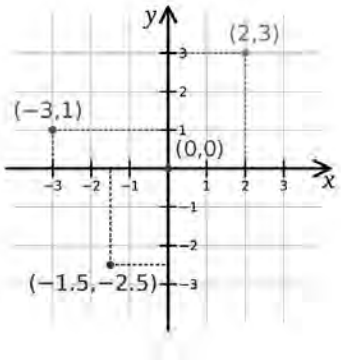
WORD	DEFINITION
Authority	The power or right to give orders, make decisions, and enforce obedience.
Expectations	A strong belief that something will happen or be the case.
Damnation	Condemnation to eternal punishment in hell.
Hierarchy	A system in which members of an organisation or society are ranked according to relative status or authority.
Manipulation	To control or influence (a person or situation) cleverly or unscrupulously.

WORD	DEFINITION
Misogyny	A hatred of women.
Monarchy	A form of government with a king or queen at the head.
Patriarchy	A society where men hold more power than women.
Redemption	The action of saving or being saved from sin, error, or evil.
Society's norms	The informal rules that govern behaviour in group.
Supreme	Having great power and influence.

GCSE Mathematics Knowledge Organiser

A1: Algebra Notation

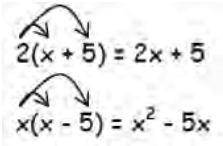
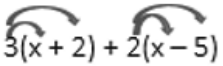
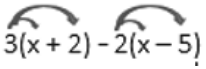
Plot Coordinates
Collect Like terms
Simplify Expressions

A1.1 Plot coordinates in four quadrants e.g. Plot the origin (0,0) Plot the point (2,3) Plot the point (-3,1) Plot the point (-1.5, -2.5)	(x coordinate, y coordinate) For x, move right for positive values and left for negative. For y, move up for positive values and down for negative. e.g. 

A1.2 Collect like terms by adding and subtracting e.g. a + 2a a + 2b $5a^2 – 2a^2$ $a^2 – 2a$	Only like terms can be added or subtracted. e.g. a + 2a = 3a a + 2b cannot be added $5a^2 – 2a^2 = 3a^2$ $a^2 – 2a$ cannot be subtracted
A1.3 Simplify simple expressions by multiplying e.g. a x b 2a x 3a	Terms can be simplified when multiplying. Multiply any numbers first, then write the letters including any powers that result. e.g. a x b = ab 2a x 3a = $6a^2$

A1: Algebra Notation

Expand a single bracket
Factorise into a single bracket
Substitute into an expression

A1.4 Expand a single bracket e.g. Expand 2(x + 5) Expand x(x - 5) Expand and simplify expressions with more than one bracket e.g. Expand 3(x + 2) + 2(x – 5) 3(x + 2) – 2(x – 5)	Multiply everything in the bracket by what is outside.  Expand each bracket and then simplify the expression. Take care with negative numbers.  = 3x + 6 + 2x – 10 = 5x - 4  = 3x + 6 -2x + 10 = x + 16

A1.5 Factorise into a single bracket. e.g. 4y - 12 $y^2 + 7y$	Divide by the highest common factor of each part of each term. e.g. 4 is the HCF of 4 and 12. y is not common to both terms. 4y – 12 = 4(y – 3) Y is common to both terms. $y^2 + 7y = y(y + 7)$
A1.6 Substitute into an expression. e.g. Find the value of 3a - b when a = 6 and b = -2.	Replace the letters with the given numbers, then carry out the calculation. Remember BIDMAS and the rules for negative numbers. e.g. 3a – b = 3 x 6 –(-2) = 18 + 2 = 20

A1: Algebra Notation

Use a formula by substituting numbers

Expand two brackets

A1.7 Use a formula by substituting numbers e.g. Use the formula v = u + at to work out v when u = 5, a = 10, t = 6. Use the formula v = u + at to work out a when v = 32, u = 7, t = 5. Use the formula v = u + at to work out t when v = 5, u = 17, a = -4.	Replace the letters with the given numbers, then carry out the calculation. Remember BIDMAS and the rules for negative numbers. e.g. v = u + at v = 5 + 10 x 6 v = 5 + 60 v = 65 v = u + at 32 = 7 + 5a 25 = 5a a = 5 v = u + at 5 = 17 – 4t -12 = -4t t = 3

A1.8 Expand two brackets. e.g. (x + 3)(x – 2) (2x – 1)(x + 4)	Use a grid to expand two brackets. Take care with negative numbers. Add together the four terms in the grid. Simplify the two x terms. e.g. x^2 + 3x -2x -6 = x^2 + x -6 $2x^2$ - 3x +8x -12 = $2x^2$ +5x -12

	x	+3
x	x^2	+3x
-2	-2x	-6

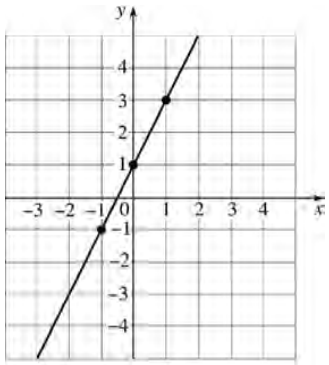
	2x	-3
x	$2x^2$	-3x
+4	+8x	-12

A1: Algebra Notation

Plot a linear graph from a sequence or formula

Use the index rules for multiplication and division

Use the index laws for raising to a power

A1.9 Plot a linear graph from a sequence or formula e.g. Plot the graph of $y = 2x + 1$	Draw a table of values by substituting values of x into the formula. Plot the points in pencil. Join the points with a ruler and pencil. They should be in a straight line. e.g. x | -1 | 0 | 1 y | -1 | 1 | 3 

A1.10 Use the index rules for multiplication and division e.g. $3a^2 \times 2a^3$ $10a^6 \div 5a^2$	Deal with the numbers first. When multiplying add the indices. When dividing subtract the indices. e.g. $3 \times 2 = 6$ $a^2 \times a^3 = a^{2+3} = a^5$ $3a^2 \times 2a^3 = 6a^5$ $10 \div 5 = 2$ $a^6 \div a^2 = a^{6-2} = a^4$ $10a^6 \div 5a^2 = 2a^4$
A1.11 Use the index rules for raising to a power e.g. $(a^2)^4$ $(2a^6)^3$	Raise any numbers to the power outside the brackets first. Multiply the indices when raising a power to a power. e.g. $(a^2)^4 = a^{2\times4} = a^8$ $2^3 = 8$ $(a^6)^3 = a^{6\times3} = a^{18}$ $(2a^6)^3 = 8a^{18}$

A2: Formulae, Functions and Expressions

Use a formula by substituting numbers

Change the subject of a simple formula

Expand two brackets

A2.1 Use a formula by substituting numbers e.g. Use the formula v = u + at to work out v when u = 5, a = 10, t = 6. Use the formula v = u + at to work out a when v = 32, u = 7, t = 5. Use the formula v = u + at to work out t when v = 5, u = 17, a = -4.	Replace the letters with the given numbers, then carry out the calculation. Remember BIDMAS and the rules for negative numbers. e.g. v = u + at v = 5 + 10 x 6 v = 5 + 60 v = 65 v = u + at 32 = 7 + 5a 25 = 5a a = 5 v = u + at 5 = 17 – 4t -12 = -4t t = 3

A2.2 Change the subject of a simple formula e.g. Make t the subject of the formula $v = u + at$	Use the same balancing steps as when you solve equations to change the subject of the formula. e.g $v = u + at$ (Minus u from both sides of the equation) $v - u = at$ (divide both sides of the equation by a) $\frac{v-u}{a} = t$
A2.3 Expand two brackets. e.g. (x + 3)(x – 2)	Use a grid to expand two brackets. Take care with negative numbers. Add together the four terms in the grid. Simp e.g

	x	+3
x	x^2	+3x
-2	-2x	-6

$x^2 + 3x - 2x - 6$
$= x^2 + x - 6$

A2: Formulae, Functions and Expressions

Substitute into an expression

Use a function machine to find input and output

A2.4
Substitute into an expression.

e.g.
Find the value of
3a - b
when
a = 6 and b = -2.

e.g

Find the value of

abc+ 3b
when
a= 5, b=3 and c=7

Replace the letters with the given numbers, then carry out the calculation.
Remember BIDMAS and the rules for negative numbers.

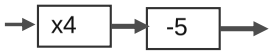
e.g.
3a – b
= 3 x 6 –(-2)
= 18 + 2
= 20

e.g

abc+ 3b
= 5x3x7-3x3
= 105-9
=96

A2.5
Use a function machine to find input or output

e.g
find the output for the function machine below when the input is 4



e.g
find the input for the function machine below when the output is 7

To find the output follow the instructions from left to right. To find the input, reverse the function machine by using inverse functions and follow it from right to left

e.g

Input is 4
= 4x4-5
Output =11

e.g
Reverse function machine is

Output is 7
=7-5x3
Input is 6

A2: Formulae, Functions and Expressions

Evaluate formulae in a calculator including fractions and negative numbers

Rearrange formulae with fractions

Expand and simplify an expression involving brackets

A2.6 Evaluate formulae in a calculator including fractions and negative numbers e.g. Find the value of 5a-3b when a = $\frac{2}{3}$ and b = -2.	Rewrite the formula, replacing the letters with numbers. When putting into a calculator remember to use the fraction key and put any negative numbers into brackets e.g Rewrite the formula to be $5 \times \frac{2}{3} - 3 \times (-2)$ Type into calculator so it looks exactly like this =$\frac{28}{3}$ or $9.\dot{3}$
A2.7 Rearrange formulae with fractions e.g Make x the subject of the formula $y = \frac{x}{5} + k$	Multiply each term by the denominator then use the same balancing method as when solving equations e.g $y = \frac{x}{5} + k$ (Multiply every term by 5) $5y = x + 5k$ (Subtract 5k from both sides) $5y - 5k = x$

A2.8 Expand and simplify an expression involving brackets e.g Expand and simplify $3(x + 2) + 2(x - 5)$ e.g Expand and simplify $3(x + 2) - 2(x - 5)$	To expand brackets multiply each term in the bracket by the term outside the bracket. Collect like terms together. Take care with negative signs. e.g $3(x + 2) + 2(x - 5)$ $=3x + 6 + 2x - 10$ $=5x - 4$ e.g $3(x + 2) - 2(x - 5)$ $=3x + 6 - 2x + 10$ $=x + 16$

A2: Formulae, Functions and Expressions

Factorise a quadratic expression where a=1

Use index rules for multiplying and Dividing

Use index rules for raising to a power

A2.9 Factorise a quadratic expression where a=1 e.g factorise $x^2 + 5x + 4$ e.g Factorise $x^2 - 3x - 4$	Work out two numbers that: Add to make the number in front of x; Multiply to make the number on its own. Write each bracket with an x and one of the numbers. Take care with negative numbers. e.g $x^2 + 5x + 4$ Add to make 5 Multiply to make 4 (x + 4)(x + 1) e.g $x^2 - 3x - 4$ Add to make -3 Multiply to make -4 (x - 4)(x + 1)

A2.10 Use Index rules for multiplying and dividing e.g Simplify $3a^2 \times 5a^7$ e.g Simplify $20c^8 \div 4c^3$	When multiplying the same base number with different indices, ADD the indices When dividing the same base number with different indices subtract the indices e.g Multiply the coefficients together and add the powers $=15a^9$ e.g Divide the coefficients and subtract the powers $=5c^5$
A2.11 Use index rules for raising to a power e.g simplify $(3y^2)^4$	Rewrite the calculation using the usual rules of indices then use the rules of multiplication to simplify e.g Rewrite as $3y^2 \times 3y^2 \times 3y^2 \times 3y^2$ Multiply the coefficients together and add the powers $=81y^8$

A2: Formulae, Functions and Expressions

Rearrange formulae with factorisation

Simplify algebraic fractions by factorisation

A2.12 Rearrange formulae with factorisation e.g. Make x the subject of the formula $ax = by + cx$	If there is more than one of the variable you're making the subject you will need to factorise. Move all of that variable to one side of the equation then factorise it out to leave you with only one of that variable e.g Move all the terms with x in them onto the same side $ax - cx = by$ Factorise out the x variable $x(a - c) = by$ Divide both sides by the created brackets $x = \frac{by}{a - c}$

A2.13 Simplify algebraic fractions by factorisation e.g Simplify $\frac{6x - 15}{9}$ e.g Simplify $\frac{x^2 + 7x + 12}{x^2 - 2x - 15}$	Start by factorising the numerator and denominator of the fraction. Then look for common factors that can be cancelled, these may be brackets or coefficients of brackets e.g Factorise the numerator $\frac{3(2x - 5)}{6}$ Cancel the common factor of 3 from the denominator and the multiplier of the brackets on the numerator $\frac{2x - 5}{2}$ e.g Factorise the numerator and denominator $\frac{(x + 3)(x + 4)}{(x + 3)(x - 5)}$ Cancel the matching brackets $\frac{(x + 4)}{(x - 5)}$

A2: Formulae, Functions and Expressions

Adding/Subtracting Algebraic fractions

Multiplying/Dividing algebraic fractions

Expand Triple Brackets

Substitute into a function using function notation

A2.14 Adding/Subtracting Algebraic Fractions e.g simplify $\frac{2x-4}{3}+\frac{3x+4}{5}$	Form a common denominator by using cross multiplication. Then add/subtract the numerator using the rules of algebra e.g Form a common denominator in the usual way $\frac{10x-20}{15}+\frac{9x+12}{15}$ Add the numerators together $\frac{19x-8}{15}$
A2.15 Multiplying/Dividing algebraic fractions e.g Simplify $\frac{x^2+2x-3}{x^2+4x+4}\div\frac{x^2+5x+6}{x^2-6x-16}$	Factorise the numerator/denominator of all fractions then follow the usual rules for multiplying/dividing, remembering to cross cancel e.g Factorise numerator and denominator and keep change flip $\frac{(x+3)(x-1)}{(x+2)(x+2)}\times\frac{(x+2)(x-8)}{(x+2)(x+3)}$ Cross cancel matching brackets $\frac{(x-1)(x-8)}{(x+2)(x+2)}$

A2.16 Expand triple brackets e.g Expand and simplify $(x+3)(x+4)(x-2)$	Expand two of the brackets using a grid then multiply the answer by the third bracket in another grid e.g Expand the first two brackets using a grid 	x	x	$+3$
---	---	---
x	x^2	$+3x$
$+4$	$+4x$	$+12$ | $=x^2+7x+12$ Then put this answer into another grid and expand with the third | x	x	$+7x$	$+12$
---	---	---	---
x	x^3	$+7x^2$	$+12x$
-2	$-2x^2$	$-14x$	-24	 $=x^3+5x^2-2x-24$
A2.17 Substitute into a function using function notation e.g If $f(x)=x^2-5$ evaluate $f(4)$	Replace the letter in the bracket with the number in the bracket and calculate using BIDMAS e.g Replace the x ('s)in the formula with 4 and calculate $=4^2-5$ $=11$

A2: Formulae, Functions and Expressions

Find the Inverse of a function

Find a compound function

A2.18 Find the inverse of a function e.g Find $f^{-1}(x)$ where $f(x) = 3x + 5$ e.g Find $f^{-1}(x)$where $f(x) = x^2 - 6$	Replace the $f(x)$ notation with a y then rearrange the formula to make x the subject of the formula. Finally replace all y's in the formula with x's e.g Replace f(x) with y $y = 3x + 5$ Rearrange the formula to make x the subject $x = \frac{y-5}{3}$ Replace all y's with x's $f^{-1}(x) = \frac{x-5}{3}$ e.g Replace f(x) with y $y = x^2 - 6$ Rearrange the formula to make x the subject $x = \sqrt{y+6}$ Replace all y's with x's $f^{-1}(x) = \sqrt{x+6}$

A2.19 Find a compound function e.g Find $fg(x)$ where $f(x) = 3x + 5$ and $g(x) = x^2 - 6$ e.g Find gf(x) where $f(x) = 3x + 5$ and $g(x) = x^2 - 6$	Work from right to left replacing the x's with the stated function. e.g Working from right to left $g(x)$ needs to be substituted into $f(x)$ $fg(x) = 3(x^2 - 6) + 5$ Expand the brackets and simplify $fg(x) = 3x^2 - 13$ e.g Working from right to left $f(x)$needs to be substituted into $g(x)$ $gf(x) = (3x + 5)^2 - 6$ Expand the brackets and simplify $gf(x) = 9x^2 + 30x + 19$

A3: Solving Equations and Inequalities

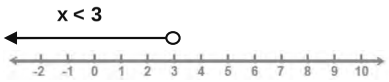
Solve Simple and two step linear equations

Solve Linear equations with brackets

Solve Linear equations with unknowns on both sides

Solve a linear inequality

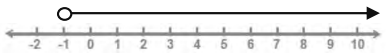
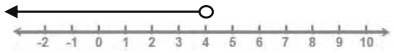
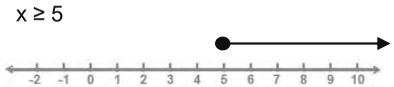
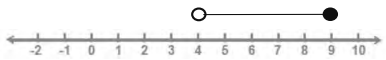
A3.1 Solve simple and two step linear equations e.g. 2x – 3 = 7 $\frac{x}{2}$ + 1 = 5	e.g. 2x – 3 = 7 (add 3 to each side) 2x = 10 (divide both sides by 2) x = 5 e.g. $\frac{x}{2}$ +1 = 5 (subtract 1 from each side) $\frac{x}{2}$ = 4 (multiply both sides by 2) x = 8
A3.2 Solve linear equations with brackets e.g. 3(4x + 1) = 15 2(5x - 4) = 12	e.g. 3(4x + 1) = 15 (expand the bracket) 12x + 3 = 15 (subtract 3 from both sides) 12x = 12 (divide both sides by 12) **x = 1** e.g. 2(5x - 4) = 12 (expand the bracket) 10x - 8 = 12 (add 8 to each side) 10x = 20 (divide both sides by 10) **x = 2**

A3.3 Solve linear equations with unknowns on both sides e.g. 2a + 5 = a + 8 4a - 3 = 2a + 11	e.g. 2a + 5 = a + 8 (subtract a from both sides) a + 5 = 8 (subtract 5 from both sides) **a = 3** e.g. 4a - 3 = 2a + 11 (subtract 2a from both sides) 2a - 3 = 11 (add 3 to both sides) **a = 7**
A3.4 Solve a linear inequality e.g. 2x – 4 < 2 3x + 5 > 11	e.g. 2x – 4 < 2 (add 4 to both sides) 2x < 6 (divide both sides by 2) **x < 3**  e.g. 3x + 5 > 11 (add 4 to both sides) 3x > 6 (divide both sides by 2) **x > 2** 

A3: Solving Equations and Inequalities

Display an inequality on a number line

Solve Linear Simultaneous Equations

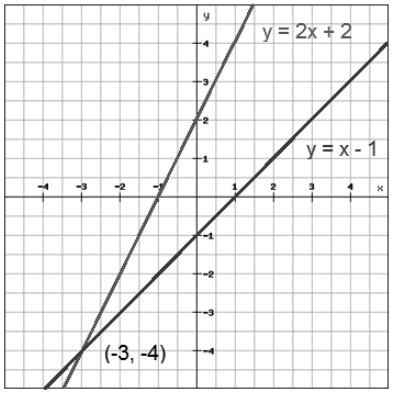
A3.5 Display an inequality on a number line e.g. x > -1 x < 4 x ≤ 7 x ≥ 5 4 < x ≤ 9	A circle represents the number in the inequality. If the sign is > or < then the circle is not coloured in. If the sign is ≥ or ≤ then the circle is coloured in. x > -1 (x is greater than -1) x < 4 (x is less than 4) x ≤ 7 (x is less than or equal to 7) x ≥ 5 (x is greater than or equal to 5) 4 < x ≤ 9 (x is greater than 4 and less than or equal to 9) e.g. x > -1  x < 4  x ≤ 7  x ≥ 5  4 < x ≤ 9 

A3.6 Solve linear simultaneous equations e.g. Solve 2x – 3y = 11 5x + 2y = 18	**Make the number in front of the y the same by multiplying the whole linear equation.** 2x – 3y = 11 (x2) 5x + 2y = 18 (x3) **Add or subtract to eliminate y.** **Same signs subtract.** **Different signs add.** 4x – 6y = 22 15x + 6y = 54 **Solve the equation to find the value of x**. 19x = 76 x = 4 **Substitute the value of x into one of the equations to find the value of y.** 5(4) + 2y = 18 20 + 2y = 18 2y = -2 y = -1

A3: Solving Equations and Inequalities

Solving simultaneous equations graphically

Solve a quadratic equation by factorising when a=1

A3.7 Solving simultaneous equations graphically e.g. Solve y = 2x + 2 y = x - 1	Draw the graphs of the equations. Find out where they cross. The solution is the coordinates of the intersection point.  **x = -3** **y = -4**

A3.8 Solve a quadratic equation by factorising when a = 1 e.g. Solve $x^2 + 7x + 12$	**Write the equation in the form $ax^2 + bx + c = 0$.** $x^2 + 7x + 12 = 0$ **Factorise the left-hand side. Find two values that add to make b and multiply to make c.** Add to make 7 Multiply to make 12. Factors of 12 (12&1, 6&2, 3&4) (x + 3)(x + 4) = 0 **Equate each factor to 0 and solve for the values of x.** x + 3 = 0 (subtract 3 from both sides) X = -3 x + 4 = 0 (subtract 4 from both sides) X = -4 **x = -3** **or** **x = -4**

A3: Solving Equations and Inequalities

Solve a quadratic equation by factorising when a does not equal 1

Solve a quadratic equation using the quadratic formula

A3.9 Solve a quadratic equation by factorising when a does not equal 1 e.g. Solve $2x^2 + 7x + 3 = 0$	**Write the equation in the form $ax^2 + bx + c = 0$.** $2x^2 + 7x + 3 = 0$ **Factorise the left-hand side. Find two values that add to make b and multiply to make (c x a).** Add to make 7 *Multiply to make 3 x 2* Multiply to make 6 Factors of 6 (6&1, 3&2) 6 + 1 = 7 As a = 2, we must divide 6 by 2 to get 3. (2x + 1)(x + 3) = 0 **Equate each factor to 0 and solve for the values of x.** 2x + 1 = 0 (subtract 1 from both sides) 2x = -1 (divide both sides by 2) x = - ½ x + 3 = 0 (subtract 3 from both sides) X = -3 **x = - ½ or x = -3**

A3.10 Solve a quadratic equation using the quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ e.g. Solve $x^2 + 4x - 2$	**Write the equation in the form $ax^2 + bx + c = 0$.** $x^2 + 4x - 2 = 0$ **Write the values for a, b and c (including the sign)** a = 1, b = 4, c = -2 **Substitute the values for a, b and c into the formula** $x = \frac{-4 \pm \sqrt{(4^2 - 4 \times 1 \times -2)}}{2 \times 1}$ **Simplify to get the two values of x** $x = \frac{-4 \pm \sqrt{24}}{2}$ **$x = \frac{-4 + \sqrt{24}}{2} = 0.45$ (2dp)** **or** **$x = \frac{-4 - \sqrt{24}}{2} = -4.45$ (2dp)**

A3: Solving Equations and Inequalities

Solve a quadratic equation by completing the square

Solve linear /quadratic simultaneous equations using substitution

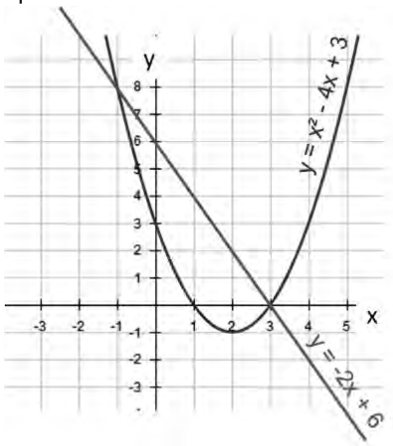
A3.11 Solve a quadratic equation by completing the square e.g. Solve $x^2 + 8x - 40$	**Write the equation in the form $ax^2 + bx + c = 0$.** $x^2 + 8x - 40 = 0$ **Write x + half the coefficient of x in brackets then square** $(x + 4)^2 - 40 = 0$ **Square and subtract the coefficient of x** $4^2 = 16$ $(x + 4)^2 - 16 - 40 = 0$ $(x + 4)^2 - 56 = 0$ **Now solve by adding the constant to both sides** $(x + 4)^2 - 56 = 0$ $(x + 4)^2 = 56$ **Square root both sides** $(x + 4)^2 = 56$ $x + 4 = \pm \sqrt{56}$ **Solve to find the two values of x** **$x = -4 - \sqrt{56} = -11.48$ (2dp)** **or** **$x = -4 + \sqrt{56} = 3.48$ (2dp)**

A3.12 Solve linear/quadratic simultaneous equations using substitution e.g. Solve Solve $x + y = 4$ and $x^2 + y^2 = 40$.	**Rearrange the linear equation** $x + y = 4$ $y = 4 - x$ **Substitute the linear equation into the quadratic.** $x^2 + (4 - x)^2 = 40$. **Expand and simplify.** $(4 - x)^2 = x^2 - 8x + 16$ $x^2 + x^2 - 8x + 16 = 40$. $2x^2 - 8x + 16 = 40$ **Solve the quadratic by an appropriate method.** $2x^2 - 8x + 16 = 40$ $2x^2 - 8x - 24 = 0$ $(2x - 12)(x + 2) = 0$ $2x = 12$ **$x = 6$** **or** **$x = -2$** **Substitute the values found into the linear equation.** **When $x = 6$, $y = 4 - 6 = -2$** **When $x = -2$, $y = 4 - -2 = 6$**

A3: Solving Equations and Inequalities

Solve linear/quadratic simultaneous equations graphically

Use iteration to solve an equation

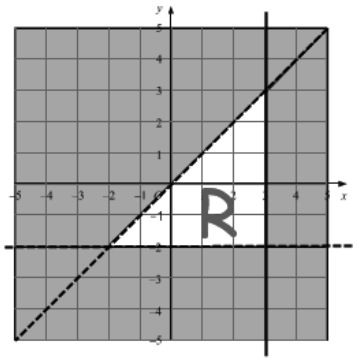
A3.13 Solve linear/quadratic simultaneous equations graphically e.g. Solve $y = x^2 - 4x + 3$ $y = -2x + 6$	Draw the graphs of the equations. Find out where they cross. The solutions are the coordinates of the intersection points.  **When x = -1 y = 8** **or** **When x = 3 y = 0**

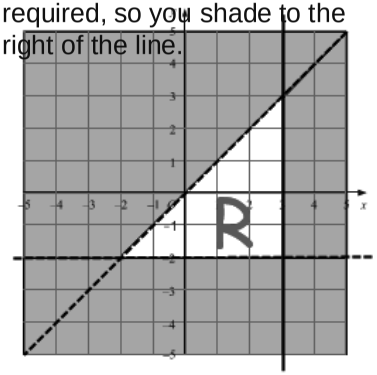
A3.14 Use iteration to solve an equation e.g. Using $x_{n+1} = 8 - \frac{5}{x_n^2}$ With $x_0 = 1$ Find the values of: x_1, x_2 , x_3 and x_4	**Input the value for x_0 into the formula to find the value for x_1.** $8 - \frac{5}{1^2} = 3$ $x_1 = 3$ **Input the value for x_1 into the formula to find the value for x_2.** $8 - \frac{5}{3^2} = \frac{67}{9}$ $x_2 = \frac{67}{9}$ **Input the value for x_2 into the formula to find the value for x_3.** $8 - \frac{5}{(\frac{67}{9})^2} = 7.909779461$ $x_3 = 7.909779461$ **Input the value for x_3 into the formula to find the value for x_4.** $8 - \frac{5}{(7.909779461)^2} =$ 7.920082617 $x_4 = 7.920082617$ **$x_1 = 3$** **$x_2 = \frac{67}{9}$** **$x_3 = 7.909779461$** **$x_4 = 7.920082617$**

A3: Solving Equations and Inequalities

Represent an inequality graphically

Find a region on a graph defined by more than one inequality

A3.15 Represent an inequality graphically e.g. Represent the following inequalities graphically: $x < y$ $y > -2$ $x \leq 3$	Plot each straight line. Use a broken line for < or >. Use a solid line for ≤ or ≥. Decide which side of the line to shade. Leave the required region unshaded. 

A3.16 Find a region on a graph defined by more than one inequality e.g. Find the region defined by the following inequalities: $x < y$ $y > -2$ $x \leq 3$	**Decide which side of the line to shade – shade the section you do not want and leave the required region unshaded.** $x < y$ (x is less than y) Area below the line is required, so you shade above the line. $y > -2$ (y is greater than -2) Area above the line is required, so you shade below the line. $x \leq 3$ (x is less than or equal to 3) Area to the left of the line is required, so you shade to the right of the line. 

A3: Solving Equations and Inequalities

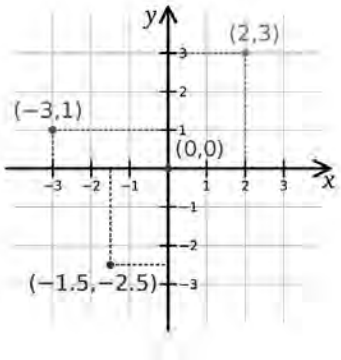
Use trial and improvement to solve an equation

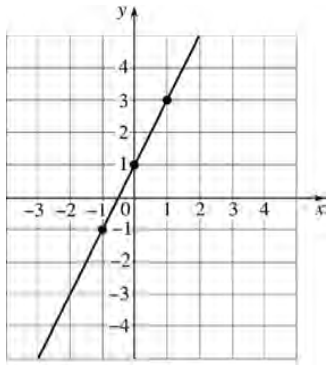
A3.17 Use trial and improvement to solve an equation e.g. Use trial and improvement to solve the following equation to 1dp. $x^2 + 3x + 2 = 86$ has a solution between 7 and 8.	**Substitute different values for x into the equation until a value closest to the solution is found to the required degree of accuracy.** Solution between 7 and 8. Start with the midpoint of 7.5. $(7.5)^2 + 3(7.5) + 2 = 80.25$ *too small* $(7.6)^2 + 3(7.6) + 2 = 82.56$ *too small* $(7.7)^2 + 3(7.7) + 2 = 84.39$ *too small* $(7.8)^2 + 3(7.8) + 2 = 86.24$ *too big* *Solution is between 7.7 and 7.8* $(7.75)^2 + 3(7.75) + 2 = 85.3125$ *too small* The solution is between 7.75 and 7.8. Therefore to 1dp the solution is 7.8. **x = 7.8 to 1dp**

A4: Graphs 1

Plot coordinates in four quadrants

Plot a linear graph from a sequence or formula

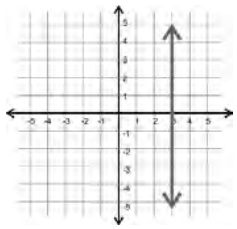
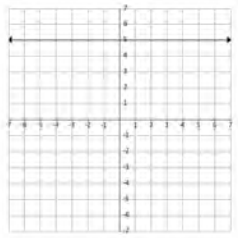
A4.1 Plot coordinates in four quadrants e.g. Plot the origin (0,0) Plot the point (2,3) Plot the point (-3,1) Plot the point (-1.5, -2.5)	(x coordinate, y coordinate) For x, move right for positive values and left for negative. For y, move up for positive values and down for negative. e.g. 

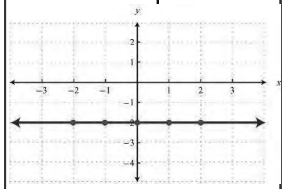
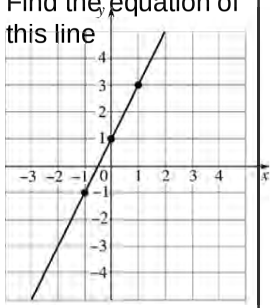
A4.2 Plot a linear graph from a sequence or formula e.g. Plot the graph of y = 2x + 1	Draw a table of values by substituting values of x into the formula. Plot the points in pencil. Join the points with a ruler and pencil. They should be in a straight line. e.g. y = 2x + 1 x | -1 | 0 | 1 y | -1 | 1 | 3 

A4: Graphs 1

Find the equation of vertical and horizontal lines

Find the equation of a line by considering the coordinates

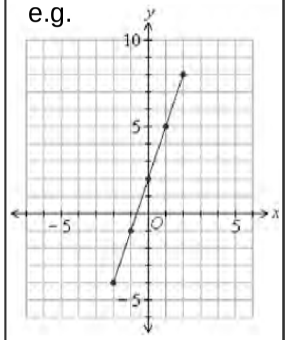
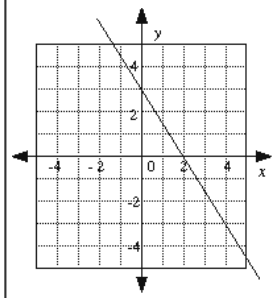
A4.3 Find the equation of vertical and horizontal lines e.g. Write the equation of this line  Write the equation of this line 	Vertical lines have the form 'x = n' where n is the value where the line crosses the x axis. e.g. this line is x = 3. Horizontal lines have the form 'y = n' where n is the value where the line crosses the y axis. e.g. this line is y = 5.

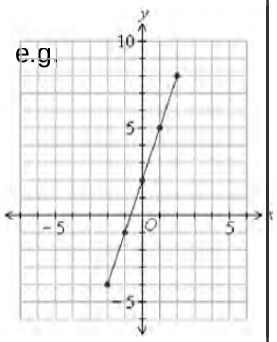
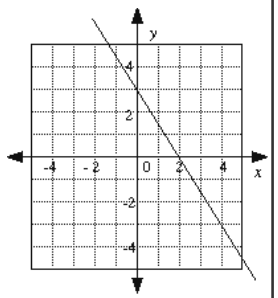
A4.4 Find the equation of a line by considering the coordinates e.g. Find the equation of  Find the equation of this line 	Select a set of coordinates from the line and compare the x and y values. Use these to determine the equation of the line. e.g. from this line you can get the coordinates (-2,-2), (-1, -2), (0, -2), (1,-2), (2,-2) In all of these the y coordinate is -2 so the equation of the line is y = -2. From this line you can get the coordinates (-2,-3), (-1, -1), (0,1), (1,3) In all of these the y coordinate is found by multiplying the x coordinate by 2 and adding 1. So the equation of the line is y = 2x + 1.

A4: Graphs 1

Identify the intercept of a graph

Calculate the gradient of a linear graph

A4.5 Identify the intercept of a graph e.g.   	The intercept of a graph is the value where the line crosses the y axis e.g. this line crosses the y axis at 2, so the intercept of the graph is 2. This line crosses the y axis at 3, so the intercept of the graph is 3.

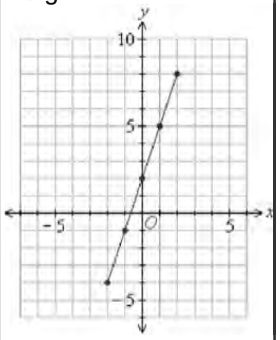
A4.6 Calculate the gradient of a linear graph e.g.   	Identify the coordinates of two points on the graph. The gradient is calculated using the formula Gradient = $\frac{Change\ in\ y\ coordinates}{Change\ in\ x\ coordinates}$ e.g. from this line you can get the coordinates (2,7) and (1,5). Gradient = $\frac{7-5}{2-1} = \frac{2}{1} = 2$. From this line you can get the coordinates (0,3) and (2,0). Gradient = $\frac{3-0}{0-2} = \frac{3}{-2} = -1.5$.

A4: Graphs 1

Calculate the gradient of a line segment between two points

Construct the equation of a line

A4.7 Calculate the gradient of a line segment between two points e.g. Find the gradient of the line segment between the points (0,3) and (2,9) Find the gradient of the line segment between the points (2,7) and (5,1)	The gradient is calculated using the formula Gradient = $\frac{Change\ in\ y\ coordinates}{Change\ in\ x\ coordinates}$ e.g. Gradient = $\frac{9-3}{2-0} = \frac{6}{2} = 3$. Gradient = $\frac{7-1}{2-5} = \frac{6}{-3} = -2$.

A4.8 Construct the equation of a line e.g.  	The equation of a straight line is given by y = mx + c. m is the gradient. c is the intercept. e.g. Gradient = $\frac{5-2}{1-0} = \frac{3}{1} = 3$. Intercept = 2. y = mx + c. y = 3x + 2.
A4.9 Find the gradient of a line parallel to a given line e.g. Find a line parallel to y = 3x - 1	Parallel lines have the same gradient. Give the equation of a line with same gradient. The intercept can be any value. e.g. Any line with a gradient of 3 y = 3x y = 3x +6

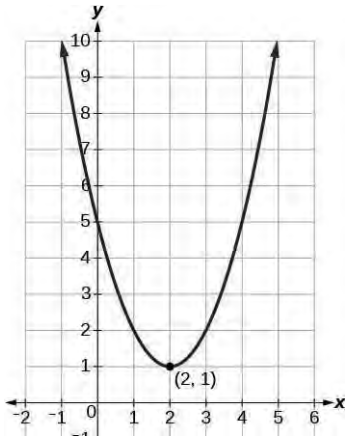
A4: Graphs 1

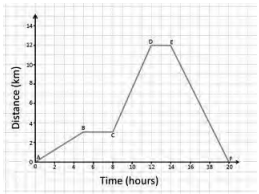
Plot a quadratic Graph

Plot and Use Distance Time Graphs

A4.11 Plot a quadratic graph e.g. Plot the graph of $y = x^2 - 4x + 5$	Draw a table of values by substituting values of x into the formula. Plot the points in pencil. Join the points with a ruler and pencil. They should be in a smooth curve e.g. $y = x^2 - 4x + 5$

x	-1	0	1	2	3	4	5
y	10	5	2	1	2	5	10

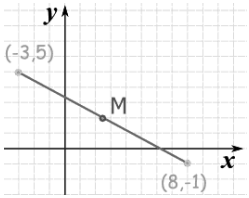


A4.12 Plot and use distance time graphs  From the graph explain what happens between: A and B; B and C; E and F. Where is the speed the greatest?	Plot distance on the vertical axis. Plot time on the horizontal axis. Speed is calculated using Speed = $\frac{Distance\ Travelled}{Time\ taken}$. e.g. Between A and B, 3 km are travelled in 5 hours. Between B and C, no distance is travelled during the 3 hour period. Between E and F, 12 km are travelled in 6 hours. The greatest speed occurs where the line is the steepest. This between C and D. You can also calculate speed: A to B 3 ÷ 5 = 0.6 km per hour; C to D 9 ÷ 4 = 2.25 km per hour; E to F 12 ÷ 6 = 2 km per hour;

A4: Graphs 1

Find the coordinates of the midpoint of a line segment

Find the equation of a line passing through a given point, parallel to a given line

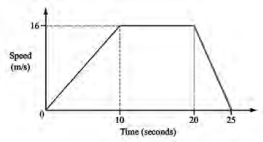
A4.13 Find the coordinates of the midpoint of a line segment e.g. Find the midpoint of this line segment  	Draw the line segment and identify the coordinates of the point at the halfway position. Alternatively, use the coordinates of the ends of the line segment. x coordinate of the midpoint is the mean average of the x coordinates of the end points, i.e. (-3 + 8) ÷ 2 = 2.5. y coordinate of the midpoint is the mean average of the y coordinates of the end points, i.e. (5 + -1) ÷ 2 = 2.

A4.14 Find the equation of a line passing through a given point, parallel to a given line e.g. Find the equation of the line parallel to $y = 3x - 1$ that passes through the point (2, 7)	If the lines are parallel, the gradient is the same for both. Use $y = mx + c$. e.g. Gradient = 3. When x = 2, y = 7. $y = mx + c$. $7 = 3 \times 2 + c$ $c = 1$ $y = 3x + 1$.

A4: Graphs 1

Plot and use speed time graphs

Find the gradient of a line perpendicular to another line

A4.15 Plot and use speed time graphs e.g.  From the graph explain what happens between: 0 and 10 seconds; 10 and 20 seconds; 20 and 25 seconds.	Plot speed on the vertical axis. Plot time on the horizontal axis. Acceleration is calculated using Acceleration = $\frac{Change\ in\ speed}{Time}$. e.g. Between 0 and 10 seconds, speed increased from 0 to 16 m/s in 10 seconds. Acceleration = 16 ÷ 10 = 1.6 m/s^2. Between 10 and 20 seconds, speed remains constant. Acceleration = 0 m/s^2. Between 20 and 25 seconds, speed decreased from 16 to 0 m/s in 10 seconds. Acceleration = -16 ÷ 5 = -3.2 m/s^2.

A4.16 Find the gradient of a line perpendicular to another line e.g. Find the gradient of a line perpendicular to the line y = 5x + 4 Find the gradient of a line perpendicular to the line y = -2x + 4	When two lines are perpendicular, the product of their gradients is -1. Find the gradient of the given line. Find the reciprocal and change the sign. This is the gradient of the perpendicular line. e.g. Gradient of y = 5x + 4 is 5. Negative reciprocal is -1/5 or -0.2. Gradient of perpendicular is -0.2. Gradient of y = -2x + 4 is -2. Negative reciprocal is ½ or 0.5. Gradient of perpendicular is ½.

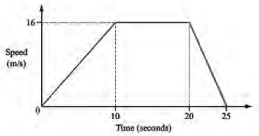
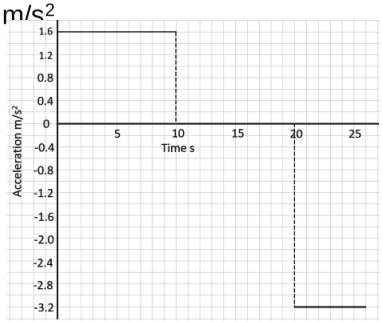
A4: Graphs 1

Find the equation of a line passing through a given point, perpendicular to a given line

Find the equation of a perpendicular bisector to a line segment

Plot and use acceleration time graphs

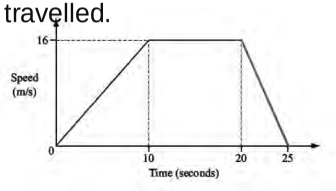
A4,17 Find the equation of a line passing through a given point, perpendicular to a given line e.g. Find the equation of the line perpendicular to $y = \frac{1}{2}x + 3$ that passes through the point (2, 7)	If the lines are perpendicular, the product of their gradients is -1. Use $y = mx + c$. e.g. Gradient of given line = ½ . Gradient of perpendicular = -2. When x = 2, y = 7. $y = mx + c$. $7 = -2 \times 2 + c$ $c = 11$ $y = -2x + 11$.
A4.18 Find the equation of a perpendicular bisector to a line segment e.g. Find the equation of the perpendicular bisector of the line segment joining the points (0, 7) and (4,5).	Find the gradient and midpoint of the line segment. Find the gradient of a line perpendicular to the line segment. Use $y = mx + c$. e.g. Gradient of line = $\frac{7-5}{0-4}$ = -½ . Gradient of perpendicular = 2. Midpoint of given line is (2, 6). $y = mx + c$. $6 = 2 \times 2 + c$ $c = 2$ $y = 2x + 2$.

A4.19 Plot and use acceleration time graphs e.g. Plot an acceleration time graph for this speed time graph  	Plot acceleration on the vertical axis. Plot time on the horizontal axis. e.g. Between 0 and 10 seconds, acceleration = 16 ÷ 10 = 1.6 m/s^2. Between 10 and 20 seconds, acceleration = 0 m/s^2. Between 20 and 25 seconds, acceleration = -16 ÷ 5 = -3.2 m/s^2. 

A4: Graphs 1

Relate gradient of a line or curve to rate of change

Relate the area under a speed time graph to distance

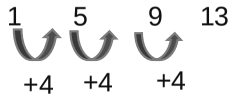
A4.20 Relate gradient of a line or curve to rate of change.	The gradient of a line gives the rate of change of the variables. On a distance time graph, it shows the rate of change of distance with respect to time, i.e. speed. On a speed time graph, it shows the rate of change of speed with respect to time, i.e. acceleration.
A4.21 Relate the area under a speed time graph to distance.	The area under a speed time graph gives the distance travelled.  In the example, the distance travelled in the first 10 seconds is the area of the triangle. Distance travelled = (16 x 10) ÷ 2 = 80m.

A5: Sequences

Continue a sequence using a term to term rule
Generate a linear sequence using a term to term rule
Generate e linear sequence using nth term
Find the nth term of a linear sequence

A5.1
Continue a sequence using a term to term rule

1 5 9 13
This is the start of a sequence.
Each individual digit is called a term.
Using a term to term rule carry on the sequence.
What are the next two numbers of this sequence?

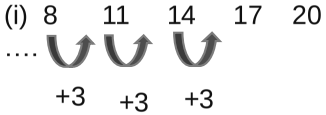


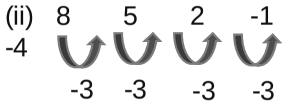
Term to term rule = +4
The sequence can be carried On by adding 4.
The next two numbers are 17 and 21

A5.2
Generate a linear sequence using term to term rule

(i) A sequence has a starting term of 8 and a term to term rule of +3. Generate the sequence

(ii) A sequence has a starting term of 8 and a term to term rule of -3. Generate the sequence





A5.3
Generate a linear sequence using nth term

If the nth term of a sequence is **5n+1** what are the 1st, 2nd and 3rd terms of the sequence?

Replace n by each of the numbers 1, 2 and 3 in turn.

If the nth term is **5n+1**
1st term (n=1) = 5 x **1** + 1 = 6
2nd term (n=2) = 5 x **2** + 1 = 11
3rd term (n=3) = 5 x **3** + 1 = 16
The sequence begins 6, 11, 16
The terms have a difference of 5 which matches the 5n in the formula.

A5.4
Find the nth term of a linear sequence

The position to term rule allows us to write a rule for any term in the sequence from its position.

Find the nth term for the sequence 4, 10, 16, 22

Position	1	2	3	4
Term	4	10	16	22

+6

+6 means that the rule for this sequence contains 6n.
1 x 6 – 2 =4
2 x 6 – 2 = 10
3 x 6 – 2 = 16
Term = position x 6 – 2
Term = n x 6 – 2
nth term = 6n - 2

A5: Sequences

Continue sequence of square numbers
Continue sequence of cube numbers
Relate sequences to patterns
Plot a linear graph from a sequence or formula

A5.5
Continue sequence of square numbers

A square number is obtained by multiplying a number by itself e.g. 1 x 1 = 1
2 x 2 = 4

1, 4, 9, 16, 25
is the start of a sequence of square numbers.
How can this sequence be continued?

1 4 9 16 25
+3 +5 +7 +9
+2 +2 +2

The first line of differences is the set of odd numbers beginning with 3.
The second line of differences is a constant 2.
Each term is the square of its term number.

A5.6
Continue sequence of cube numbers

A cube number is obtained by multiplying a number by itself three times e.g. 1 x 1 x 1 = 1
2 x 2 x 2 = 8

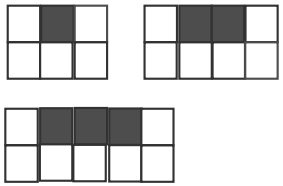
1, 8, 27, 64, 125
is the start of a sequence of cube numbers.
How can this sequence be continued?

1 8 27 64 125
+7 +19 +37 +61
+12 +18 +24
+6 +6

If we calculate the first line of differences and continue with the second we find that the third line of differences is a constant 6.
Each term is the cube of its term number.

A5.7
Relate sequences to patterns

This is a sequence of diagrams showing black tiles *b* and white tiles *w.*
How many white tiles are there when there are 8 black tiles?



Find a formula for w in terms of b

b	1	2	3
W	5	6	7

Using the rule for sequences w = b + 4

Therefore when b = 8
w = 8 + 4
w = 12

A5.8
Plot a linear graph from a sequence or formula

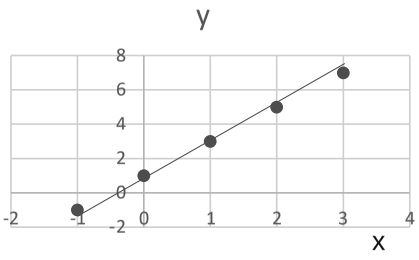
Plot the graph of the formula
y = 2x + 1

First make a table of values +
y = 2 x -1 + 1 = -1
y = 2 x 0 + 1 = 1 etc

Y = 2x + 1

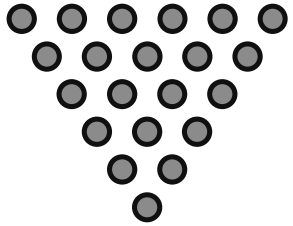
x	-1	0	1	2	3
y	-1	1	3	5	7

Now plot x and y values as co-ordinate points and join with a straight line.

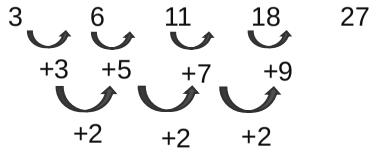


A5: Sequences

Recognise and continue sequence of triangular numbers
Recognise and continue Fibonacci type sequences

A5.9 Recognise and continue sequence of triangular numbers 	1, 3, 6, 10, 15, …. is the start of the sequence of triangular numbers. The difference between the terms is +2, +3, +4, +5 and this can be used to continue the sequence. The 1st row of the triangle is 1, the 1st triangle number. Adding the 1st + 2nd rows of the triangle gives 1 + 2= 3 which is the 2nd triangle number Adding the 1st+2nd+3rd rows gives 1 + 2 + 3 = 6 which is the 3rd triangle number and so on.
A5.10 Recognise and continue Fibonacci type sequences 0, 1, 1, 2, 3, 5, 8, 13, … This is the Fibonacci sequence. How can this sequence be continued?	To continue the Fibonacci sequence add each term to the previous term to generate the next one e.g. 0 + 1 = 1 1 + 1 = 2 1 + 2 = 3 2 + 3 = 5 3 + 5 = 8 5 + 8 = 13 8 + 13 = 21 which is the next term in the sequence.

Identify arithmetic and geometric type sequences
Identify a quadratic sequence

A5.11 Identify arithmetic and geometric type sequences In an **Arithmetic sequence** the same amount (common difference) is added on to each term to continue the sequence. In a **Geometric sequence** every term is multiplied by the same amount (common ratio) to continue the sequence.	Are the following arithmetic or geometric sequences? (i) 2, 6, 18, 54, …. (ii) 5, 8, 11, 14, 17 ….. (iii) 256, 128, 64, 32, …… (iv) 42, 38, 34, 30, 26, ….. (i) Geometric: common ratio x3 (ii) Arithmetic: common difference +3 (iii) Geometric: common ratio x 0.5 (iv) Arithmetic: common difference -4
A5.12 Identify a quadratic sequence 3 6 11 18 27 This sequence does not have a common difference on the first line of Differences so we continue to the second row of differences.	 The 1st row of differences has a common difference of 2 so this is a quadratic sequence.

A5: Sequences

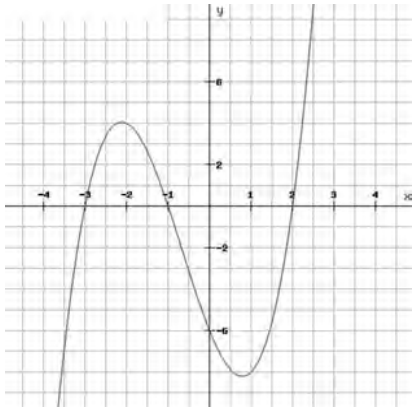
Use the nth term to write a quadratic sequence

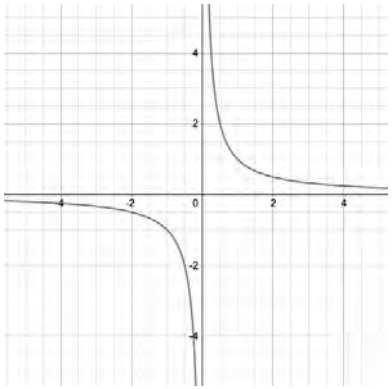
A5.13 Use the nth term to write a quadratic sequence A **quadratic** sequence always contains a squared term. The nth term of a quadratic sequence is $2n^2 + n + 1$. Write down the first 5 terms of this sequence.	$2n^2 + n + 1$. $2 \times 1^2 + 1 + 1 = 4$ $2 \times 2^2 + 2 + 1 = 11$ $2 \times 3^2 + 3 + 1 = 22$ $2 \times 4^2 + 4 + 1 = 37$ $2 \times 5^2 + 5 + 1 = 56$ So the sequence is 4, 11, 22, 37, 56 ....
A5.14 Find the nth term of a quadratic sequence Find the nth term of the sequence 4, 13, 26, 43, 64 If the 2nd line of differences is 2 rule is n^2 is 4 rule is $2n^2$ is 6 rule is $3n^2$ is 8 rule is $4n^2$	4 13 26 43 64 +9 +13 +17 +21 +4 +4 +4 The 2nd line of differences is 4 so the rule contains $2n^2$ Term no: 1 2 3 4 Term: 4 13 26 43 $2n^2$: 2 8 18 32 Subtract: 2 5 8 11 This sequence has a rule 3n-1 so the whole rule is $2n^2 + 3n - 1$

A6: Graphs 2

Plot a graph of a cubic function

Identify and plot a reciprocal graph

A6.1 Plot a graph of a cubic function e.g. Plot the graph of $y = x^3 + 2x^2 - 5x - 6$.	Draw a table of values by substituting values of x into the formula. Plot the points in pencil. Join the points with a ruler and pencil. They should be in a smooth curve e.g. $y = x^3 + 2x^2 - 5x - 6$. x: -3, -2, -1, 0, 1, 2 y: 0, 4, 0, -6, -8, 0 

A6.2 Identify and plot a reciprocal graph e.g. Plot the graph of $y = \frac{1}{x}$.	Draw a table of values by substituting values of x into the formula. Plot the points in pencil. Join the points with a ruler and pencil. They should be in smooth curves as in the example, $y = \frac{1}{x}$. The axes are asymptotes. x: -4, -2, -1, -0.5, 0.5, 1, 2, 4 y: -0.25, -0.5, -1, -2, 2, 1, 0.5, 0.25 

A6: Graphs 2

Identify and plot a exponential graph

Know the graph of sine

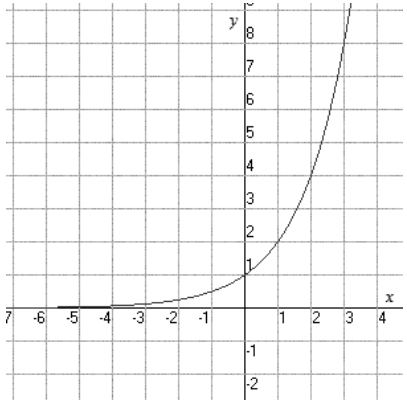
Know the graph of cosine

A6.3
Identify and plot an exponential graph

e.g.
Plot the graph of $y = 2^x$.

Draw a table of values by substituting values of x into the formula.
Plot the points in pencil.
Join the points with a ruler and pencil.
They should be in a smooth curve
e.g. $y = 2^x$.

x	-3	-2	-1	0	1	2	3
y	1/8	¼	½	1	2	4	8

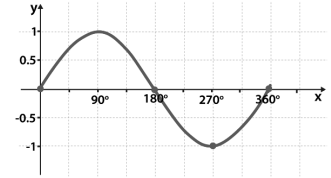


A6.4
Know the graph of sine

For the Sine function between 0 and 360°, the main values are

x	0	90	180	270	360
y	0	1	0	-1	0

giving this curve

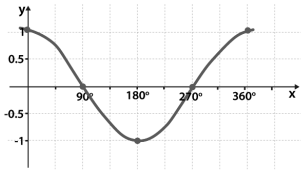


Know the graph of cosine

For the Cosine function between 0 and 360°, the main values are

x	0	90	180	270	360
y	1	0	-1	0	1

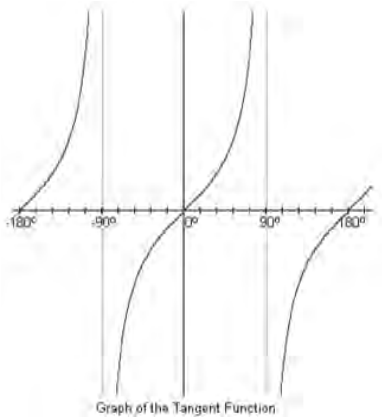
giving this curve

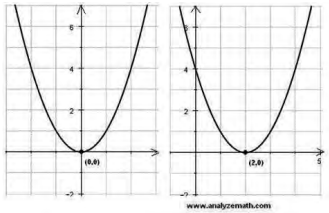
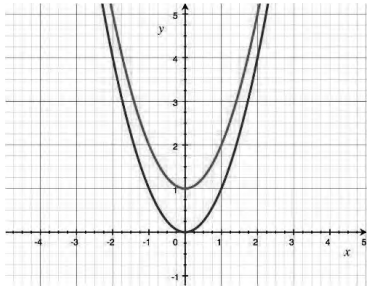


A6: Graphs 2

Know the graph of tangent

Translate a graph f(x+a) and f(x) +a

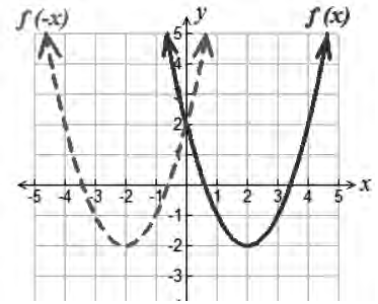
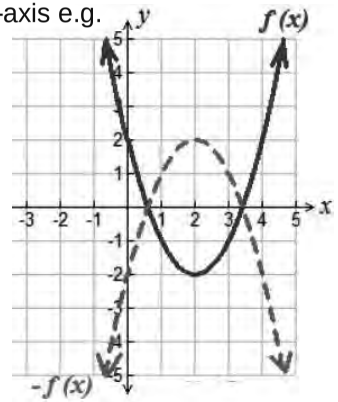
A6.5 Know the graph of tangent	For the Tangent function between -180° and 180°, the main values are | x	-180	-135	-45	0	45	135	180
---	---	---	---	---	---	---	---
y	0	1	-1	0	1	-1	0	 There are asymptotes at -90° and 90°. The graph of tangent is  Graph of the Tangent Function

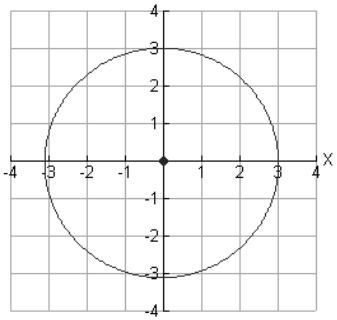
A6.6 Translate a graph f(x + a) and f(x) + a e.g. y = f(x – 2) y = f(x) + 1	**y = f(x + a).** Translates the graph (-a) steps along the x-axis. e.g. y = f(x – 2) translates y = f(x) 2 units along the x axis, to the left.  **y = f(x) + a.** Translate the graph a steps along the y-axis. e.g. y = f(x) + 1 translates y = f(x) 1 unit up along the y=axis. 

A6: Graphs 2

Reflect a graph f(-x) and –f(x)

Know and plot the graph of a circle

A6.7 Reflect a graph f(-x) and -f(x) e.g. y = f(-x) y = -f(x)	**y = f(-x).** Reflects the graph of f(x) in the y-axis e.g.  **y = -f(x).** Reflects the graph of f(x) in the x-axis e.g. 

A6.8 Know and plot the graph of a circle e.g. plot the graph of the circle $x^2 + y^2 = 9$.	The graph of a circle is of the form: $x^2 + y^2 = r^2$ where r is the radius and the centre is (0,0). e.g. $x^2 + y^2 = 9$ $x^2 + y^2 = 3^2$ This a circle of radius 3 and centre (0,0). 

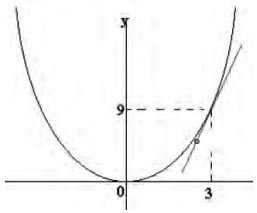
A6: Graphs 2

Estimate the gradient of a curve using a tangent

Estimate the area under a curve using trapezia

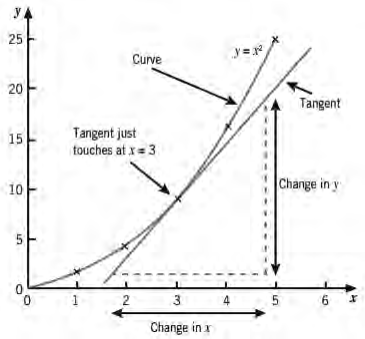
A6.9
Estimate the gradient of a curve using a tangent

Find the gradient of the curve $y = x^2$ at the point (3, 9).



To estimate the gradient of a curve at a given point, draw a tangent to the curve at that point.
Find the gradient of the tangent.

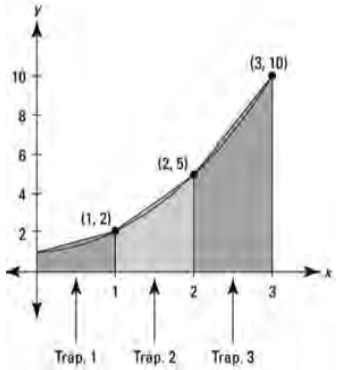
e.g. estimate the gradient of the curve $y = x^2$ at the point (3,9).



A6.10
Estimate the area under a curve using trapezia

e.g.
estimate the are under the curve $y = x^2 + 1$ between $x = 0$ and $x = 3$.

Divide the area under the curve into trapezia of equal width.
More accuracy is gained by using more trapezia.

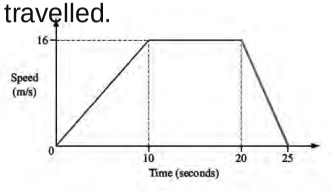


Calculate the area of each trapezium and add them for the area under the curve.
Trap 1: ½ (1 + 2)1 = 1.5 square unit.
Trap 2: ½ (2 + 5)1 = 3.5 square units.
Trap 3: ½ (5 + 10)1 = 7.5 square units.
Area
= 1.5 + 3.5 + 7.5
= 12.5 square units.

A6: Graphs 2

Relate gradient of a line or curve to rate of change

Relate the area under a speed time graph to distance

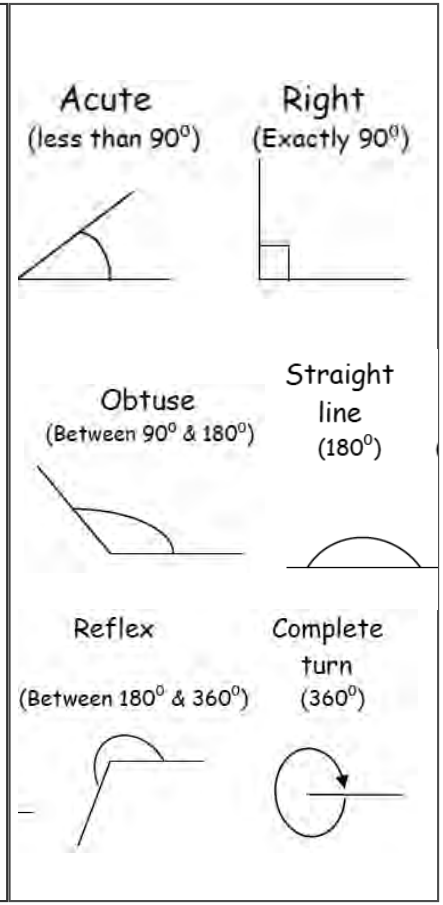
A6.11 Relate gradient of a line or curve to rate of change.	The gradient of a line gives the rate of change of the variables. On a distance time graph, it shows the rate of change of distance with respect to time, i.e. speed. On a speed time graph, it shows the rate of change of speed with respect to time, i.e. acceleration.
A6.12 Relate the area under a speed time graph to distance.	The area under a speed time graph gives the distance travelled.  In the example, the distance travelled in the first 10 seconds is the area of the triangle. Distance travelled = (16 x 10) ÷ 2 = 80m.

G1: Angles, Similarity and Congruency

Identifying types of angle

Drawing an angle

G1.1
Identifying types of angle



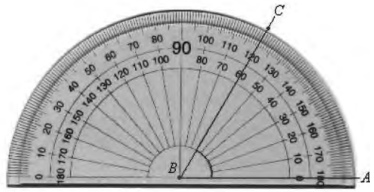
G1.2

Drawing an angle

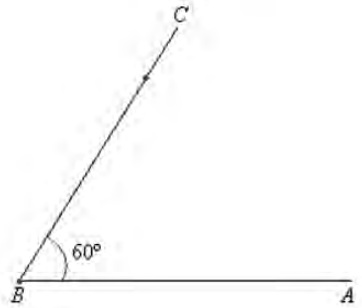
e.g. Draw an angle of 60°

Draw a straight line

Place your protractor on either end of the line and using the appropriate scale find 60 degrees and put a



Join the end of the line you measured from and the dot you drew.



A6: Graphs 2

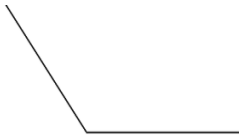
Measuring angles

Know and use angles on a straight line

G1.2

Measuring angles

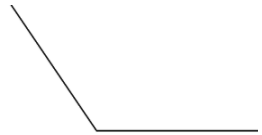
e.g. measure the following angle.

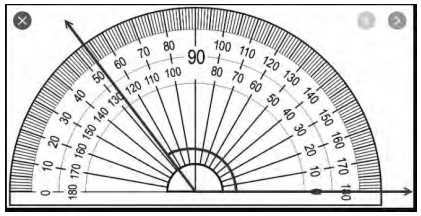


Place the midpoint of the protractor on the VERTEX of the **angle**.

Line up one side of the **angle** with the zero line of the protractor (where you see the number 0).

Read the degrees where the other side crosses the number scale.





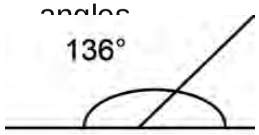
= 126°

G1.3

Know and use angles on a straight line.

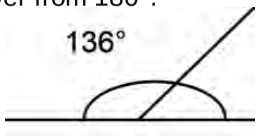
e.g.

Find the missing angles



Angles on a straight line add up to 180°

Find the total of the given angles and subtract your answer from 180°.



180 - 136 = 44°

124 + 42 = 166
180 – 166 = 14°

A6: Graphs 2

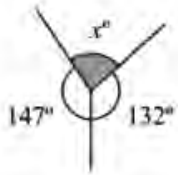
Know and use angle sums of a point

Know and use the corresponding angle rule

G1.4

Know and use angle sums at a point

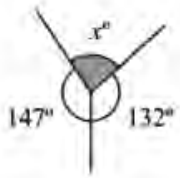
e.g. Find the missing angles



Angles at a point add up to 360°

Find the total of the given angles and subtract your answe

360 – 307 = 53°

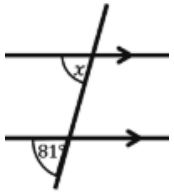


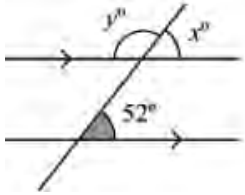
147 + 132 = 279
360 – 279 = 81°

G1.5

Know and use the correspondin g angle rule

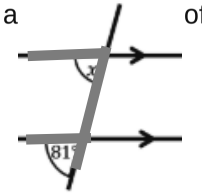
e.g. find the x in each of the following questions



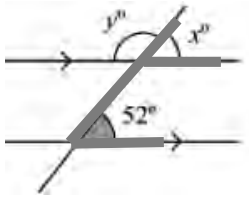


Corresponding angles are equal.

You need to be able to join the angles with an **F** shape. It can be a of an **F**.



X = 81°



X = 52°

A6: Graphs 2

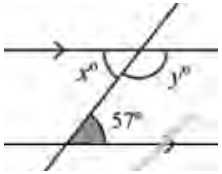
Know and use the alternate angle rule

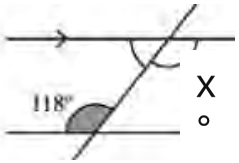
Know and use the vertically opposite angle rule

G1.6

Know and use the alternate angle rule

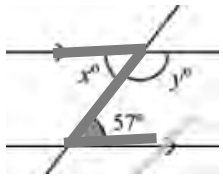
e.g. Find the x in the following questions



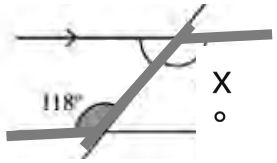


Alternate angles are equal.

You need to be able to join the angles with an **Z** shape. It can be any orientation of an **Z.**



X = 57°

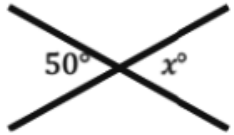


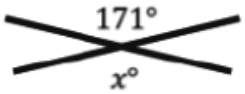
X = 118°

G1.7

Know and use the vertically opposite angle rule

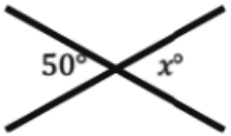
e.g. Find the missing angle in each of these



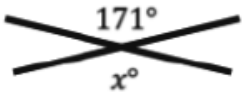


Vertically opposite angles are equal.

The **angles opposite** each other when two lines cross. They are always equal.



X = 50°



X = 171°

A6: Graphs 2

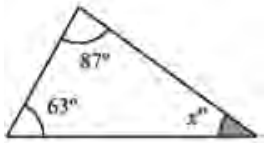
Know and use the interior angles in a triangle

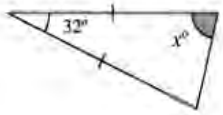
Know and use the sum of interior angles in a quadrilateral

G1.8

Know and use the sum of interior angles in a triangle

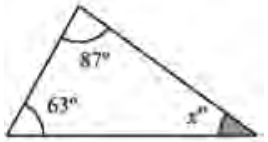
e.g. Calculate the missing angle in each of the folllowing questions.



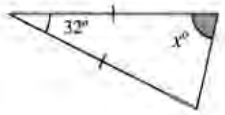


Angles in a triangle add up to 180°

Find the total of the given angles and subtract your answer from 180°.



63 + 87 = 150
180 – 150 = 30°

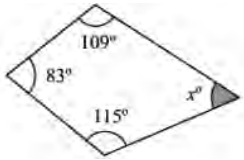


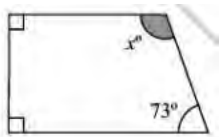
This is a special triangle called an Isosceles triangle. In an Isosceles triangle the base angles are equal. We still take the given angles away from 180, but we halve the answer afterward.
180 – 32 = 148
148 ÷ 2 = 74°

G1.9

Know and use the sum of interior angles in a quadrilateral

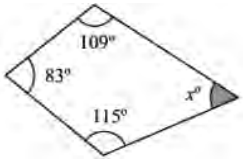
e.g. Calculate the missing angle in each of the folllowing questions.



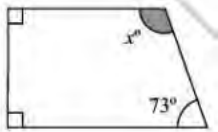


Angles in a quadrilateral add up to 360°

Find the total of the given angles and subtract your answer from 360°.



109 + 83 + 115 = 307
360 – 307 = 53°



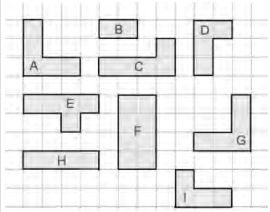
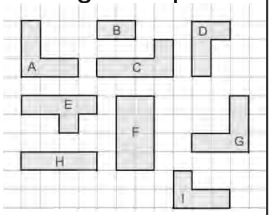
73 + 90 + 90 = 253
360 – 253 = 107°

A6: Graphs 2

Know and use the sum of internal angles of a polygon

Identify congruent shape using the simple definition of congruency

G1. 10 Know and use the sum of internal angles of a polygon e.g. Calculate the sum of internal angles of the following shape.  Calculate the sum of interior angles in a Hexagon	A **polygon** is a 2d shape formed by straight lines. The formula for finding the sum of the **measure** of the **interior angles** is (n - 2) x 180. n represents the number of sides the shape has.  (5 – 2) x 180 = 540° Calculate the sum of interior angles in a Hexagon A hexagon has 6 sides. (6 – 2) x 180 = 720°

G1. 11 Identify congruent shapes using the simple definition of congruency. e.g. List all the congruent pairs of shapes.  	**Congruent shapes** have the same size and **shape**. This means that the sides and segments of two **shapes** have the same length. And, the angles possess the same measurements If one shape can be made from another using Rotations, Reflections, or Translations then the shapes are Congruent. e.g. List the congruent pairs of shapes.  A and G D and I

A6: Graphs 2

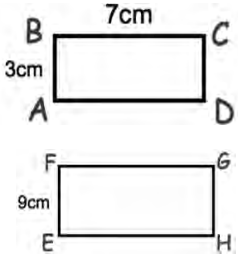
Use similarity to find missing lengths

Know and use the sum of external angles of a regular polygon

G1. 12

Use similarity to find missing lengths.

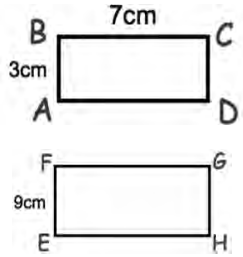
e.g. Rectangle ABCD and EFGH are mathematically similar.



Calculate the length of FG

When two shapes are **similar**, the ratios of the lengths of their corresponding sides are equal. Similar shapes are enlargements of each other.

e.g.



Rectangle ABCD and EFGH are mathematically simil ar. Calculate the length of FG.

The scale factor to get from 3cm to 9cm is 3. Which means you must multiply the other sides by 3 also.

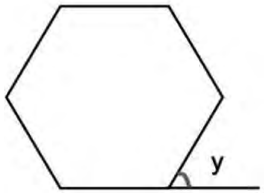
Therefore 7 x 3 = 21cm

FG=21cm

G1. 13

Know and use the sum of external angles of a regular polygon

e.g.

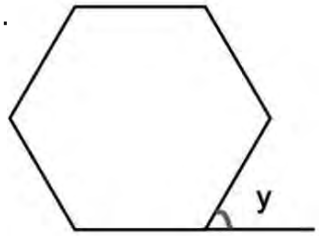


Calculate the size of angle y

The sum of **exterior angles of any polygon** is 360°. The formula for calculating the size of an **exterior angle of a regular polygon** is:

exterior angle of a regular polygon = 360 ÷ number of sides.

e.



y= 360 ÷ 6 = 60°

A6: Graphs 2

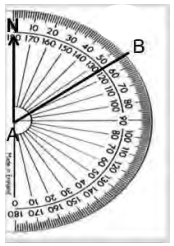
Read a bearing

Draw a bearing

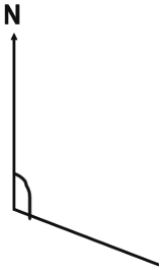
G1. 14

Read a bearing

e.g. Measure the bearing from A to B



Measure the following bearing



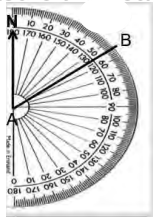
A **bearing** is used to represent the direction of one point relative to another point

There are 3 rules to follow when measuring a bearing:

- Measure from north
- Measure clockwise
- Writing using 3 digits

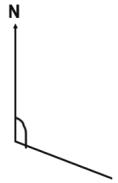
e.g. Measure the bearing from A to B.

= 054°



Measure the following bearing

= 110°



G1. 15

Draw a bearing

e.g. Draw a bearing of 130°

A **bearing** is used to represent the direction of one point relative to another point.

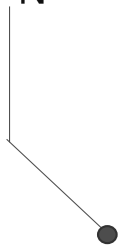
To draw a bearing of 130° you need to;

- Draw a North line

N

- Measure 130° from the north line and join.

N

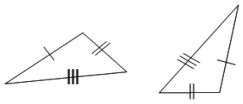


A6: Graphs 2

Prove Congruency using ASA SAS SSS and RHS

Use similarity to find missing areas

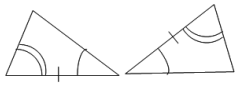
G1. 16
Prove congruency using ASA,SAS,SSS and RHS



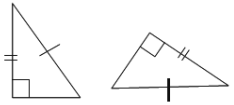
Congruent shapes have the same size and shape.
One will fit exactly over the other.
2 triangles are congruent if any of these 4 conditions are satisfied on each triangle.

The corresponding sides are equal, SSS

2 sides and the included angle are equal, SAS



2 angles and the included side are equal, ASA

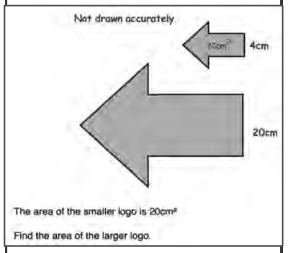


Both triangles are right angled, the hypotenuses are the same length and another pair of sides are equal, RHS.

G1. 17

Use similarity to find missing areas

e.g. find the missing area



Similar figures are identical in shape, but not necessarily in size. A missing length, area or volume on a reduction/enlargement figure can be calculated by first finding the scale factor.

We already know that if two shapes are similar their corresponding sides are in the same ratio and their corresponding angles are equal.
When calculating a missing area, we need to calculate the Area Scale Factor.

Area Scale Factor (ASF) =
(Linear Scale Factor)^2

Area Scale Factor (ASF) = 5^2

Area scale factor = 25

So the area of the new shape is;

area of old shape x area scale factor

= 20 x 25
= 500cm^2

A6: Graphs 2

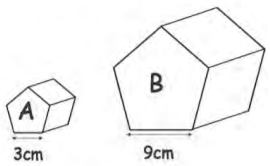
Use similarity to find missing volumes

G1. 19

Use similarity to find missing volumes

e.g. Calculate the missing volume

Below are two similar pentagonal prisms.



The volume of prism A is 15cm³
Work out the volume of prism B.

Similar figures are identical in shape, but not necessarily in size. A missing length, area or volume on a reduction/enlargement figure can be calculated by first finding the scale factor.

We already know that if two shapes are similar their corresponding sides are in the same ratio and their corresponding angles are equal.

When calculating a missing volume, we need to calculate the Volume Scale Factor.
Volume Scale Factor (VSF) = (Linear Scale Factor)^3

Volume Scale Factor (VSF) = 3^3

VSF = 27

So the volume of the new shape is;

Volume of old shape
x
Volume scale factor

15 x 27 = 405cm^3

G2: 2D Shapes

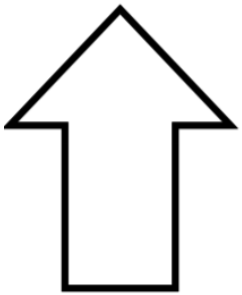
Identify Line Symmetry

Identify Rotational Symmetry

G2.1

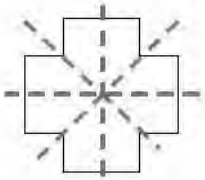
Identify line symmetry

e.g.
Draw the lines of symmetry on the following shape.



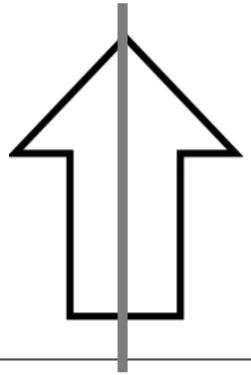
- Order of Line Symmetry

this is the number of times a shape can be folded so that one side falls exactly onto the other side



This shape has line symmetry ORDER 4

e.g. Draw the lines of symmetry on the following shape

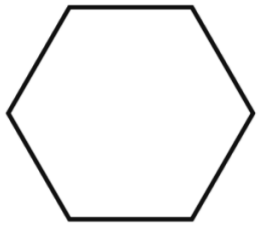


G2.2

Identify rotational symmetry

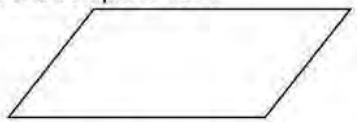
e.g.

State the order of rotational symmetry of the following shape (regular hexagon)



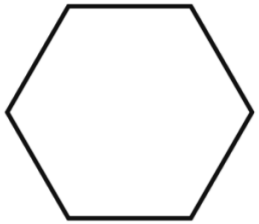
- Order of Rotational Symmetry

this is the number of times a shape falls into its outline in one complete turn



A parallelogram has rotational symmetry order 2

e.g. State the order of rotational symmetry of the following shape (regular hexagon)



Rotational symmetry order 6

G2: 2D Shapes

Reflect a Shape

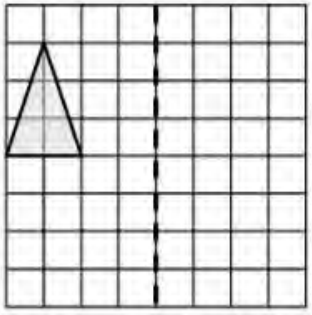
Describe a reflection

G2.3

Reflect a shape

e.g.

Reflect the shape in the given mirror line



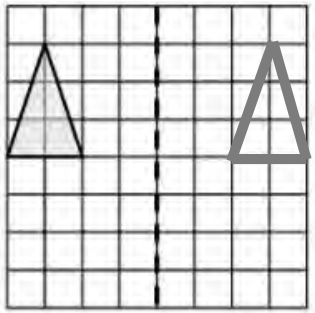
A shape can be **reflected** across a line of reflection to create an image.

The line of reflection is also called the mirror line.

Reflection is an example of a **transformation**. A transformation is a way of changing the size or position of a shape.

Every point in the image is the same distance from the mirror line as the original shape.

e. g. Reflect the shape in the given mirror line

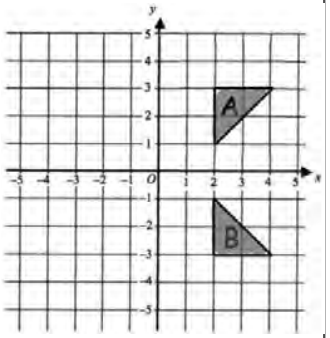


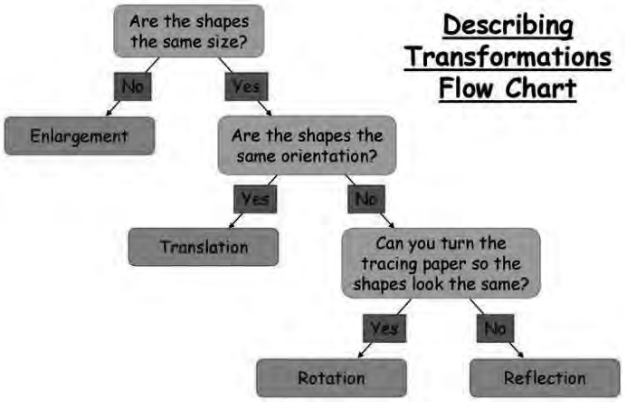
G2.4

Describe a reflection

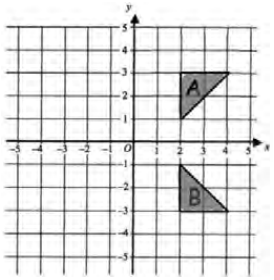
e.g.

Describe fully the single transformation that maps A onto B.





e.g. Describe fully the single transformation that maps A onto B.



Using the flow chart you can work out that it is a **reflection**, you then need to calculate where the mirror line is. To do this you need to find the line that is equidistant from each shape. In this case the mirror line is the **x-axis. So it is a reflection in the x-axis.**

G2: 2D Shapes

Rotate a shape

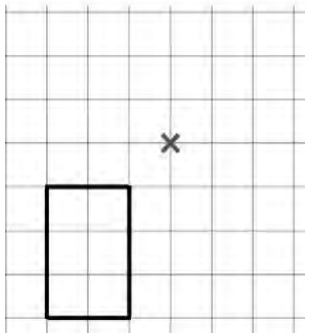
Describe a rotation

G2.5

Rotate a shape

e.g.

Rotate the following shape 90° clockwise

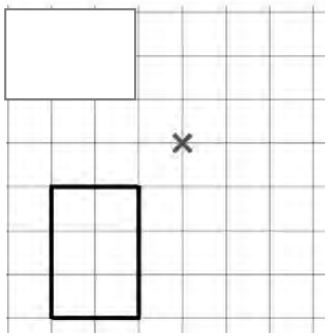


A **rotation** is a turn of a shape.

A rotation is described as the angle of **rotation**, and the direction of the turn.

- 90° is a quarter turn
- 180° is a half turn
- Clockwise is the same direction a clock turns
- The opposite to clockwise

e.g. Rotate the following shape 90° clockwise

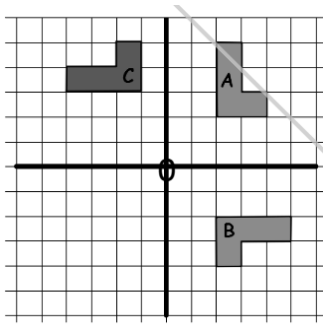


G2.6

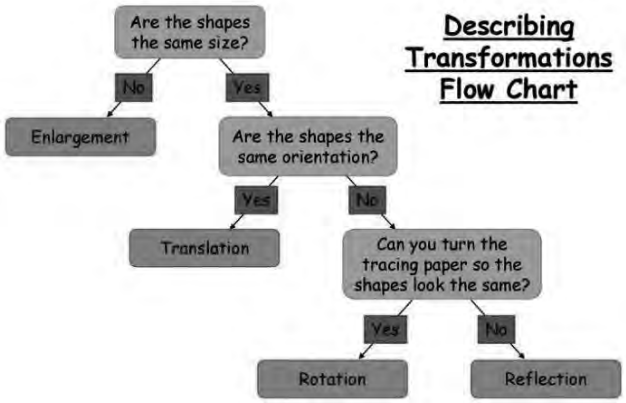
Describe a Rotation

e.g.

Describe the following transformation



A to B:
A to C:



Follow the flow diagram to see which of the transformations it is: Rotation

Calculate the angle and direction of rotation:

A to B: Rotation, 90° clockwise

A to C: Rotation 90° anti clockwise

G2: 2D Shapes

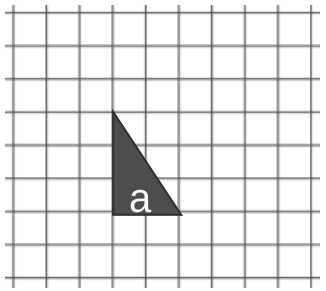
Translate a shape

Describe a translation

G2.7

Translate a shape

e.g. Translate the following shape 2 left and 1 up



A **translation** moves a shape up, down or from side to side but it does not change its appearance in any other way.

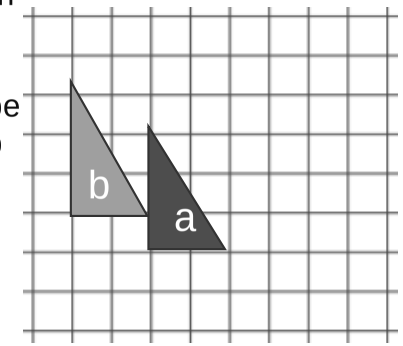
Translation is an example of a **transformation**. A transformation is a way of changing the size or position of a shape.

Every point in the shape is translated the same distance in the same direction.

You are given to instructions to move the shape;

- Left or right
- Up or down

Translate the following shape 2 left and 1 up

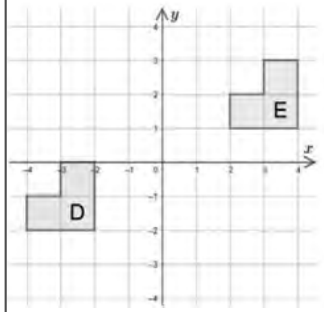


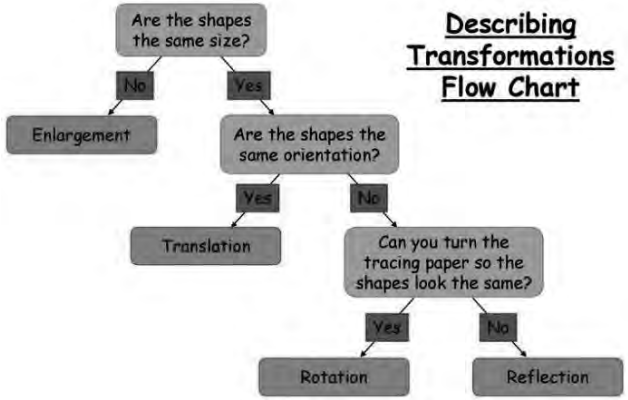
G2.8

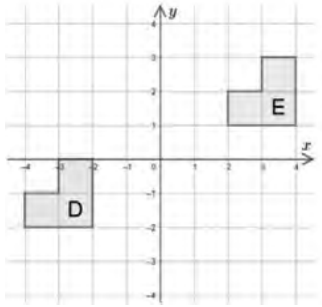
Describe a Translation

e.g.

Describe the following translation to map shape d to shape e.







e.g. describe the following translation to map shape d to shape e.

6 right and 3 up

G2: 2D Shapes

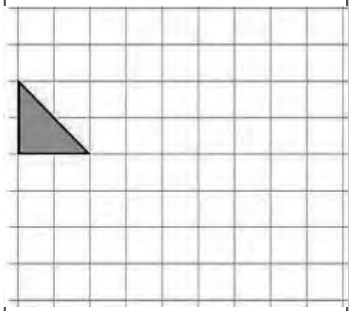
Enlarge a shape by an integer scale factor

Describe an enlargement by an integer scale factor

G2.9

Enlarge a shape by an integer scale factor

e.g. Enlarge the following shape by a scale factor of 2

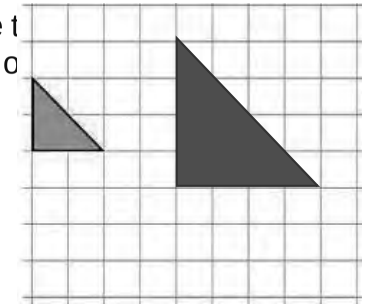


Enlarging a shape changes its size.

When enlarging a shape you need to know by how much. This is called the **scale factor**. For example, a **scale factor** of 2 means that you multiply each side of the shape by 2.

An enlargement with positive scale factor greater than 1 increases the size of the enlarged shape.

e.g. Enlarge t
scale factor o

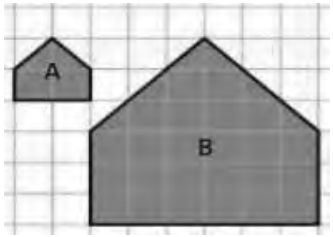


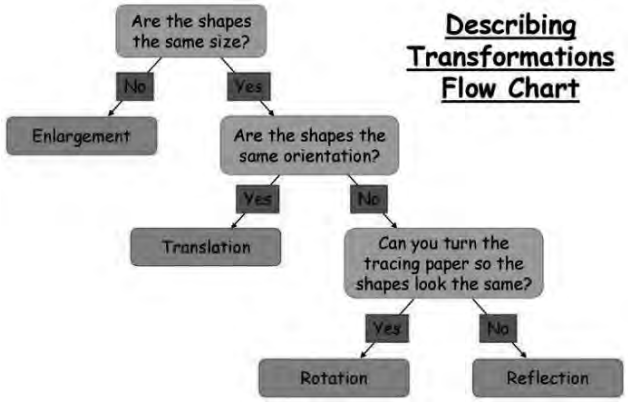
Multiply each of the sides of the shape by 2 and re-draw.

G2.10

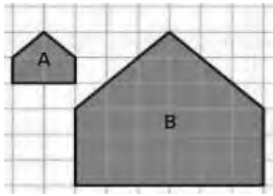
Describe an enlargement by an integer scale factor

e.g. Describe the following transformation that maps shape A to B.





e.g. Describe the following transformation that maps A to B



Follow the flow diagram to see which of the transformations it is. **Enlargement.**

To find the Scale Factor you see what each side has been multiplied by. In this case it's **3.**

The transformation is **Enlargement SF. 3.**

G2: 2D Shapes

Calculate the perimeter of a rectangle

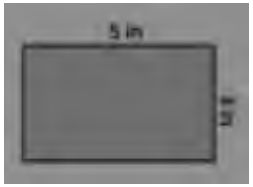
Calculate the area of a rectangle

G2.11

Calculate the perimeter of a rectangle

e.g.

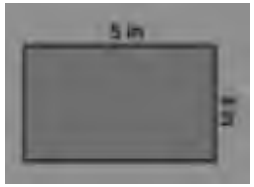
Calculate the perimeter of the following rectangle



The **perimeter** is the length of the outline of a shape. To find the **perimeter** of a rectangle or square you have to add the lengths of all the four sides

e.g.

Calculate the perimeter of the following rectangle

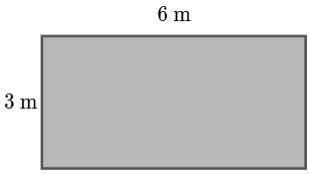


Perimeter = 5+5+3+3= 16in

G2.12

Calculate the area of a rectangle

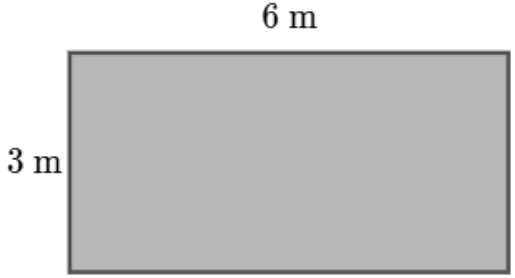
e.g. Calculate the area of the following rectangle



A shape's **area** is the number of square units it takes to completely fill it. In a rectangle you find it by multiplying the width by the height.

Formula: Width × Height

e.g. Calculate the area of the following rectangle



Area = width x height

Area = 6 x 3

Area = 18m²

G2: 2D Shapes

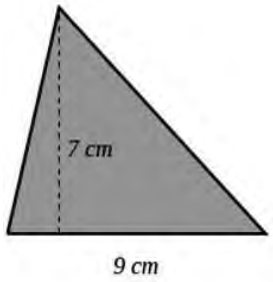
Calculate the area of a triangle Calculate the area of a parallelogram

G2.13

Calculate the area of a triangle

e.g.

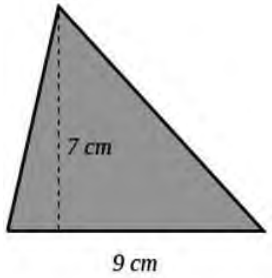
Calculate the area of the following triangle



A shapes **area** is the number of square units it takes to completely fill it. In a triangle you find it by multiplying the base by the height (perpendicular), then dividing your answer by 2.

Area of a triangle = $\frac{base\ X\ height}{2}$

e.g. Calculate the area of the following triangle



Area of triangle = $\frac{9\ X\ 7}{2}$

Area of triangle = $\frac{63}{2}$

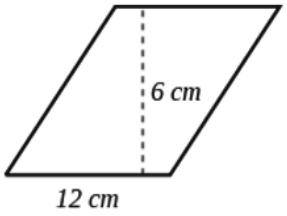
= 31.5cm²

G2.14

Calculate the area of a parallelogram

e.g.

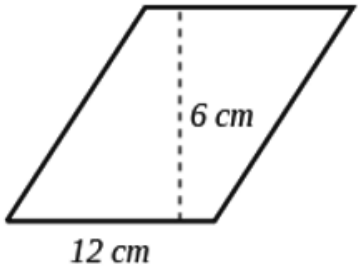
Calculate the area of the following parallelogram



A shapes **area** is the number of square units it takes to completely fill it. In a parallelogram you find it by multiplying the width by the height.

Area of a parallelogram = width x height

e.g. Calculate the area of the following parallelogram



Area of parallelogram = 12 x 6

Are of parallelogram = 72cm²

G2: 2D Shapes

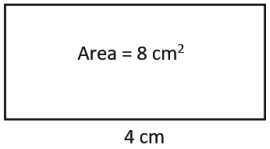
Calculate missing sides from areas
Read a timetable

G2.15

Calculate missing sides from areas

e.g.

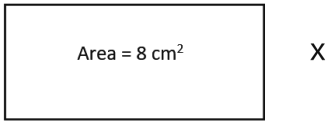
Calculate the missing side of the following shape.



To find missing lengths of rectangles you first need to remember the formula to find the area which is:

Area = width x length

What you need to do is rearrange the formula, so what you are looking for is the subject.



In this case you are looking for the length so you rearrange the formula to make it the subject.

Length = area ÷ width
Length = 8 ÷ 4
= 2cm

Shortcut:
With a rectangle or square you just divide the area by the side that you are given.

G2.16

Read a timetable

e.g. **Read & interpret timetables**

Station	Time of leaving
Peterborough	08 44
Huntingdon	09 01
St Neots	09 08
Sandy	09 15
Biggleswade	09 19
Arlesey	09 24

e.g. Time taken to travel from Peterbrough to Sandy

0844 0900 0915

16min + 15min = 31min

To read a timetable such as the one in the example, you look at the “time of leaving” column. This states the time that the particular mode of transport leaves that particular place.

G2: 2D Shapes

Use Metric measures of length

Convert metric units of length

G2.17 Use metric measures of length	We can measure how long things are, or how tall, or how far apart they are. Those are all examples of length measurements. Small units of length are called **millimetres**. A **millimetre** is about the thickness of a plastic id card (or credit card). When we have 10 millimetres, it can be called a **centimetre**. 1 centimetre = 10 millimetres A fingernail is about **one centimetre wide**. We can use millimetres or centimetres to measure how tall we are, or how wide a table is, but to measure the length of a football pitch it is better to use **metres**. A **metre** is equal to 100 centimetres. 1 metre = 100 centimetres The length of a guitar is about 1 **metre** **Metres** can be used to measure the length of a house, or the size of a playground. A **kilometre** is equal to 1000 metres. The distance from one city to another or how far a plane travels can be measured using **kilometre**s.

G2.18 Convert metric units of length e.g. Convert: 100mm to cm 170cm to m 6700m to km	<table><tr><th>10mm</th><th>1cm</th></tr><tr><td>100cm</td><td>1m</td></tr><tr><td>1000</td><td>1km</td></tr></table> e.g. convert: 100mm to cm Divide by 10 =10cm 170cm to m Divide by 100 =1.7m 6700m to km Divide by 1000 =6.7km To work the other way i.e. cm to mm you do the inverse i.e. multiply by 10.

G2: 2D Shapes

Use Metric measures of mass

Convert metric units of mass

G2.19 Using metric units for mass	Mass: how much matter is in an object. We measure mass by weighing, but weight and mass are not really the same thing. These are the most common measurements: • Grams • Kilograms • Tonnes Grams are the smallest, Tonnes are the biggest. Grams are often written as g (for short), so "300 g" means "300 grams". A loaf of bread weighs about 700 g When we have 1000g, we have 1kilogram, written short as 1kg. Scales measure our mass using kilograms. An adults mass can be about 70 kg. But when it comes to things that are very heavy, we need to use the tonne. Once we have 1,000 kilograms, we will have 1 tonne. Some cars can have a mass of around 2 tonnes

G2.20 Convert metric units of mass e.g. Convert: 5500g into kg 9870kg into tonnes	<table><tr><th>1000g</th><th>1kg</th></tr><tr><td>1000kg</td><td>1 tonne</td></tr></table> e.g. convert: 5500g to kg Divide by 1000 = 5.5kg 9870kg to tonnes Divide by 1000 =9.87 tonnes To work the other way i.e. kg to g you do the inverse i.e. multiply by 1000.

G2: 2D Shapes

Use Metric measures of volume or capacity

Convert metric units of volume or capacity (litres only)

G2.21

Use metric units of volume or capacity

Volume is the amount of 3-dimensional space something takes up.
The two most common measurements of volume are:

- Millilitres
- Litres

A **millilitre** is a very small amount of liquid, 5 ml can be held within a teaspoon.

A **litre** is just a bunch of millilitres put all together. In fact, 1000 millilitres makes up 1 litre:

1 litre = 1,000 millilitres

G2.22

Convert metric units of volume or capacity (litres only)

Convert:

5000ml to L
7L to ml
700ml to L

1000ml	**1L**

e.g. convert:

5000ml to L
Divide by 1000 =5L

7L to ml
Multiply by 1000 = 7000ml

700ml to L
Divide by 1000 =0.7L

To work the other way i.e. L to ml you do the inverse i.e. multiply by 1000

G2: 2D Shapes

Use simple conversions of imperial to metric

Enlarge a shape by an integer factor with a centre of enlargement

G2.23

Use simple conversions of imperial to metric

- Imperial units

Length	Weight	Capacity
1 inch=2.5cm	2.2 pounds≈1kg	1gallon≈4.5litres
1 foot=30cm		
1 mile≈1.6km		

Convert:

3 inches to cm
Multiply by 2.5 =7.5cm

5 feet to cm
Multiply by 30 = 150cm

4 miles to km
Multiply by 1.6 ≈ 6.4km

180 pounds to kg
Divide by 2.2 ≈ 82kg

7 gallons to litres
Multiply by 4.5 ≈31.5L

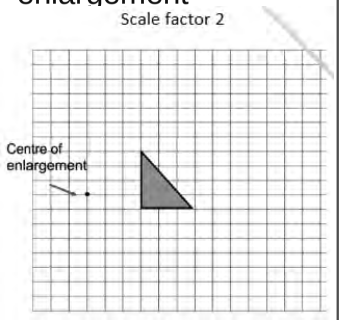
To work the other way i.e. cm to feet you do the inverse i.e. divide by 30

G2.24

Enlarge a shape by an integer scale factor with a centre of enlargement

e.g.

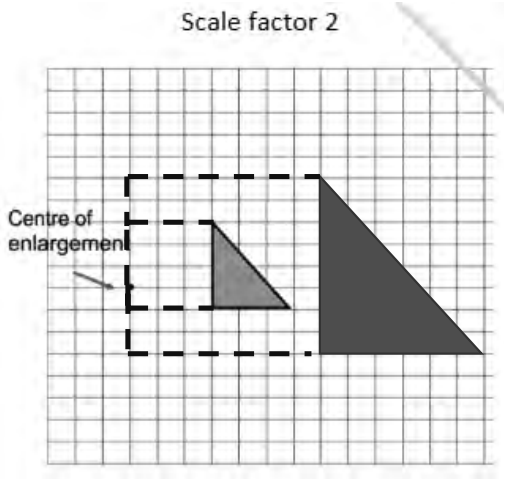
Enlarge the following shape by the given scale factor and from the given centre of enlargement



You sometimes can be asked to enlarge from a specific **centre of enlargement.** When a shape is **enlarged** from a **centre of enlargement**, the distances from the **centre** to each point are multiplied by the scale factor.

e.g. Enlarge the following shape by the given scale factor and from the given centre of enlargement

To enlarge using a centre of enlargement, you count the distance from of each point from the centre of enlargement, then multiply that distance by the scale factor.



G2: 2D Shapes

Describe an enlargement by an integer scale factor and a centre of enlargement

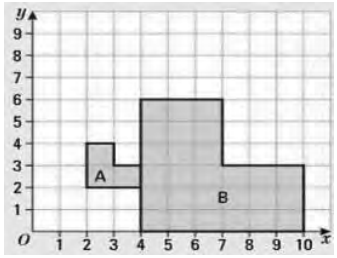
Enlarge a shape using a fractional scale factor

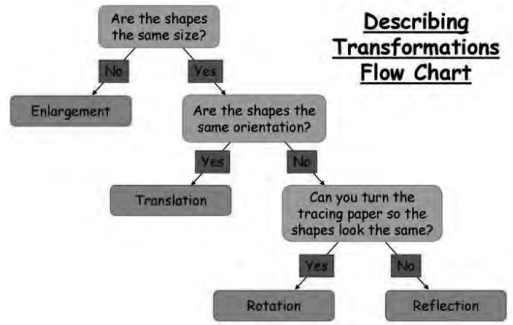
G2.25

Describe an enlargement by an integer scale factor and a centre of enlargement

e.g.

Describe fully the single transformation that maps A onto B

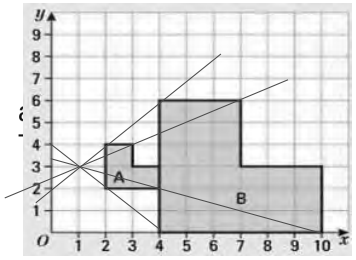




First of all use the flow chart to decide which of the transformations it is.

When you have found that it is an enlargement, you need to find the scale factor. To do this you must count the length of the sides and see what you multiply by to get from A to B.

To work out the centre of enlargement you join the vertices of both shapes and see where the lines intersect, this is the centre of enlargement.



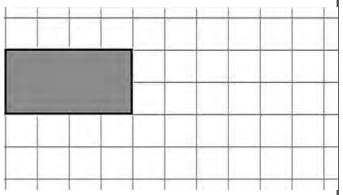
This is an enlargement, with scale factor of 3. centre of enlargement is (1,3)

G2.26

Enlarge a shape using a fractional scale factor

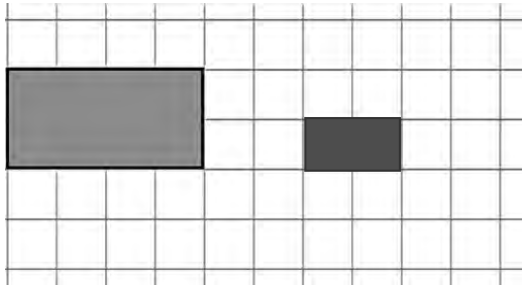
e.g.

Enlarge the following shape with a scale factor of a $\frac{1}{2}$



To enlarge a shape with a fractional scale factor, you follow the same steps as when you enlarge with an integer.

e.g. enlarge the following shape with a scale factor of a $\frac{1}{2}$.



G2: 2D Shapes

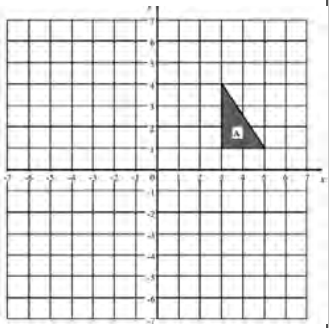
Translate a shape

Describe a translation

G2.27

Translate a shape

e.g. Translate the following shape in the vector $\begin{bmatrix}2\\1\end{bmatrix}$



A **translation** moves a shape up, down or from side to side but it does not change its appearance in any other way.

Translation is an example of a **transformation**. A transformation is a way of changing the size or position of a shape.

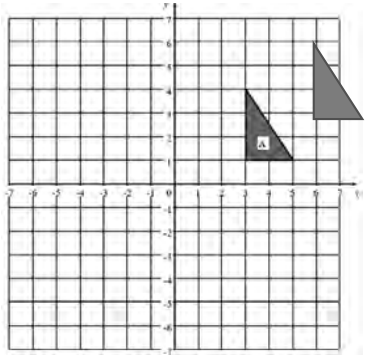
Every point in the shape is translated the same distance in the same direction.

Column **vectors** are used to describe translations.

$\begin{bmatrix}4\\-2\end{bmatrix}$ Means that you move the shape 4 to the right and 2 down

$\begin{bmatrix}-2\\5\end{bmatrix}$ Means that you move the shape 2 to the left and 5 up

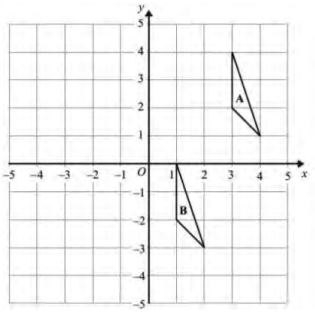
e.g. Translate the following shape in the vector $\begin{bmatrix}2\\1\end{bmatrix}$

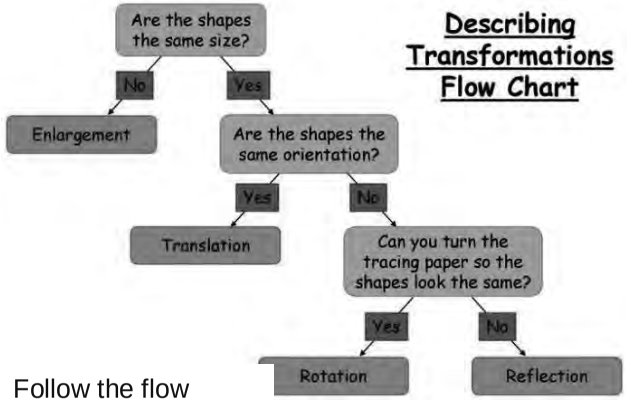


G2.28

Describe a Translation

Describe the transformation that fully maps A onto B



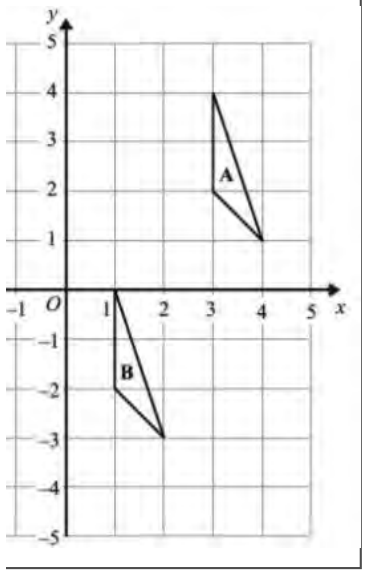


Follow the flow diagram to see which of the transformations it is.

Translation

Find the vector by counting the squares. This shape has moved 2 left and 4 down. So the vector is $\begin{bmatrix}-2\\-4\end{bmatrix}$

So the single transformation is **a translation in the vector $\begin{bmatrix}-2\\-4\end{bmatrix}$**



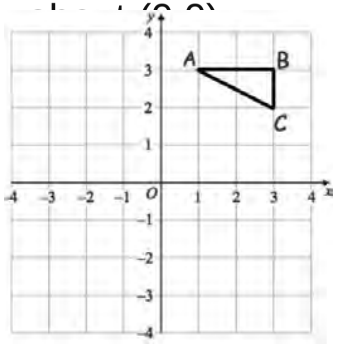
G2: 2D Shapes

Rotate a shape with a given centre of rotation

Describe a rotation through a centre of rotation

G2.29

Rotate a shape with a given centre of rotation
e.g.
Rotate the following shape 90° clockwise



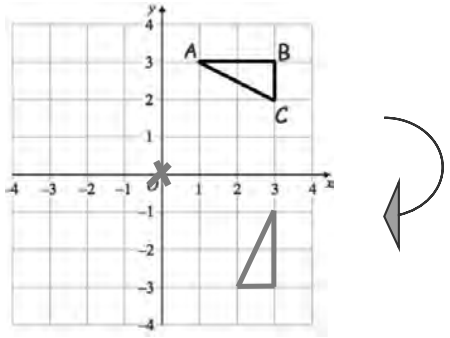
Rotation turns a shape around a fixed point called the **centre of rotation**.

Rotation is an example of a **transformation**. A transformation is a way of changing the size or position of a shape.

Three pieces of information are needed to rotate a shape:

- the centre of rotation
- the angle of rotation
- the direction of rotation

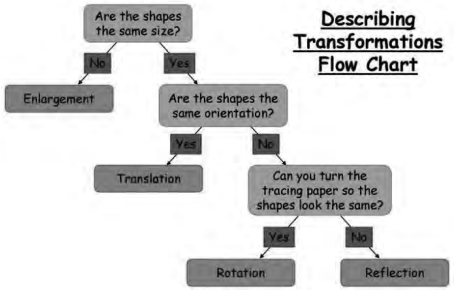
e.g. Rotate the following shape 90° clockwise about (0,0)



In this particular question you rotate the shape a quarter turn clockwise (using tracing paper) with your pencil on the given coordinate.

G2.30

Describe a rotation through a centre of rotation



First of all decide which of the transformations it is by using the flow chart.

Find two corresponding points on the original shape and the shape that's been rotated — typically, the pointy end of the triangle, or a convenient right angle. Draw a line between them.
At each of the points, draw a line at 45º towards where you thing the centre of rotation ought to be.
Where these lines cross is the centre of rotation.
Check you've gone the right way: measure the distance from your centre to two other corresponding points and check they're the same.
Otherwise, you need to draw your 45º lines on the other side of your line
Continued on the next page.

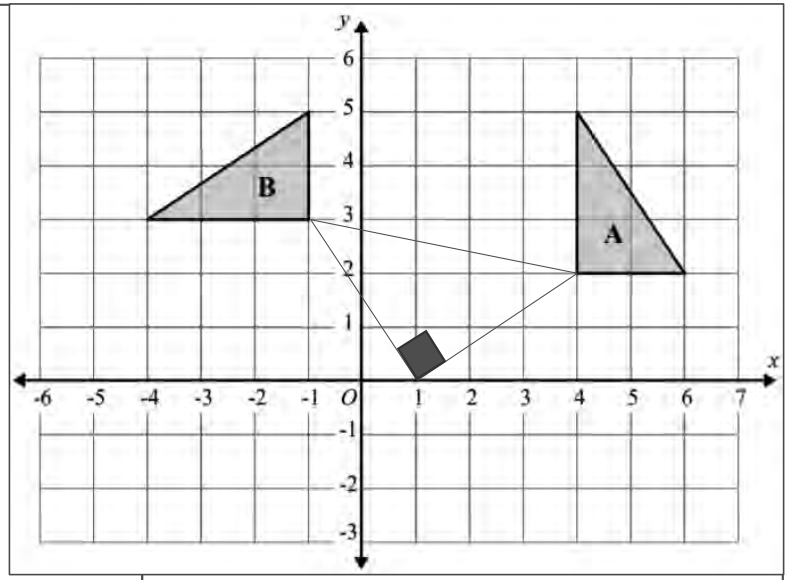
G2: 2D Shapes

Describe a rotation through a centre of rotation (continued)

Reflect a shape using a diagonal or horizontal line

G2.30

Continued



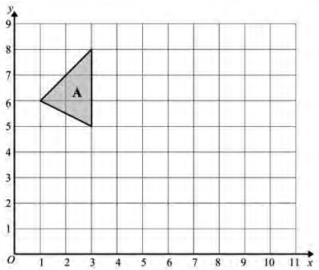
This is a rotation, 90° anticlockwise, from (1,0)

G2.31

Reflect a shape using a diagonal line or horizontal line

e.g.

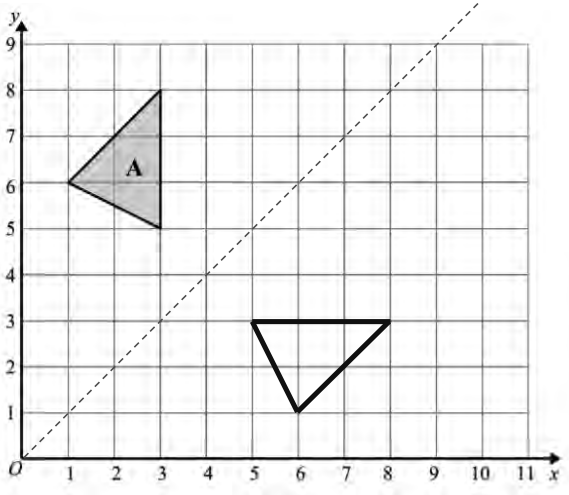
Reflect the following shape in the line y = x



Firstly, you must find the mirror line. In the line y = x the y coordinate is the same as the x coordinate.

This means if you y coordinate is 1 your x coordinate is 1. This creates a diagonal line from the origin.

You then count the distance from each vertex to the mirror line and replicate it on the other side of the mirror line.



G2: 2D Shapes

Describe a reflection using the equation of a line

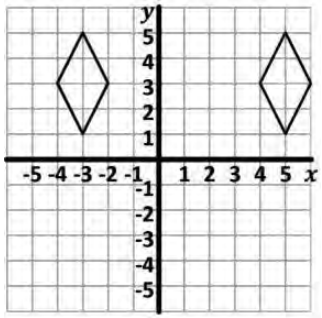
Calculate the area of a trapezium

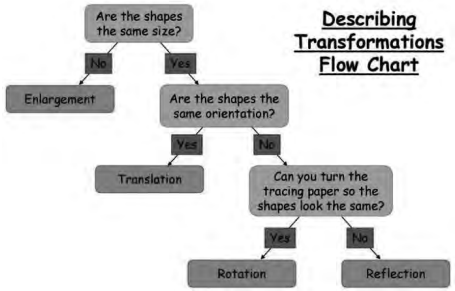
G2.32

Describe a reflection using the equation of a line

e.g.

Describe the single transformation that maps shape A to B.

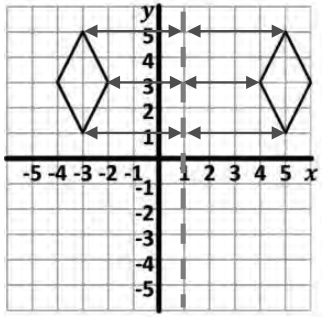




Firstly you need to decide which of the transformations it is.

When you have found that it is a reflection , you need to find the mirror line.

To do this you need to find a line in which all the points of each shape will be equidistant to the corresponding point.



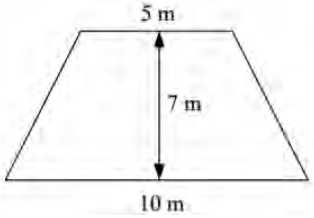
So this is a reflection in the line x=1

G2.33

Calculate the area of a trapezium

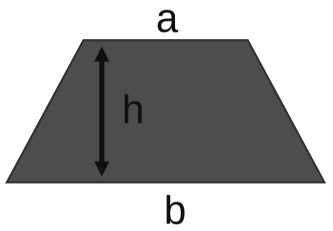
e.g.

Calculate the area of the following shape

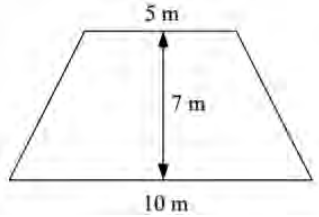


To find the area of a trapezium you need to use a specific formula.

$$A = \frac{(a+b)}{2} \times h$$



e.g. Calculate the area of the following shape



Area = $\frac{(5+10)}{2}$ x 7

Area = $\frac{15}{2}$ x 7

Area = 7.5 x7

Area = 52.5 m²

G2: 2D Shapes

Calculate the area of a circle

Calculate the circumference of a circle

G2.34

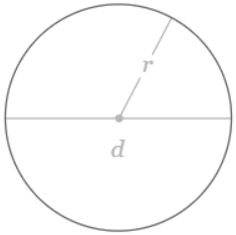
Calculate the area of a circle

e.g.

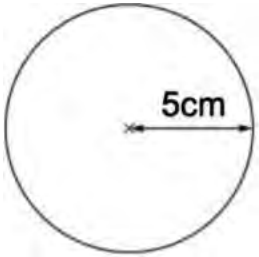
Work out the area of the following circle

To find the area of a circle you need to follow a specific formula.

$$A = \pi r^2$$



e.g. work out the area of the following circle



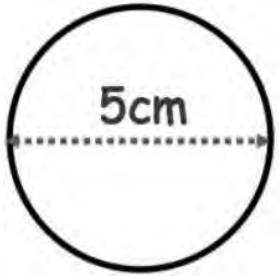
Area = πr^2
Area = π x 5^2
Area = 78.5398163…
Area = 78.5 cm^2 1dp

G2.35

Calculate the circumference of a circle

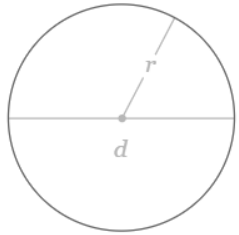
e.g.

Work out the circumference of the following circle



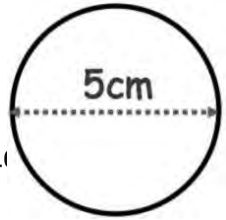
To find the circumference of a circle you need to follow a specific formula.

C = 2 πr or c = πd



e.g. Work out the circumference of the following circle

Circumference = πd
Circumference = π x 5
Circumference = 15.707…
Circumference = 15.7cm 1



G2: 2D Shapes

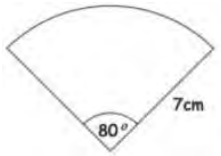
Calculate the area of a sector
Calculate arc length

G2.36

Calculate the area of a sector

e.g.

Find the area of the following sector

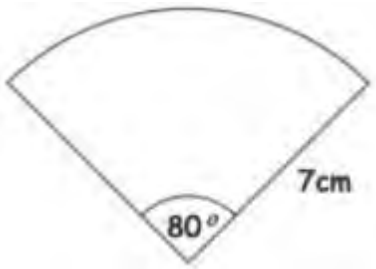


We can find the area of a sector using the formula:

$$\frac{\theta}{360} \times \pi r^2$$

θ is the angle of the secto r is the radius

e.g. Find the area of the following sector



Area = $\frac{80}{360}$ x π x 7^2

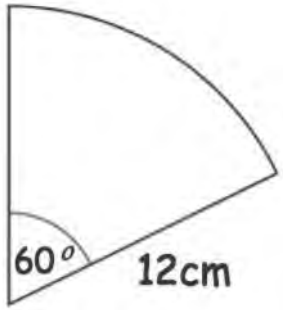
Area = 34.208…
Area = 34.2cm² 1dp

G2.37

Calculate arc length

e.g.

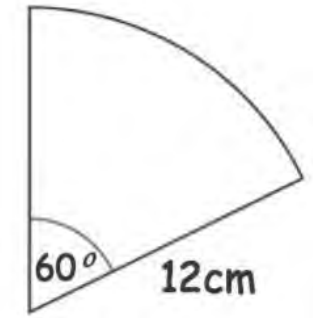
Evaluate the length of the following arc



To
calculate arc length you use

$$\textit{Arc length} = \frac{\textit{angle}}{360^\circ} \times \pi \times d$$

e. g. Find the length of the following arc



Arc length = $\frac{60}{360}$ x π x 24
Arc length = 12.566…
Arc length = 12.6 cm

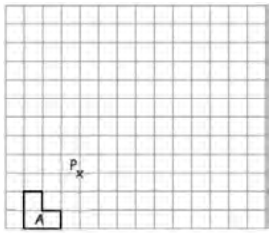
G2: 2D Shapes

Enlarge a shape using a negative scale factor
Convert metric units of area and volume

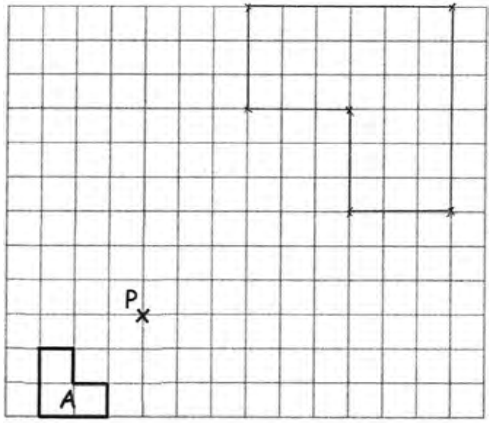
G2.38

Enlarge a shape using a negative scale factor

e.g. Enlarge the following shape with a scale factor of -3 from point 3



An **enlargement** using a **negative scale factor** will cause the **enlargement** to appear on the other side of the centre of **enlargement**; and will be inverted (upside down). The **shape** will also change size depending on the value of the **enlargement**.



To enlarge by a negative scale factor, you need to work out the vector from P to each corner of the shape.

You then multiply each vector by the scale factor.

You will end up with new vectors that you draw from p.

In this example you multiply each vector by -3.

G2.39

Convert metric units of area or volume

e.g. Convert $5m^2$ to cm^2

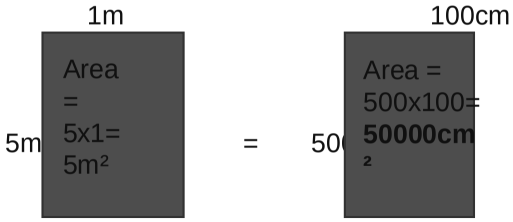
e.g. Convert 5,000 mm^3 to cm^3

The method for converting between units works the same as the one for converting units of area and volume.

When you are converting one sort of unit to another, you need to know how many smaller units are needed to make 1 larger unit.

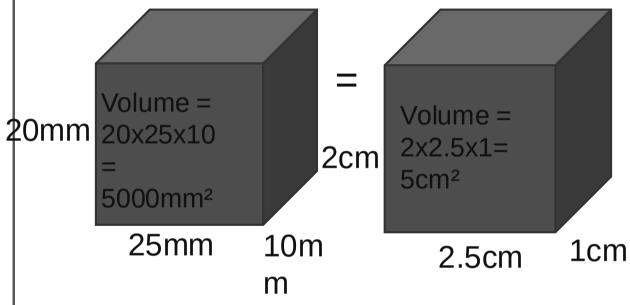
Area

Convert $5m^2$ to cm^2



Volume

Convert 5,000 mm^3 to cm^3



G2: 2D Shapes

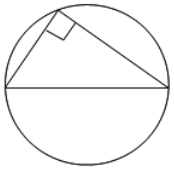
Recognise the circle theorems

G2.40

Recognise the circle theorems

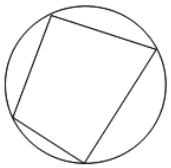
e.g. What are the eight circle theorems?

The angle at the centre = 2 x angle at the circumference

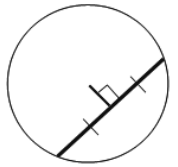


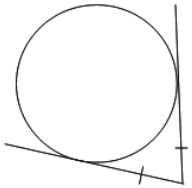
The angle in a semi-circle is a right angle

Angles in the same segment are equal



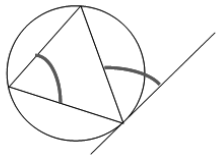
Opposite angles in a cyclic quadrilateral add up to 180°



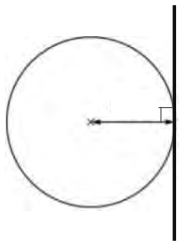


The perpendicular from the centre to the chord bisects the chord

Tangents from a point to a circle are equal



The angle between a tangent and a chord is equal to the angle in the alternate segment

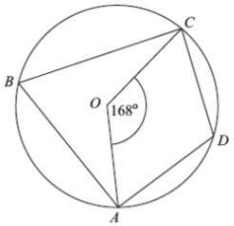


The angle between a tangent and a radius is always 90°

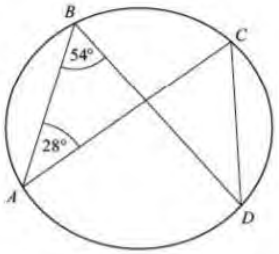
G2: 2D Shapes
Use circle theorems to solve problems

G2.41

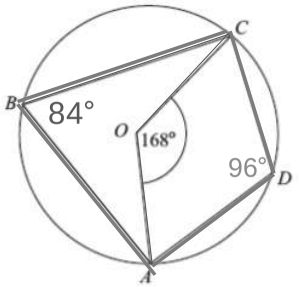
Use circle theorems to solve problems



e.g. Work out angle ADC

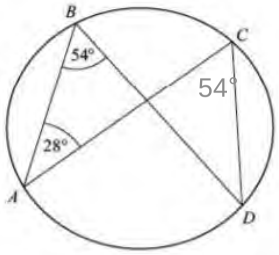


e.g. Work out the angle ACD, give reasons for your answer



Work out angle ADC

Angle ABC = 84° Angle at the centre is 2x the angle at the circumference.
Angle ADC = 96° Opposite angles in a cyclic quadrilateral add up to 180°



Work out the angle ACD, give reasons for your answer

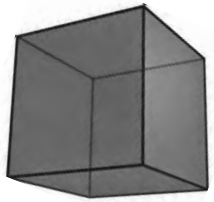
ACD = 54° because angles in the same segment are equal.

G3: 3D Shapes

Identify properties of a 3D shape
Represent a 3D shape on an isometric grid
Identify a net of a cube
Identify a net of other 3D cuboids

G3.1
Identify properties of a 3D shape

E.g. Name the properties of a Cube.



3D shapes have faces (sides), edges and vertices (corners).

Faces
A face is a flat or curved surface on a 3D shape. E.g. a cube has 6 faces, a cylinder has 3 and a sphere 1.

Edges
An edge is where two faces meet. E.g. a cube has 12 edges, a cylinder has 2 and a sphere has none.

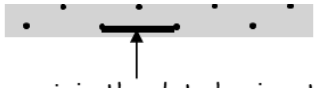
Vertices
A vertex is a corner where edges meet. The plural is vertices. E.g. a cube has 8 vertices, a cone has 1 vertex and a sphere has none.

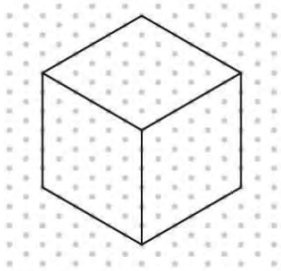
A cube has 6 identical faces, 12 edges and 4 vertices.

G3.2
Represent a 3D shape on an isometric grid

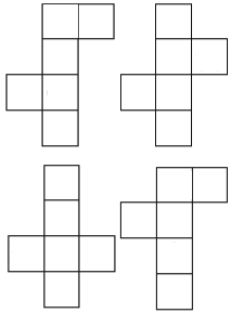
E.g. Create an isometric drawing of a cube measuring 6cm x 6cm x 6cm.

Isometric paper is used to accurately draw 3D shapes.

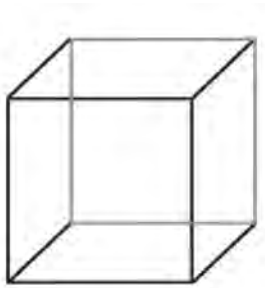




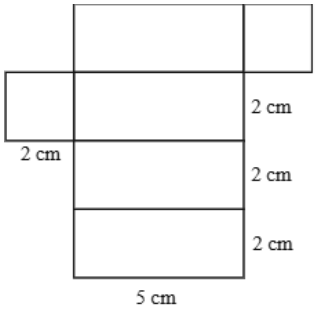
G3.3
Identify a net of a cube.
E.g. What 3D shape do all of these nets form?



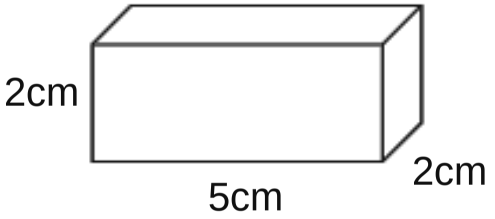
A cube



G3.4
Identify a net of other 3D cuboids.
E.g. Draw and name the shape this would create and include the measurements.



A cuboid.

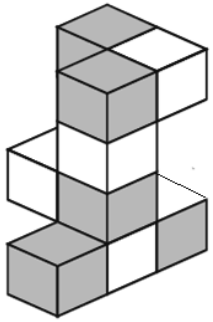


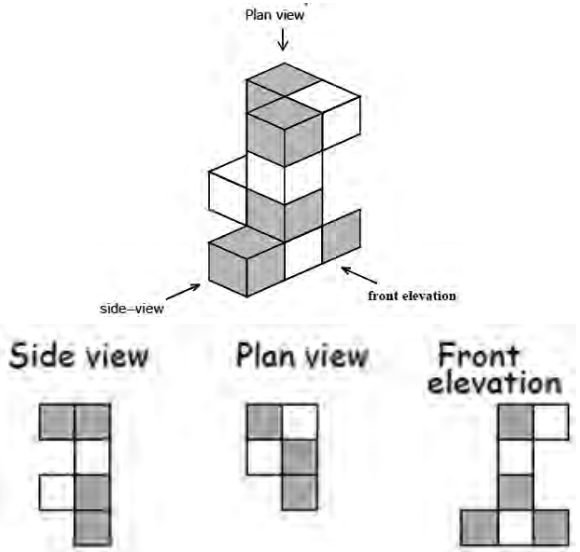
G3: 3D Shapes

Identify a 3D shape from plans and elevations
Calculate the volume of a cuboid
Calculate the surface area of a cuboid
Recognise the net of a cylinder

G3.5
Interpret a 3D shape from plans and elevations

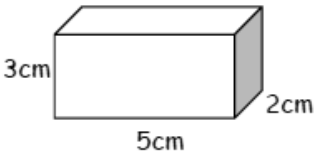
E.g. Draw the Side view, Plan View and Front Elevation of this shape.



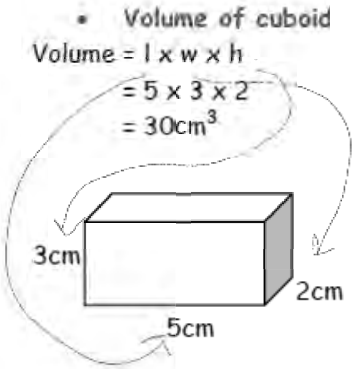


G3.6
Calculate the volume of a cuboid

E.g. Calculate the volume of this cuboid.

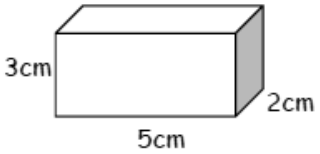


Volume is the amount of space a 3D shape takes up.



G3.7
Calculate the surface area of a cuboid

E.g. Calculate the surface area of this cuboid.



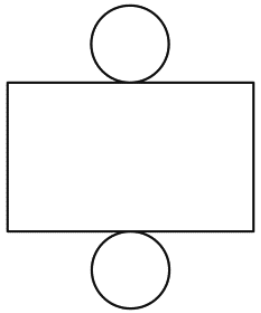
Surface area is the amount of space covering the outside of a three-dimensional shape
Remember a cuboid has 6 faces, you need to include all 6.

- Surface area of cuboid

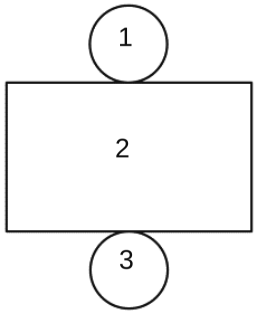
Front = 5x3 = 15
Back = 5x3 = 15
Top = 5x2 = 10
Bottom = 5x2 = 10
Side = 3x2 = 6
Side = 3x2 = 6

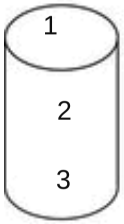
} Total Surface Area = 62cm²

G3.8
Recognise the net of a cylinder
E.g. What 3D shape does this net form?



A cylinder.



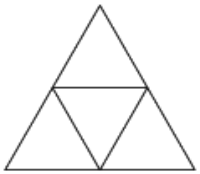


G3: 3D Shapes

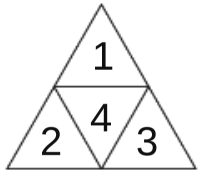
Recognise the net of a tetrahedron
Recognise the net of prisms
Calculate the volume of a prism
Calculate the volume of a prism

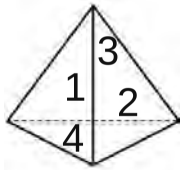
G3.9
Recognise the net of a tetrahedron

E.g. What 3D shape does this net create?



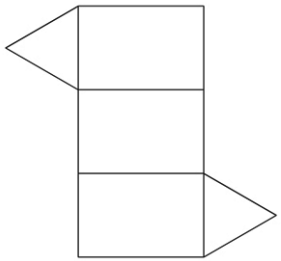
A Tetrahedron. also known as a triangular pyramid, is a polyhedron composed of four triangular faces, six straight edges, and four vertex corners.



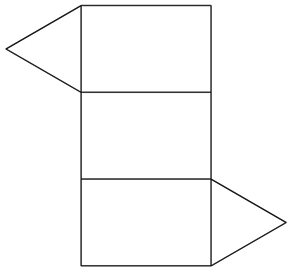


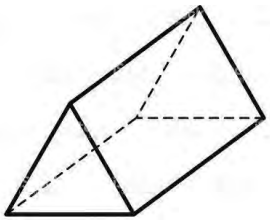
G3.10
Recognise the net of prisms

E.g. What 3D Shape would this net form?



A Triangular Prism. A triangular prism is a prism composed of two triangular bases and three rectangular sides.





G3.11
Calculate the volume of a prism

E.g. What is the formula for working out the volume of any prism?

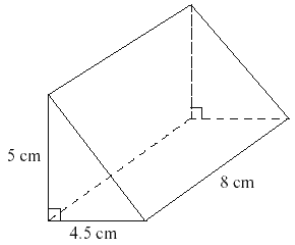
To find the volume of any prism, calculate the area of the cross-section and multiply by the length.

Volume = Area of cross-section x length

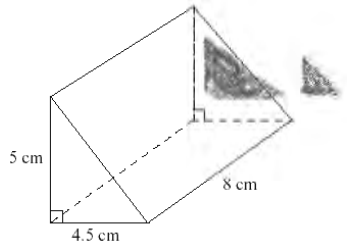
With any prism there is a shape which is repeated throughout the length - this is the cross section.

G3.12
Calculate the volume of a prism

E.g. Calculate the volume of this Triangular Prism



Volume = Area of cross-section x length



Area of cross section

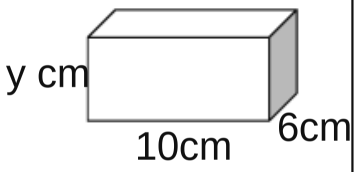
$= \frac{5 \times 4.5}{2} = 11.25 cm^2$

Volume =
$11.25 \times 8 = 90 cm^3$

G3: 3D Shapes

Calculate missing sides from volume
Calculate the surface area of a cylinder
Use the formula for volume of a sphere
Use the formula for the volume of a cone

G3.13
Calculate missing sides from volumes
E.g. The volume of this cube is 420cm³. What is the length the missing side?

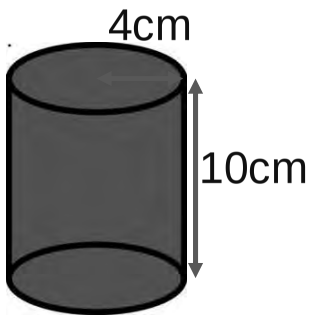


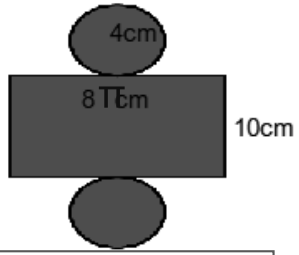
Volume of a cuboid = Length x Height x Width

420 = 10 x 6 x y
420 = 60y
Y = 7cm

G3.14
Calculate the surface area of a cylinder

E.g. Calculate the surface area of this cylinder.





Length of the rectangle = the circumference of the circle.
C= πd
= 8 π

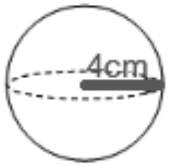
Circle = 4²x π
2 x Circle = 32π

Rectangle = 8π x 10
= 80π

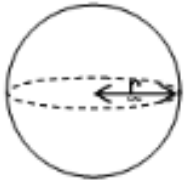
Total Surface area
= 32π + 80π
=112πcm²
(351.86cm²)

G3.15
Use the formula for volume of a sphere

E.g. Calculate the volume of this sphere to one decimal place.



Volume of sphere = $\frac{4}{3}\pi r^3$



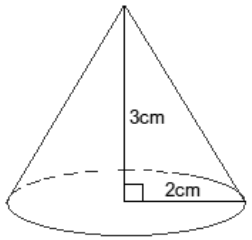
$= \frac{4}{3} \times \pi \times 4^3$

$= \frac{4}{3} \times \pi \times 4^3$

$\frac{256\pi}{3} = 85.3\text{cm}^3$

G3.16
Use the formula for the volume of a cone

E.g. Calculate the volume of this cone to one decimal place.



Volume = $\frac{1}{3}\pi r^2 h$

$v = \frac{1}{3} \times \Pi \times 2^2 \times 3$

$v = 4\Pi$

$v = 12.6cm^3$

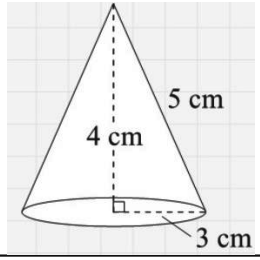
G3: 3D Shapes

Use the formula for curved surface area of a cone

Use the formula to find the surface area of a sphere

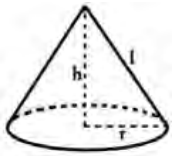
Recognise the net of a cone

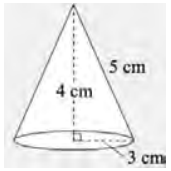
G3.17
Use the formula for curved surface area of a cone
E.g. Work out the area of the curved surface of this cone. Leave in terms of pi.



The area of the curved (lateral) surface of a cone
$= \pi rl$

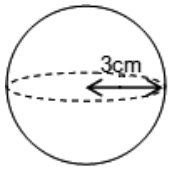
Where,
r is the radius
h is the height
l is the slant height



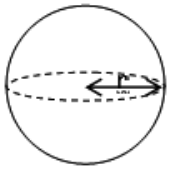


SA = πrl
$= \pi x 3 x 5$
$= 15\pi$

G3.18
Use the formula to find the surface area of a sphere
E.g. Calculate the surface area of this sphere. Leave your answer in terms of pi.

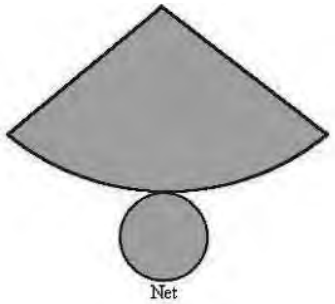


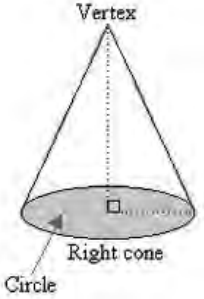
Curved surface area of a sphere = $4\pi r^2$



SA = $4\pi r^2$
$= 4 \times \pi \times 3^2$
$= 4 \times \pi \times 9$
$= 36\pi$

G3.19
Recognise the net of a cone
E.g. What 3D shape does this net create?





A Cone.

The **net** of a cone consists of the following two parts:

- a circle that gives the base; and
- a sector that gives the curved surface

G3: 3D Shapes

Calculate the volume of a frustum

Calculate the curved surface area of a frustum

G3.20
Calculate the volume of a frustum

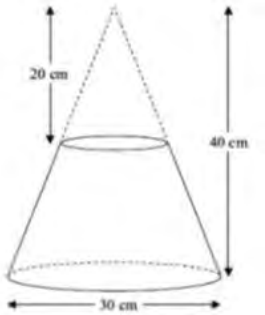
E.g. Below is the frustum of a cone.

The height of the small cone is 20cm.

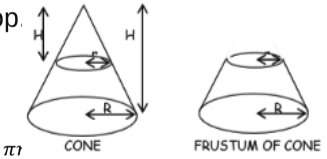
The height of the large cone is 40cm.

The diameter of the base of the large cone is 30cm.

Work out the volume of the frustum. Leave your answer correct to 3.s.f.



A frustum is a cone that has had a smaller cone removed from the top.



Volume of a Cone = $\frac{\pi r^2 h}{3}$

Radius is half of diameter

Large cone = $\frac{\pi 15^2 \times 40}{3}$

= 3000π

To find the radius of the small cone we have to remember it is in proportion. The height goes from 40cm to 20cm ..It has halved.
So we can half the radius too.

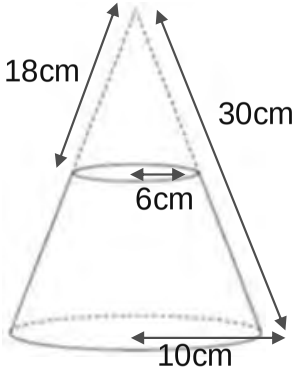
Small cone = $\frac{\pi 7.5^2 \times 20}{3}$

= 375π

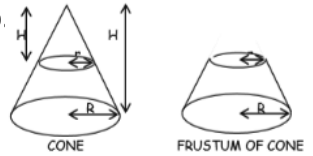
Large cone - small cone = 2625 π
= 8250cm³

G3.21
Calculate the curved surface area of a frustum

E.g. Work out the curved surface area of the frustum of the cone below. Leave your answer in terms of pi.



A frustum is a cone that has had a smaller cone removed from the top.



So we want to find the curved surface area of the large cone and take away the curved surface area of the small cone.

Curved surface area of a cone = πrl
Where l is the slanted height of the cone.

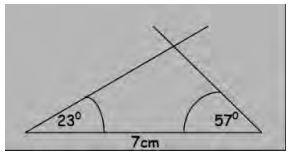
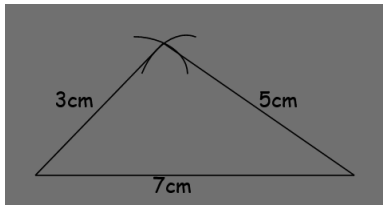
Large cone = π x 10 x 30
= 300π

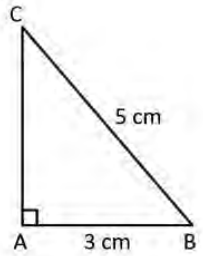
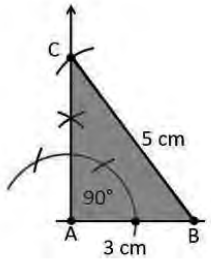
Small cone = π x 6 x 18
= 108π

Total surface area of the frustum
= large cone - small cone
300π - 108π = 192π

G4: Constructions and Loci

Construct a triangle given two angles and a side
Construct a triangle given two sides and an angle
Construct a triangle given all three sides
Construct a right angled triangle given the hypotenuse

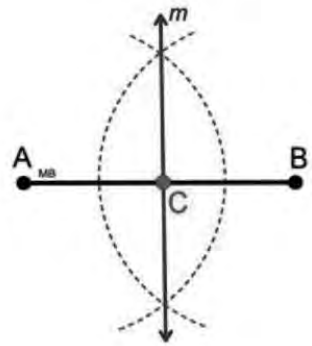
G4.1 Construct a triangle given two angles and a side (ASA)	Measure out the base using a ruler Use a protractor to construct the angles Leave construction lines 
G4.2 Construct a triangle given two sides and an angle (SAS)	Draw the base using a ruler Use a protractor and draw in the angle Measure second side using a ruler and draw it in. Complete the triangle
G4.3 Construct a triangle given all three sides (SSS)	 Use a compass and leave the arcs.

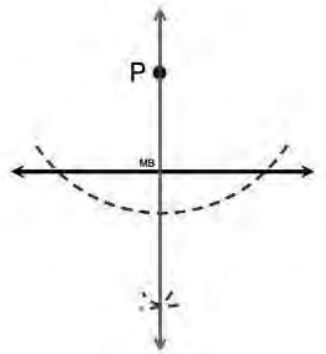
G4.4 Construct a right angled triangle given the hypotenuse	**Example:**  Draw line segment of 3cm to form the base Construct a perpendicular bisector from A Using a compass construct an arc from B, crossing the perpendicular bisector at C Draw in the sides of your triangle, leaving the construction marks. 

G4: Constructions and Loci

Construct a perpendicular bisector

Construct a perpendicular bisector from a point to a line

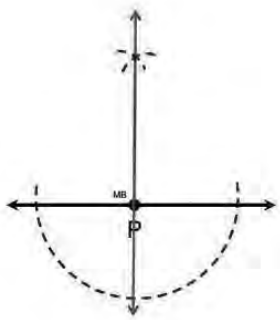
G4.5 Construct a perpendicular bisector	Using a compass construct arcs from points A & B. Make sure the distance between your pencil and the compass point is the same for both. Complete your bisection by drawing a line through the intersecting points of the two arcs, going through C on the diagram 

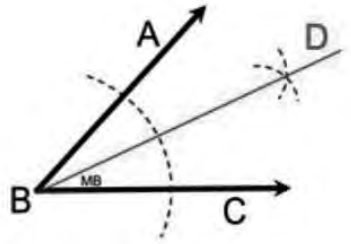
G4.6 Construct a perpendicular bisector from a point to a line segment	Using a compass construct a semicircle below the line segment, placing your compass point at P. Construct a perpendicular as you did before, using the points where the semicircle crosses the line segment as point A & B as in the example given in G4.5 

G4: Constructions and Loci

Construct a perpendicular bisector through a point on a line segment

Construct an angle bisector

G4.7 Construct a perpendicular bisector through a point on a line segment	Using a compass construct a semicircle below the line segment, placing your compass point at P. Construct a perpendicular as you did before, using the points where the semicircle crosses the line segment as point A & B as in the example given in G4.5 

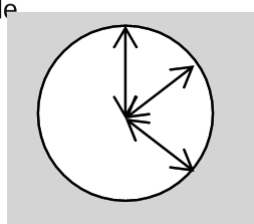
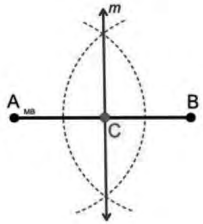
G4.8 Construct an angle bisector	Using a compass construct an arc from B, passing through both AB and BC. Draw an arc, placing the compass point at the intersection on AB. Repeat for the intersection on BC. The arcs with intersect at D. Draw a line segment through D to B as shown in the diagram. 

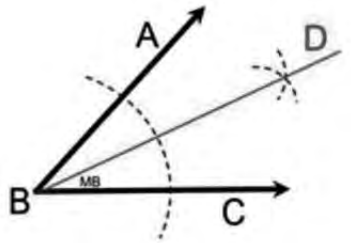
G4: Constructions and Loci

Draw a locus of points a given distance from a point (circle)

Draw a locus of points equidistant from two points

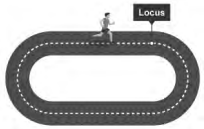
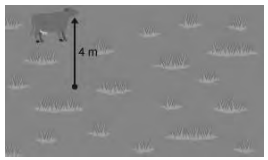
Draw a locus of points equidistant from two lines

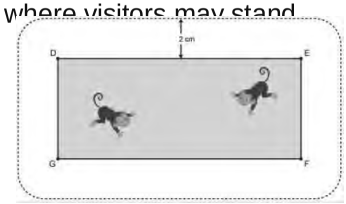
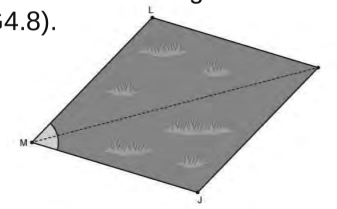
G4.9 Draw a locus of points a given distance from a point (circle)	A **locus** is the path or region a point covers as it moves according to a rule. A series of points a fixed distance (equidistant) from a point is a circle 
G4.10 Draw a locus of points equidistant from two points	The locus of points equidistant from two points is a perpendicular bisector (see G4.5, G4.6, G4.7) 

G4.11 Draw a locus of points equidistant from two lines	The locus of points equidistant from two intersecting lines is an angle bisector (see G4.8) 

G4: Constructions and Loci

Apply loci techniques to more complex problems

G4.12 Apply loci techniques to more complex loci problems	Some **examples** of more complex loci problems. Remember that loci is the plural of locus. The runner is following a path. The path is a locus.  The hands of a clock move around the clock and create a locus.  A cow is tied to a post by a 4m length of rope. The area of grass she can reach is a locus. 

G4.12 Apply loci techniques to more complex loci problems	Some **examples** of more complex loci problems. Remember that loci is the plural of locus. Visitors must stand 2m away from the walls of a monkey enclosure. The diagram shows where visitors may stand.  The path is equidistant between the edges of the field, MJ and ML. The locus is an angle bisector (G4.8). 

G5: Pythagoras and Trigonometry

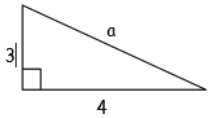
Use Pythagoras' theorem to find a missing side

Use Pythagoras' theorem to calculate a missing side

G5.1 Use Pythagoras' theorem to find a missing hypotenuse

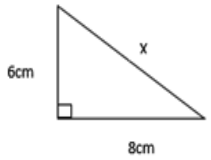
e.g

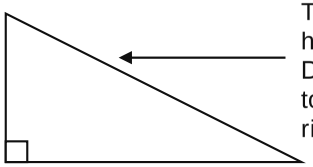
Find a in the triangle below



e.g

Find x in the triangle below





The hypotenuse DOESN'T touch the right angle

If you are finding the hypotenuse, square the two shorter sides, add them together and square root the number you get

e.g

$$3^2 + 4^2 = a^2$$
$$9 + 16 = a^2$$
$$\sqrt{25} = a$$
$$5 = a$$

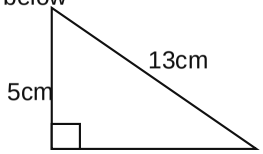
e.g

$$6^2 + 8^2 = x^2$$
$$36 + 100 = x^2$$
$$\sqrt{136} = x$$
$$11.7 = x$$

G5.2 Use Pythagoras' theorem to calculate a missing side

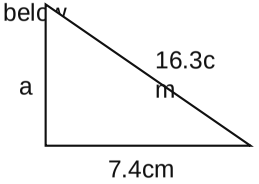
e.g

Find x in the triangle below



e.g

Find a in the triangle below



If you are finding one of the two shorter sides (not the hypotenuse), square the two sides you have, subtract the shorter from the longer and square root the answer

e.g

$$5^2 + x^2 = 13^2$$
$$x^2 = 13^2 - 5^2$$
$$x^2 = 169 - 25$$
$$x = \sqrt{144}$$
$$x = 12$$

e.g

$$7.4^2 + a^2 = 16.3^2$$
$$a^2 = 16.3^2 - 7.4^2$$
$$a^2 = 265.69 - 54.76$$
$$a = \sqrt{210.93}$$
$$a = 14.5 \quad 1dp$$

G5: Pythagoras and Trigonometry

Use trigonometry for right angle triangles to find a missing side

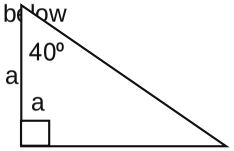
Use trigonometry for right angle triangles to find missing angles

Use vector column notation

G5.3 Use Trigonometry for right angled triangles to find a missing side

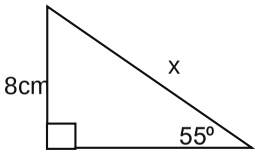
e.g

Find a in the triangle below



e.g

Find x in the triangle below

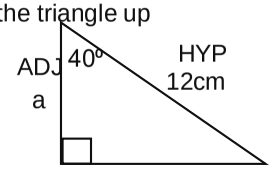


Remember SOHCAHTOA.

Label the sides of the triangle you have with Opposite, Adjacent or Hypotenuse. Choose the correct trigonometric ratio to use. Substitute into the relevant formula and solve the equation

e.g

Label the triangle up



We have adj and hyp so use Cosine

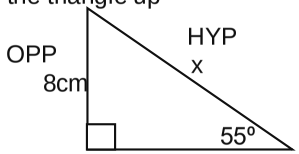
$$\cos(40) = \frac{a}{12}$$

$$12 \times \cos(40) = a$$

$$9.19cm = a$$

e.g

Label the triangle up



We have opp and hyp so use Sine

$$\sin(55) = \frac{8}{x}$$

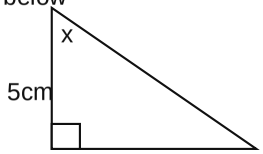
$$x = \frac{8}{\sin(55)}$$

$$x = 9.77cm$$

G5.4 Use Trigonometry for right angled triangles to find missing angles

e.g

Find x in the triangle below

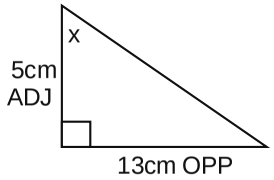


Remember SOHCAHTOA

Label the sides of the triangle you have with Opposite, Adjacent or Hypotenuse. Choose the correct trigonometric ratio to use. Substitute into the relevant formula and solve the equation using inverse functions

e.g

Label the triangle up



We have opp and adj so use Tan

$$\tan(x) = \frac{13}{5}$$

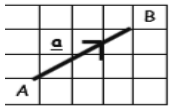
$$x = \tan^{-1}(\frac{13}{5})$$

$$x = 69.0°$$

G5.5 Use Vector column notation

e.g

Give the vector that represents a



In your vector the top value indicates spaces right or left (+ means right, - means left) and the bottom value means up or down (+ means up, - means down)

e.g

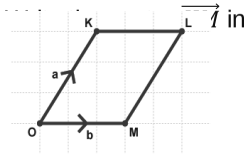
Moves 3 spaces right and 2 spaces up so vector is $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$

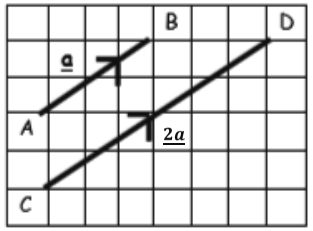
G5: Pythagoras and Trigonometry

Add and subtract two column vectors

Use unknown vector notation

Know how to show two vectors are parallel

G5.6 Add and Subtract two column vectors e.g If $a = \begin{pmatrix}4\\7\end{pmatrix}$ and $b = \begin{pmatrix}2\\-3\end{pmatrix}$ calculate $a + b$ $a - b$	Vectors must have the same number of elements in them to be added or subtracted from each other. Match up each corresponding element and do the required calculation e.g $a + b$ gives $\begin{pmatrix}4\\7\end{pmatrix} + \begin{pmatrix}2\\-3\end{pmatrix}$ $= \begin{pmatrix}4+2\\7+-3\end{pmatrix}$ $= \begin{pmatrix}6\\4\end{pmatrix}$ $a - b$ gives $\begin{pmatrix}4\\7\end{pmatrix} - \begin{pmatrix}2\\-3\end{pmatrix}$ $= \begin{pmatrix}4-2\\7--3\end{pmatrix}$ $= \begin{pmatrix}2\\10\end{pmatrix}$
G5.7 and 5.8 Use unknown vector notation e.g  $\overrightarrow{1}$ in	Vectors are often represented simply using letters rather than numbers. These can be added and subtracted to find expressions for other unknown vectors e.g $\overrightarrow{KM} = \overrightarrow{KO} + \overrightarrow{OM}$ $\overrightarrow{KO} = -a$ and $\overrightarrow{OM} = b$ So $\overrightarrow{KM} = -a + b$ or $b - a$

G5.9 Know how to show two vectors are parallel	If two vectors are parallel one will be a multiple of the other e.g  $\overrightarrow{AB} = a$ and $\overrightarrow{CD} = 2a$ as 2a is a multiple of a $\overrightarrow{AB}$ and $\overrightarrow{CD}$ ARE parallel

G5: Pythagoras and Trigonometry

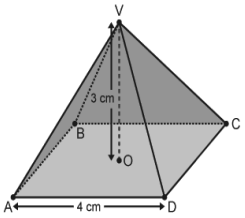
Use Pythagoras and trigonometry in 3D

Use the sine rule to find a missing side

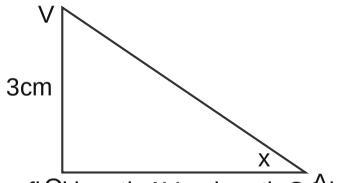
G5.10 and G5.11 Use Pythagoras and Trigonometry in 3D

e.g
ABCDV is a square based pyramid.
O is the **midpoint** of the square base ABCD.
Lengths AD, DC, BC and AB are all 4 cm.
The **perpendicular** height of the pyramid (OV) is 3 cm.

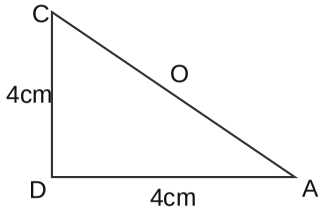
Find the angle between AV and the plane ABCD



Draw out 2D triangles that represent the lengths or angles that you are trying to calculate and apply Pythagoras and/or trigonometry as you would in a 2D shape
e.g:The angle between AV and ABCD is represented by the triangle below



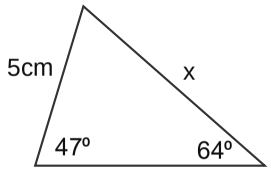
Either find length AV or length OA in order to use trigonometry to find x. We will find OA using the triangle below



Using Pythagoras' theorem from 5.1 AC is 5.66cm. As) is the midpoint of this line OA is 2.83cm. Use trigonometry to find an angle from section 5.4 on the top triangle the angle is 46.7º

G5.12 Use the sine rule to find a missing side

e.g
Find the missing side in the triangle below

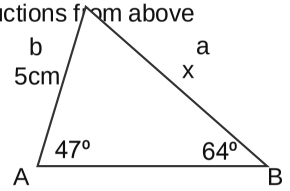


In order to find a missing side using Sine rule label the side you are trying to find as a and the angle that is opposite that as A. Then label the other side you know as b and the angle opposite that as B. Following that substitute into the below formula and solve for a

$$\frac{a}{sin(A)} = \frac{B}{\sin(B)}$$

e.g

First relabel the triangle using the instructions from above



Then substitute into the formula and solve

$$\frac{x}{\sin(47)} = \frac{5}{\sin(64)}$$

Multiply both sides by sin 47

$$x = \frac{5 \times \sin(47)}{\sin(64)}$$

$$x = 4.07cm$$

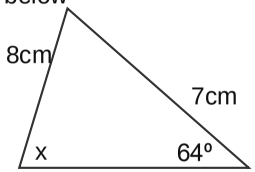
G5: Pythagoras and Trigonometry

Use the sine rule to find a missing angle

Use cosine rule to find a missing side

G5.13 Use the sine rule to find a missing angle

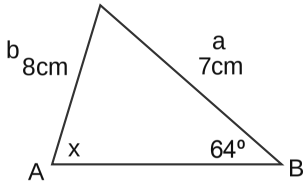
e.g
Find the missing angle in the triangle below



In order to find a missing angle using Sine rule label the angle you are trying to find as A and the side that is opposite that as a. Then label the other angle you know as B and the side opposite that as b.
Following that substitute into the below formula and solve for A

$$\frac{\sin(A)}{a} = \frac{\sin(B)}{\text{b}}$$

e.g
First relabel the triangle using the instructions from above



Then substitute into the formula and solve

$$\frac{\sin(x)}{7} = \frac{\sin(64)}{8}$$

Multiply both sides by 7

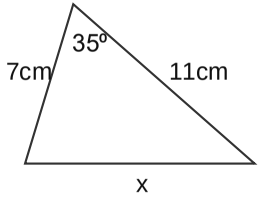
$$\sin(x) = \frac{7 \times \sin(64)}{8}$$

Take $\sin^{-1}$

$x = 51.9°$

G5.14 Use the cosine rule to find a missing side

e.g
Find the missing side in the triangle below

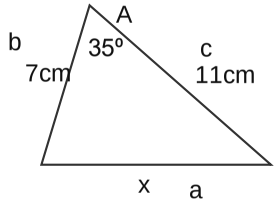


In order to find a missing side using Cosine rule label the side you are trying to find as a and the angle that is opposite that as A. Then label the other two sides you know as b and c (it doesn't matter which is which.
Following that substitute into the below formula and solve for a

$$a^2 = b^2 + c^2 - 2bcCos(A)$$

e.g

First relabel the triangle using the instructions from above



Then substitute into the formula and solve

$x^2 = 7^2 + 11^2 - 2 \times 7 \times 11 \times \cos(35)$

Square root both sides

$$x = \sqrt{43.85}$$
$$x = 6.62cm$$

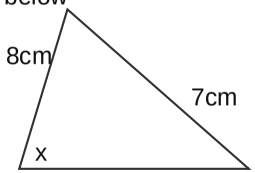
G5: Pythagoras and Trigonometry

Use the cosine rule to find a missing angle

Find the area of a triangle of unknown height or find a side or angle when given the area of a triangle

G5.15 Use the cosine rule to find a missing angle

e.g
Find the missing angle in the triangle below

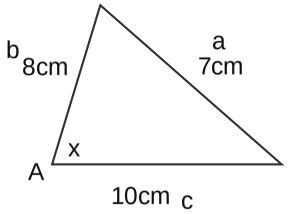


In order to find a missing angle using Sine rule label the angle you are trying to find as A and the side that is opposite that as a. Then label the other two sides you know as b and c (it doesn't matter which is which.) Following that substitute into the below formula and solve for A

$$\cos(A) = \frac{b^2 + c^2 - a^2}{2bc}$$

e.g

First relabel the triangle using the instructions from above



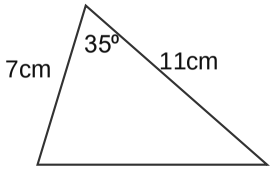
Then substitute into the formula and solve

$$\cos(A) = \frac{8^2 + 10^2 - 7^2}{2 \times 8 \times 10}$$

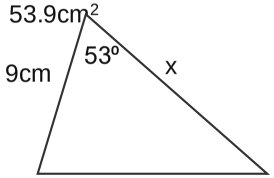
Take $\cos^{-1}$

$$x = 44.0°$$

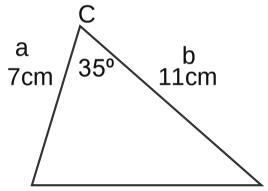
G5.16 and G5.17
Find the area of a triangle of unknown height or find a side or angle when given the area of a triangle
e.g Find the area of the triangle below



e.g Find the length of the unknown side given the area is $53.9cm^2$



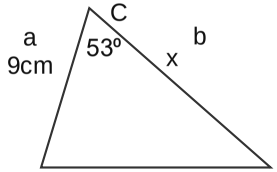
The formula for finding the area of a non- right angled triangle is $Area = \frac{1}{2}absin(C)$ where a and b are known sides and C is a known included angle.
e.g
Label up the triangle and substitute into the formula



$$Area = \frac{1}{2} \times 7 \times 11 \times \sin(35)$$

$$Area = 22.1cm$$

e.g Label up the triangle as previously



Substitute into formula and solve for x using inverse functions

$$53.9 = \frac{1}{2} \times 9 \times x \times \sin(53)$$

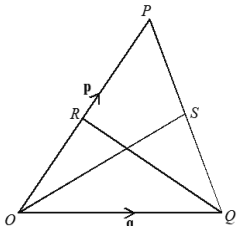
$$x = 15.0cm$$

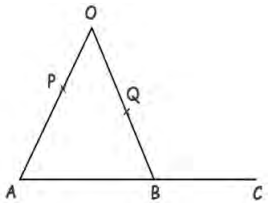
G5: Pythagoras and Trigonometry

Calculate the length of a vector

Prove that two vectors are parallel

Prove that two vectors are co-linear

G5.18 Calculate the length of a vector e.g Find the length of the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	To calculate the length of a vector you use a simplified version of pythagroas' theorem. For a vector $\begin{pmatrix} x \\ y \end{pmatrix}$ you calculate $\sqrt{x^2+y^2}$ to find the length e.g $\sqrt{3^2+-4^2}$ $vector\ length = 5\ units$
G5.19 Prove that two vectors are parallel e.g OPQ is a triangle $\overrightarrow{OQ} = q$ and $\overrightarrow{OR} = p$ R is the midpoint of $\overrightarrow{OP}$ and S is the midpoint of $\overrightarrow{PQ}$ Prove that $\overrightarrow{RS}$ and $\overrightarrow{OQ}$ are parallel 	Use the skills built in G5.7/G5.8 and G5.9 to prove that two unknown vectors are parallel. Firstly by using vector notation to combine the vectors you require then showing that they are multiples of each other e.g For $\overrightarrow{RS}$ to be parallel to $\overrightarrow{OQ}$ it will need to be a multiple of q $\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$ so $\overrightarrow{PQ} = q - p$ $\overrightarrow{RS} = \overrightarrow{RP} + \overrightarrow{PS}$ and as R is the mid point of $\overrightarrow{OP}$ and S is the midpoint of $\overrightarrow{PQ}$ then $\overrightarrow{RP} = \frac{p}{2}$ and $\overrightarrow{PS} = \frac{q}{2} - \frac{p}{2}$ That means that $\overrightarrow{RS} = \frac{p}{2} + \frac{q}{2} - \frac{p}{2} = \frac{q}{2}$ Therefore $\overrightarrow{OQ} = \frac{\overrightarrow{RS}}{2}$ so $\overrightarrow{RS}$ and $\overrightarrow{OQ}$ are parallel

G5.20 Prove that two vectors are co-linear (lie in a straight line) e.g AOB is a triangle P is a point on $\overrightarrow{AO}$ $\overrightarrow{AB} = 2a$, $\overrightarrow{AO} = 6b$ and $\overrightarrow{AP}:\overrightarrow{PO} = 2:1$ B is the midpoint of $\overrightarrow{AC}$ Q is the midpoint of $\overrightarrow{OB}$ Prove that PQC is a straight line 	To prove that two vectors are co-linear, or make a straight a straight line you need to prove that two vectors are parallel as in G5.19 but also that they both go through a common point e.g To prove that PQC is a straight line we will show that $\overrightarrow{PQ}$ and $\overrightarrow{PC}$ are parallel and as they both go through P they will make a straight line $\overrightarrow{OB} = \overrightarrow{OA} + \overrightarrow{AB} = 2a - 6b$ $\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$ where $\overrightarrow{PO} = \frac{\overrightarrow{AO}}{3} = 2b$ and $\overrightarrow{OQ} = \frac{\overrightarrow{OB}}{2} = \frac{2a-6b}{2} = a - 3b$ Therefore $\overrightarrow{PQ} = 2b + a - 3b = a - b$ $\overrightarrow{PC} = \overrightarrow{PA} + \overrightarrow{AC}$ where $\overrightarrow{PA} = -\frac{2\overrightarrow{AO}}{3} = -4b$ and $\overrightarrow{AC} = 2\overrightarrow{AB} = 4a$ Therefore $\overrightarrow{PC} = -4b + 4a$ or $4a - 4b$ That means that $\overrightarrow{PC} = 4\overrightarrow{PQ}$ which proves that these two vectors are parallel. As they also both go through the common point P that proves that PQC is a straight line

N1: Calculating with Numbers

Understand the use of place value
Multiply by a two digit number
Multiply by 10, 100, 1000 etc,
Divide by a one digit number

N1.1 Understand the use of place value e.g. What value is the 6 in the number 6700	Th H T U. 6 7 0 0 The '6' is in the thousands column. Therefore the value of the 6 is six thousand.
N1.2 Multiply by a two-digit number e.g. 152 x 34	Draw a grid. Write the hundreds, tens and units across the top. Write the tens and units down the side. Multiply each number together. Add all the numbers from inside the box. 152 x 34 = 3400 +1700+ 68 = **5168**

	100	50	2
30	3000	1500	60
4	400	200	8

N1.3 Multiply by 10, 100, 1000 etc. e.g. 3.52 x10 3.52 x 100 3.52 x 1000	To multiply by powers of ten, move all the digits to the left by the same number of places as the power 3.52 x 10 = 35.2 (move 1 place) 3.52 x 100 = 352 (move 2 places) 3.52 x 1000 = 3520 (move 3
N1.4 Divide by a one-digit number e.g. 756 ÷ 3	Draw a bus stop. The number you divide by goes on the outside. Divide the number into the first number underneath. If it does not go, write 0 on top and carry the number underneath. Divide into the next number. 3 | 7 5 6 → 2 5 2 -6 ↓ 1 5 ↓ 1 5 0 6 e.g. 756 ÷ 3 =252

N1: Calculating with Numbers

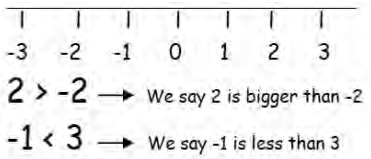
Divide by a two digit number
Use BIDMAS to order operations
Add and subtract decimals
Multiply decimals

N1.5 Divide by a two-digit number e.g. 4928 ÷ 32	Draw a bus stop. The number you divide by goes on the outside. Divide the number into the first number underneath. If it does not go, write 0 on top and carry the number underneath. Divide into the next number. 0 1 5 4 3 2 | 4 9 2 8 -3 2 ↓ 1 7 2 ↓ -1 6 0 1 2 8 -1 2 8 4928 ÷ 32 = 154
N1.6 Use BIDMAS to order operations e.g. 3 + 4 x 6 - 5	**B**racket **I**ndices **D**ivide } Do these in the order they appear **M**ultiply **A**dd } Do these in the order they appear **S**ubtract e.g. 3 + 4 x 6 – 5 = 22 ↑ first

N1.7 Add and subtract decimals e.g. 4.32 + 5.6	4.32 + 5.60 9.92 Line up the decimal point. Fill any blank spaces with 0. Add the numbers starting from the right. 4.32 + 5.6 = 9.92
N1.8 Multiply Decimals e.g. 2.5 x 1.1	Take out the decimal points. Multiply as with long multiplication. Put the decimal back in. e.g. 2.5 x 1.1 25 x 11 = 275 There are 2 decimal places in the question, so the answer is 2.75 2.5 x 1.1 = 2.75

N1: Calculating with Numbers

Divide by decimals
Order negative numbers
Add and subtract negative numbers
Multiply and divide by negative numbers

N1.9 Divide by decimals e.g. 2.84 ÷ 0.2	Make the divisor into a whole number. Multiply both numbers. e.g. 2.84 ÷ 0.2 (multiply both by 10) 28.4 ÷ 2 = 14.1 2.84 ÷ 0.2 = 14.1
N1.10 Order negative numbers e.g. order the numbers in ascending order: -3, 5, -1, -2, 0	 -3, -2, -1, 0, 5

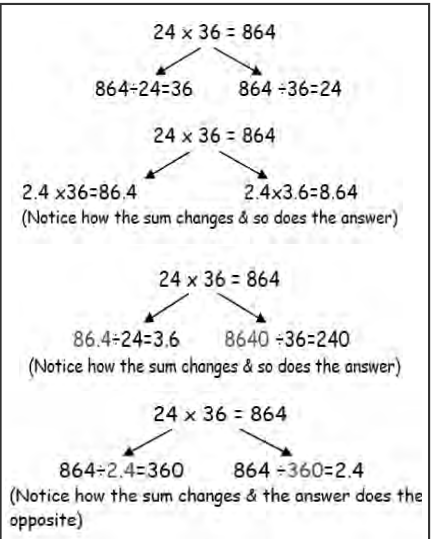
N1.11 Add and subtract negative numbers e.g. 8 + -2 8 - +2 8 - -2	Remember the rules: • When subtracting go down the number line • When adding go up the number line • 8 + - 2 is the same as 8 – 2 = 6 • 8 - + 2 is the same as 8 – 2 = 6 • 8 - - 2 is the same as 8 + 2 = 10
N1.12 Multiply and divide by negative numbers e.g. -8 x -2 -8 ÷ -2	When multiplying negatives remember: + x + = + + x - = - - x + = - - x - = + When dividing negatives remember: + x + = + + x - = - - x + = - - x - = + 8 x -2 = -16 -8 ÷ -2 = 4

N1: Calculating with Numbers

Use one calculation to work out another

Use a calculator efficiently for simple calculations

Use a calculator efficiently for powers, roots and more complex calculations

N1.13 Use one calculation to work out another e.g. 24 x 36 = 864, what is 2.4 x 3.6?	
N1.14 Use a calculator efficiently for simple calculations	Know your keys Addition: + Subtraction: - Multiply: x Divide: ÷ Equals: = Brackets: ()

N1.15 Use a calculator efficiently for powers, roots and more complex calculations	Know your keys x^2 Square key x^3 Cube key $x^{\blacksquare}$ Power key $\sqrt{\ }$ Square root key $\sqrt[3]{\ }$ Cube root key (-) Negative key $\frac{\blacksquare}{\square}$ Fraction key

N2: Fractions, Decimals and Percentages

Write equivalent fractions
Simplify a fraction
Add and subtract fractions (same denominator)
Add fractions (different denominators)
Subtract fractions (different denominators)

N2.1 Write equivalent fractions e.g. write equivalent fractions for: $\frac{4}{5}$	To write an equivalent fraction you must multiply the numerator and denominator by the same number. $\frac{4}{5} = \frac{16}{20}$ (multiply by 4) $\frac{4}{5} = \frac{40}{50}$ (multiply by 10) $\frac{4}{5} = \frac{8}{10}$ (multiply by 2)
N2.2 Simplify a fraction e.g. simplify: $\frac{8}{12}$ $\frac{15}{40}$	See what number divides exactly into both the numerator and denominator e.g. $\frac{8}{12} \xrightarrow{\div 4} \frac{2}{3}$ e.g. $\frac{15}{40} \xrightarrow{\div 5} \frac{3}{8}$

N2.3 Add and subtract fractions (same denominator) e.g. $\frac{2}{3} + \frac{2}{3}$	Add & subtract with same denominator e.g. $\frac{2}{3} + \frac{2}{3} = \frac{4}{3} = 1\frac{1}{3}$
N2.4 Add fractions (different denominators) e.g. $\frac{1}{5} + \frac{7}{10}$	Make denominators the same then add the numerators e.g. $\frac{1}{5} + \frac{7}{10}$ $= \frac{2}{10} + \frac{7}{10}$ $= \frac{9}{10}$
N2.5 Subtract fractions (different denominators) $\frac{4}{5} - \frac{2}{3}$	Make denominators the same then subtract the numerators $\frac{4}{5} - \frac{2}{3}$ $= \frac{12}{15} - \frac{10}{15}$ $= \frac{2}{15}$

N2: Fractions, Decimals and Percentages

Multiply fractions
Find a fraction of a quantity
Divide a fraction by a whole number
Order fractions
Convert common fractions, decimals and percentages

N2.6 Multiply fractions e.g. $\frac{2}{7} \times \frac{2}{3}$	When multiplying fractions, multiply the numerators and multiply the denominators. Cancel down if possible before or after the calculation. $\frac{2}{7} \times \frac{2}{3} = \frac{4}{21}$
N2.7 Find fraction of a quantity e.g. Find $\frac{4}{5}$ of £40	$\frac{\mathbf{4}}{\mathbf{5}}$ **means ÷ 5 x 4.** e.g. To find $\frac{4}{5}$ of £40 £40 ÷ 5 x 4 = £32
N2.8 Divide a fraction by a whole number e.g. $\frac{2}{7} \div 3$	Make the whole number a fraction e.g. 3 becomes $\frac{3}{1}$ Then Keep Change Flip: Keep first fraction the same Change ÷ to x Flip the second fraction and calculate $\frac{2}{7}$ x $\frac{1}{3}$ = $\frac{2}{21}$

N2.9 Order fractions e.g. order: $\frac{5}{6}, \frac{7}{12}, \frac{2}{3}, \frac{3}{4}$	Fractions must have the same denominator They must have the same denominator e.g. $\frac{5}{6}$ $\frac{7}{12}$ $\frac{2}{3}$ $\frac{3}{4}$ ↓ ↓ ↓ ↓ $\frac{10}{12}$ $\frac{7}{12}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{7}{12}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$
N2.10 Convert common fractions, decimals and percentages e.g. 0.5, 0.25	LEARN THESE = 0.25 = 25% = ¼ = 0.5 = 50% = ½ = 0.75 = 75% = ¾

N2: Fractions, Decimals and Percentages

Order decimals
Find a percentage of a quantity
Converting fractions to decimals

N2.11 Order decimals e.g. order: 0.3, 0.304, 0.32, 0.33	Decimals need the same number of digits Give them all the same number of digits e.g. 0.3, 0.304, 0.32, 0.33 ↓ ↓ ↓ ↓ 0.300 0.304 0.320 0.330 Now the decimals can be ordered 0.3, 0.304, 0.32, 0.33
N2.12 Find percentage of a quantity e.g. 8% of £240 12.5% of 80kg 80% of 52 litres	e.g. 8% of £240 = 0.08 x 240 = £19.20 12 ½ % of 80kg = 0.125 x 80 = 10kg 80% of 52 litres = 0.8 x 52 = 41.6 litres
N2.13 Converting fraction to decimal e.g. $\frac{4}{5}$ $\frac{9}{12}$ $\frac{3}{8}$	Fractions to decimals - by changing e.g. $\frac{4}{5} = \frac{8}{10} = 0.8$ e.g. $\frac{9}{12} = \frac{3}{4} = 0.75$ Fractions to decimals - by dividing e.g. $\frac{3}{8} = 3 \div 8 = 0.375$

Convert a decimal to a fraction
Convert from a percentage to a decimal to a fraction
Convert from a decimal to a percentage to a fraction
Convert fractions to decimals to percentages

N2.14 Convert decimal to a fraction e.g. 0.74	To convert see what column the number ends in. In this case the hundredths. Therefore put the number over 100 and simplify. $0.74 = \frac{74}{100} = \frac{37}{50}$
N2.15 Convert from percentage to decimal to fraction e.g. 27% 7% 70%	$27\% = 0.27 = \frac{27}{100}$ $7\% = 0.07 = \frac{7}{100}$ $70\% = 0.7 = \frac{70}{100} = \frac{7}{10}$
N2.16 Convert from decimal to percentage to fraction e.g. 0.3 0.03 0.39	$0.3 = 30\% = \frac{3}{10}$ $0.03 = 3\% = \frac{3}{100}$ $0.39 = 39\% = \frac{39}{100}$
N2.17 Convert fractions to decimals to percentages e.g. $\frac{4}{5}$ $\frac{3}{8}$	$\frac{4}{5} = \frac{80}{100} = 80\% = 0.8$ Change to 100 $\frac{3}{8} = 3 \div 8 = 0.375 = 37.5\%$

N2: Fractions, Decimals and Percentages

Divide fractions
Increase by a percentage
Decrease by a percentage
Order fractions, decimals and percentages

N2.18 Divide fractions e.g. $\frac{2}{7} \div \frac{2}{3}$	Invert fraction after ÷ Multiply numerator Multiply denominators. Keep Change Flip $\frac{2}{7} \div \frac{2}{3} = \frac{2}{7} \times \frac{3}{2}$ $= \frac{6}{14} = \frac{3}{7}$
N2.19 Increase by a percentage e.g. Increase £12 by 5%	• To increase £12 by 5% 10% of £12 = £1.20 5% of £12 = £0.60 (OR 0.05 x 12 = 0.6) *Increased amount = £12 + £0.60 = £12.60* If using a calculator: Multiplier needed to increase a quantity. To increase a quantity by 5% Multiply the quantity by 1.05 (100 + 5 = 105) 12 x 1.05 = £12.60

N2.20 Decrease by a percentage. e.g. Decrease £50 by 15%	• To decrease £50 by 15% 10% of £50 = £5 5% of £50 = £2.50 15% of £50 = £7.50 (OR 0.15x50=7.5) *Decreased amount = £50 - £7.50 = £42.50* If using a calculator: Multiplier needed to decrease a quantity. To decrease a quantity by 15%. Multiply the quantity by 0.85 (100 - 15) 50 x 0.85 = £42.50
N2.21 Order Fractions, Decimals, Percentages e.g. Order: 0.3, $\frac{3}{5}$, 40%, 0.56	You need to convert them all to the same form. In this case it is easier to convert all to decimals and then order 0.3 $\frac{3}{5}$ = 0.6 40% = 0.4 0.56 Therefore the correct order in ascending order is: 0.3, 40%, 0.56, $\frac{3}{5}$

N2: Fractions, Decimals and Percentages

Change a recurring decimal into a fraction

Prove that a recurring decimal is equal to a fraction

N2.22 Change a recurring decimal into a fraction e.g. Convert = 0.44444444444 into a fraction	Set the recurring decimal = x. Multiply by a power of 10. The power is the same as the number of digits recurring. Subtract the smaller decimal from the larger. This will give an equation. Solve the equation, leaving your answer as a fraction in its simplest terms. Let x = 0.44444444444… 10x = 4.4444444444… 9x = 4 $x = \frac{4}{9}$
N2.23 Prove that a recurring decimal is equal to a fraction e.g. prove that $0.44444 = \frac{4}{9}$	A proof will need every step clearly written. Use the method shown in N2.22.

N3: Accuracy and Measures

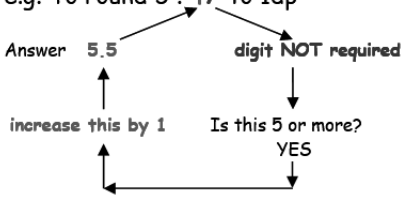
Round to the nearest 1,10,100 etc

Round to 1 decimal place.

Round to 1 or more decimal places

Round to 1 significant figure

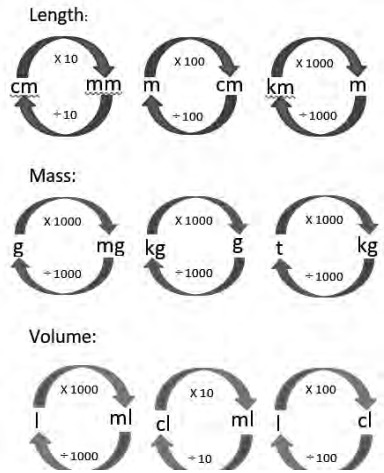
N3.1 Round to the nearest 1, 10, 100 etc. Round 2548.6 to the nearest 1, 10, 100 & 1000.	Numbers can be **rounded to the nearest whole number, the nearest ten**, the **nearest hundred**, the **nearest thousand**, the **nearest** million, and so on. If the digit you are **rounding** is followed by a 5, 6, 7, 8, or 9, **round** the number up. If the number you are **rounding** is followed by a 0, 1, 2, 3, or 4, **round** the number down. 1 | 10 | 100 | 1000 2549 | 2550 | 2500 | 3000
N3.2 Round to 1 decimal place. Round to 1 decimal place: a) 34.64 b) 53.271 c) 102.956	Numbers can be **rounded to one decimal place**. If the digit in the 2nd decimal place is a 5, 6, 7, 8, or 9, **round** the number up. If it is a 0, 1, 2, 3, or 4, **round** the number down. a) 34.6 b) 53.3 c) 103.0

N3.3 Round to 1 or more decimal places. a) Round 43.568 b) to 2dp. b) Round 5.6741 to 3dp. c) Round 4.7955 to 2dp.	• Look at the digit required • Look at the first digit NOT required e.g. To round 5 . 47 to 1dp  a) 43.57 b) 5.674 c) 4.80
N3.4 Round to 1 significant figure. The first s.f. is the first non-zero digit from the left. Round to 1 significant figure: a) 289.6 b) 4489 c) 0.000763	Look at the first non-zero digit. Look at the next digit. If this next digit is **5 or more**, increase the previous digit by one If this next digit is **4 or less**, keep the previous digit the same Replace all the digits after the first non-zero digit with zeros, stopping at the decimal point if there is one. a) 300 b) 4000 c) 0.0008

N3: Accuracy and Measures

Round to 2 or more significant figures
Estimate a calculation using rounding
Calculate with metric units

N3.5 Round to 2 or more significant figures. a) Round 65590 to 2sf. b) Round 674.82 to 3sf. c) Round 0.01362 to 2sf.	Look at the digit after the first non-zero digit. Look at the next digit. If this next digit is **5 or more**, increase the previous digit by one. If this next digit is **4 or less**, keep the previous digit the same. Replace all these other digits with zeros, stopping at the decimal point if there is one a) 66000 b) 675 c) 0.014
N3.6 Estimate a calculation using rounding. Estimate: a) 423 x 28 b) 1589 ÷ 0.473	When estimating always round each number to 1 significant figure first. a) 400 x 30 = 12000 b) 2000 ÷ 0.5 = 4000

N3.7 Calculate with metric units. Convert : a) 6m to cm b) 7200g to kg c) 34cl to l	 a) 6 x 100 = 600cm b) 7200 ÷ 1000 = 7.2 kg c) 34 ÷ 100 = 0.34 l

N3: Accuracy and Measures

Calculate with time

Calculate with money

Convert units of time

N3.8 Calculate with time.	For adding time: 1) Add the hours 2) Add the minutes 3) It the minutes are 60 or more subtract 60 from the minutes and add 1 hour.
What is 2:45 + 1:20?	Add the hours, 2 + 1 = 3. Add the minutes 45 + 20 = 65. The minutes are more than 60, so subtract 60 from the minutes, 65 – 60 = 5, and add 1 to the hours, 3 + 1 = 4. The answer is 4:05.
	For subtracting time: 1) Subtract the hours 2) Subtract the minutes 3) If the minutes are negative add 60 to the minutes and subtract 1 hour.
What is 9:15 - 3:35?	Subtract the hours, 9 - 3 = 6 Subtract the minutes 15 - 35 = -20 The minutes are negative, so add 60 to the minutes, -20 + 60 = 40, and subtract 1 from the hours, 6 - 1 = 5. The answer is 5:40.

N3.9 Calculate with money.	Use the same method of adding numbers that have 2 decimal places.
Richard buys a notebook that costs £6.78 and a pen that costs £4.19. Work out the total cost.	6.78 + 4.19 10.97 1 Total cost = £10.97
N3.10 Convert units of time.	1 century = 100 years 1 decade = 10 years 1 year = 365 days (except leap years) 1 day = 24 hours 1 hour = 60 minutes 1 minute = 60 seconds
How many seconds are there in 1 week?	7 x 24 x 60 x 60 = 604,800 seconds

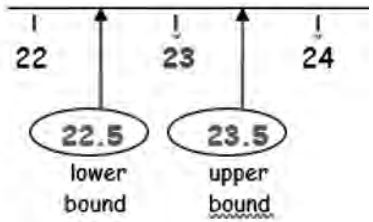
N3: Accuracy and Measures

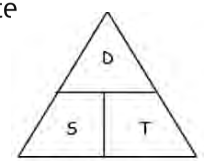
Write the upper bound and lower bound of a number or measurement

State an error interval for a rounded number

State an error interval for a truncated number

Calculate using the compound measure speed

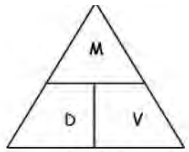
N3.11 Write the upper bound and lower bound of a number or measurement What is the lower and upper bound of 23cm if rounded to the nearest centimetre?	Bounds tell us the largest possible value of a number and the smallest possible value. 
N3.12 State an error interval for a rounded number The mass m of a table is 45.7kg rounded to 1dp. Write the error interval for this.	Lower and upper bounds can be written as error intervals with the use of inequalities. Look out for the word “rounded” when doing this type of error interval. 45.65 ≤ m < 45.75 kg

N3.13 State an error interval for a truncated number. The volume v of a tank is 78.7 litres truncated to 1dp. Write the error interval for this.	Lower and upper bounds can be written as error intervals with the use of inequalities. Look out for the word “truncated” when doing this type of error interval. 78.7 ≤ v < 78.8 litres
N3.14 Calculate using the compound measure speed. How long does a journey last if a car travels 180 miles at an average speed of 40 mph?	Use this triangle to help you to remember the different formulae. Cover up the quantity that you want to calculate S = D ÷ T D = S x T T = D ÷ S  D~Distance S~Speed T~Time Time taken = 180 ÷ 40 = 4.5 hours

N3: Accuracy and Measures

Calculate using the compound measure density

Use bounds to find the upper limit or lower limit of a calculation

N3.15 Calculate using the compound measure density.	Use this triangle to help you to remember the different formulae. Cover up the quantity that you want to calculate. D = M ÷ V M = D x V V = M ÷ D  M~Mass D~Density V~Volume
What is the density of a rod of aluminium that has a mass of 575.4g and a volume of 210cm³	Density = 575.4 ÷ 210 = 2.74 g/cm³

N3.16 Use bounds to find the upper limit or lower limit of a calculation	
If a is rounded to the nearest x Upper bound = a + ½ x. Lower bound = a – ½ x.	1.8 is rounded to 1 dp. Upper bound = 1.8 + ½(0.1) = 1.85 Lower bound = 1.8 - ½(0.1) = 1.75
Calculating using bounds.	
Adding: Maximum = upper + upper Minimum = lower + lower	 1.85 + 1.85 = 3.70 1.75 + 1.75 = 3.50
Subtracting: Maximum = upper – lower Minimum = lower – upper	 1.85 – 1.75 = 0.10 1.75 – 1.85 = -0.10
Multiplying: Maximum = upper x upper Minimum = lower x lower	 1.85 x 1.85 = 3.4225 1.75 x 1.75 = 3.0625
Dividing: Maximum = upper ÷ lower Minimum = lower ÷ upper	 1.85 ÷ 1.75 = 1.06 (2 dp) 1.75 ÷ 1.85 = 0.95 (2 dp)

N4: Factors, Multiples and Primes

Understand the term factor
Understand the term Prime
Understand the term multiples
Understand the term square
Understand the term cube
Calculate the power of a number
Calculate the root of a number

N4.1 Understand the term 'factor'. e.g. define a factor.	**<u>FACTORS</u> are what divides exactly into a number** Factors of 12 are: 1 12 2 6 3 4
N4.2 Understand the term 'prime'. e.g. define a prime.	**<u>PRIMES</u> have exactly TWO factors** Factors of 7 are 1 and 7 **<u>7 is PRIME</u>**
N4.3 Understand the term 'multiple. e.g. define a multiple.	**Multiples are what you get when you multiply a number by successive numbers** Multiples of 12 are: 12 (= 12 x 1), 24 (= 12 x 2), 36 (= 12 x 3), and so on.
N4.4 Understand the term 'square'. e.g. define a square number.	**<u>SQUARES</u> are the result of multiplying a number by itself** 3 x 3 = 3^2 = 9 8 x 8 = 8^2 = 64 **9 & 64 are square numbers**

N4.5 Understand the term 'cube'. e.g. define a cube number.	**<u>Cubes</u> are the result of multiplying a number by itself and by itself again** 2 x 2 x 2 = 2^3 = 8 4 x 4 x 4 = 4^3 = 64 **8 & 64 are cube numbers**
N4.6 Calculate the power of a number. e.g. Calculate 4^2. Calculate 5^3. Calculate 3^4.	4^2 is 4 **squared**, or the square of 4. It means 4 x 4 = 16 5^3 is 5 **cubed**, or the cubes of 5. It means 5 x 5 x 5 = 125 3^4 is 3 **to the power of** 4. It means 3 x 3 x 3 x 3 = 81
N4.7 Calculate the root of a number. e.g. Calculate $\sqrt{16}$ $\sqrt[3]{125}$ $\sqrt[4]{81}$	The **inverse** operation for '**power**' is '**root**' $\sqrt{16} = 4$ $\sqrt[3]{125} = 5$ $\sqrt[4]{81} = 3$ **There are keys on the calculator to all of these**

N4: Factors, Multiples and Primes

Find factors of a number
Find multiples of a number
Identify a prime number

N4.8 Find Factors of a number. e.g. find the factors of 24.	**<u>FACTORS</u> are what divides exactly into a number** You can find factors using factor pairs: <u>Factors of 24</u> 1 x 24 2 x 12 3 x 8 4 x 6 **1, 2 , 3, 4, 6, 12 and 24 are all factors of 24**
N4.9 Find Multiples of a number. e.g. list the first 6 multiples of 5.	**<u>Multiples</u> are the numbers in a times table** The first 6 multiples of 5 are… 5, 10, 15, 20, 25, 30

N4.10 Identify a Prime Number. e.g. list the prime numbers less than 30.	**<u>Prime numbers</u>** only have two factors, 1 and themselves. These are the only numbers you can divide into a prime number <u>Factors of 17</u> 1 x 17 only 17 ÷ 1 = 17 17 ÷ 17 = 1 **This means 17 is a prime number.** **2 is the only even prime number.** **1 isn't a prime number**
	The prime numbers less than 30 are… **2, 3, 5, 7, 11, 13, 17, 19, 23, 29**

N4: Factors, Multiples and Primes

Find the highest common factor of two or more numbers

Find the lowest common multiple of two or more numbers

N4.11 Find the Highest Common Factor (HCF) of two or more numbers. e.g. find the HCF of 36 and 54.	Find the factors of the numbers. The **highest common factor (HCF)** is the biggest factor that is common to both. **HCF of 36 and 54** Factors of 36 1 x (36) 2 x 18 3 x 12 4 x 9 6 x 6 Factors of 54 1 x 54 2 x 27 3 x (18) 6 x 9 18 is the biggest factor of both, and so… **the HCF of 36 and 54 is 18** You would never be asked to find the lowest common factor as 1 is a factor of all numbers. This means there will always be an HCF for two or more numbers.

N4.12 Find the Lowest Common Multiple (LCM) of two or more numbers. e.g. find the LCM of 9 and 12.	List the multiples (times tables) of the numbers. The **Lowest Common Multiple (LCM)** is the first number common to both (in both lists). **LCM of 9 and 12** Multiples of 9 (9), 18, 27, (36), 45, 54, 63, 72, 90… Multiples of 12 (12), 24, (36), 48, 60, 72, 84…. **The LCM of 9 and 12 is 36** (note that 72 is also common to both, but this isn't the lowest) You would never be asked for the highest common multiple, as there are an infinite number of common multiples.

N4: Factors, Multiples and Primes

Write a number as its product of prime factors

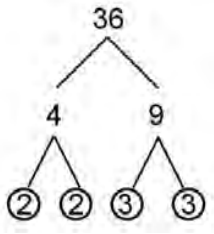
Write large numbers in standard form

N4.13
Write a number as its product of prime factors.

e.g. write 36 as the product of its prime factors.

To find the **product of prime factors** for a number, produce a factor tree. Stop when you get to prime numbers, which you circle

Product of prime factors for 36



36 = 2 x 2 x 3 x3
(product of prime factors)

36 = 2^2 x 3^2
(index form)

N4.14
Write large numbers in standard form.

e.g.
Write 50000 in standard form

Write 320000 in standard form

Standard Form is a shorthand method for writing large and small numbers.

Large Numbers in Standard Form

$5 \times 10^4 = 5000$

A number between 1 and 9.9 recurring

A power of 10

$3.2 \times 10^5 = 320\,000$

46×10^3 not standard form

$= 4.6 \times 10^4$

$= 46\,000$

N4: Factors, Multiples and Primes

Write small numbers in standard form

Write a number in standard form as a regular number

N4.15
Write small numbers in standard form.

e.g.
Write 0.005 in standard form

Write 0.000041 in standard form

Standard Form is a shorthand method for writing large and small numbers.

Small Numbers in Standard Form

$5 \times 10^{-3} = 0.005$

3 zeros before the 5

A number between 1 and 9.9 recurring

A power of 10

$4.1 \times 10^{-5} = 0.000041$

32×10^{-4} not standard form

$= 3.2 \times 10^{-3}$

$= 0.0032$

N4.16
Write a number given in standard form as a regular number

e.g.
Write 5×10^4 as a number

Write 5×10^{-3} as a number.

Positive Powers

5×10^4

$= 5 \times 10000$

$=50000$

The digit 5 has moved 4 places to the left.
Positive power moves to the left by the number of places equal to the index number

Negative Powers

$5 \times 10^{-3} = 0.005$

The digit moves 3 places to the right.
Negative power moves to the left by the number of places equal to the number in the index.

N4: Factors, Multiples and Primes

Apply the law of indices for multiplying powers
Apply the law of indices for dividing powers
Apply the law of indices for powers of powers
Evaluate fractional indices

N4.17 Apply the law of indices for multiplying powers. e.g. simplify $5^3 \times 5^6$ $4^7 \times 4^{-2}$	When **multiplying indices** add the powers $5^3 \times 5^6 = 5^9$ $4^7 \times 4^{-2} = 4^5$
N4.18 Apply the law of indices for dividing powers. e.g. simplify $\frac{8^7}{8^2}$ $\frac{6^2}{6^9}$	When **dividing indices** subtract the powers $\frac{8^7}{8^2} = 8^5$ $\frac{6^2}{6^9} = 6^{-7}$ When applying the laws of indices the base number (the 8 and the 6 in the above examples) must be the same.

N4.19 Apply the law of indices for powers of powers e.g. simplify $(4^6)^2$ $(6^3)^5$ $(7^5)^{-4}$	Multiply out the brackets $(4^6)^2 = 4^6 \times 4^6$ $= 4^{12}$ $(6^3)^5 = 6^{15}$ $(7^5)^{-4} = 7^{-20}$
N4.20 Evaluate fractional indices e.g. evaluate $16^{\frac{1}{2}}$ $8^{\frac{1}{3}}$ $25^{\frac{3}{2}}$	**Fractional indices** are roots. 'Evaluate' means to show your answer as a number value, and not as an index power. $16^{\frac{1}{2}} = \sqrt{16} = 4$ $8^{\frac{1}{3}} = \sqrt[3]{8} = 2$ $25^{\frac{3}{2}}$ Denominator is the root, numerator the power. $= (\sqrt{25})^3 = 125$

N4: Factors, Multiples and Primes

Evaluate negative indices

Evaluate indices involving both negative and fractional

Simplify a surd

Simplify a surd expression

N4.21 Evaluate negative indices e.g. evaluate 4^{-2} 10^{-3}	**Negative indices** are equivalent to fractions and decimals. $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$ $10^{-3} = \frac{1}{10^3} = \frac{1}{1000} = 0.001$ Give your answer as a fraction unless told otherwise.
N4.22 Evaluate indices involving both negative and fractional e.g. evaluate $16^{-\frac{3}{2}}$	$16^{-\frac{3}{2}}$ Turn into a fraction. Denominator is the root, numerator the power. $= \frac{1}{(\sqrt{16})^3} = \frac{1}{64}$

N4.23 Simplify a surd e.g. simplify $\sqrt{18}$ $\sqrt{75}$	$\sqrt{25}$ is <u>NOT</u> a surd because it is exactly 5. $\sqrt{3}$ is a surd because the answer is not exact. **A surd is an irrational number** **To simplify surds look for square number factors** $\sqrt{18} = \sqrt{9} \times \sqrt{2} = 3\sqrt{2}$ $\sqrt{75} = \sqrt{25} \times \sqrt{3} = 5\sqrt{3}$
N4.24 Simplify a surd expression e.g. simplify $5\sqrt{3} + 2\sqrt{3}$ $5\sqrt{3} \times 2\sqrt{3}$	$5\sqrt{3} + 2\sqrt{3} = 7\sqrt{3}$ When adding the root stays the same $5\sqrt{3} \times 2\sqrt{3} = 10\sqrt{9}$ $= 10 \times 3 = 30$

N4: Factors, Multiples and Primes

Rationalise the denominator of a fraction

Multiply two surd brackets together

N4.25
Rationalise the denominator of a fraction (simple surd)

e.g. Rationalise $\frac{3}{\sqrt{2}}$

Rationalising the denominator of a surd is removing the surd from the denominator of a fraction by multiplying the numerator and denominator of that fraction by the denominator.

In general:

$$\frac{a}{\sqrt{b}} \times \frac{\sqrt{b}}{\sqrt{b}} = \frac{a\sqrt{b}}{b}$$

Example:

$$\frac{3}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{2}$$

These are equivalent fractions

N4.26
Multiply two surd brackets together

e.g. simplify fully

$(5-\sqrt{3})(1+\sqrt{3})$

Multiply **surd brackets** together in the same way you would in algebra with double brackets to form a quadratic expression. Using the grid method is the most straightforward way.

Example:
Simplify fully

$(5-\sqrt{3})(1+\sqrt{3})$

×	1	$\sqrt{3}$
5	5	$5\sqrt{3}$
$-\sqrt{3}$	$-\sqrt{3}$	-3

$$= 5 - \sqrt{3} + 5\sqrt{3} - 3$$

Collecting terms gives…

$$= 4\sqrt{3} + 2$$

N4: Factors, Multiples and Primes

Rationalise the denominator of a fraction (surd expression)

Calculate with numbers in standard form

N4.27 Rationalise the denominator of a fraction (surd expression) e.g. rationalise this surd $\frac{5}{3-\sqrt{2}}$	**Rationalising the denominator** of a surd is removing the surd from the denominator of a fraction by multiplying the numerator and denominator of that fraction by the denominator. **Example**: Rationalise this surd $\frac{5}{3-\sqrt{2}}$ $\frac{5}{3-\sqrt{2}} \times \frac{(3+\sqrt{2})}{(3+\sqrt{2})}$ $= \frac{5(3+\sqrt{2})}{(3-\sqrt{2})(3+\sqrt{2})}$ $= \frac{15+5\sqrt{2}}{9+3\sqrt{2}-3\sqrt{2}-2}$ $= \frac{15+5\sqrt{2}}{7}$

N4.28 Calculate with numbers in standard form (1) e.g. calculate, giving your answer in standard form, $(3 \times 10^4) \times (2 \times 10^6)$ $(4 \times 10^4) \times (6 \times 10^6)$ $(8 \times 10^9) \div (4 \times 10^3)$	When **multiplying in standard form,** use the laws of indices for the powers, while multiplying the whole numbers as usual. $(3 \times 10^4) \times (2 \times 10^6) = 6 \times 10^{10}$ $(4 \times 10^4) \times (6 \times 10^6) = 24 \times 10^{10} = 2.4 \times 10^{11}$ Make sure numbers are in standard form. When **dividing in standard** form, use the laws of indices for the powers, while dividing the whole numbers as usual. $(8 \times 10^9) \div (4 \times 10^3) = 2 \times 10^6$

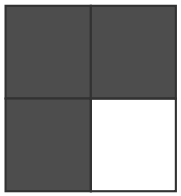
N4: Factors, Multiples and Primes

Calculate with numbers in standard form continued

N4.28 Calculate with numbers in standard form (2) e.g. Calculate, giving your answer in sta $\frac{1.2 \times 10^{12}}{2.4 \times 10^{4}}$, $(3.5 \times 10^{4}) + (6.2 \times 10^{5})$	When **dividing in standard form**, use the laws of indices for the powers, while dividing the numbers as usual. $\frac{1.2 \times 10^{12}}{2.4 \times 10^{4}} = 0.5 \times 10^{8}$ $= 5 \times 10^{7}$ Make sure numbers are in standard form. When **adding and subtracting in standard form**, turn the numbers given in standard form back into ordinary numbers first, add or subtract them, then convert your answer to standard form. $(3.5 \times 10^{4}) + (6.2 \times 10^{5})$ $= 35\,000 + 620\,000$ $= 655\,000$ $= 6.55 \times 10^{5}$

P1: Ratio and Proportion

Use proportion to describe a part of a whole
Use a ratio and a quantity to find another quantity
Simplify a ratio
Write a ratio in the form 1:n

P1.1 Use proportion to describe a part of a whole.  Describe the proportion of the shape that is white	One white square out of 4 squares altogether. So as a fraction $\frac{1}{4}$ Part is the numerator Whole is the denominator Proportion can also be a decimal or percentage. The fraction needs to be converted. As a decimal 0.25 As a percentage 75%
P1.2 Use a ratio and a quantity to find another quantity e.g. The ratio of squash to water is 1:7. How much squash do I need for 50ml of squash	Ratio Squash : Water 1:7 X 50 on this side 50:350 Multiply by the same number on this side

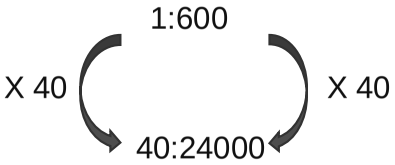
P1.3 Simplify a ratio e.g. simplify 12:15 Simplify 30cm:1m	e.g. 12 : 15 => 4 : 5 e.g. 30cm : 1m => 30 : 100 => 3 : 1 Divide both sides by a common factor. Convert the amounts to the same units if required,
P1.4 Write a ratio in the form 1:n e.g. Write 2:5 in the form 1:n	e.g. 2 : 5 (÷ both parts by 2) => 1 : 2.5

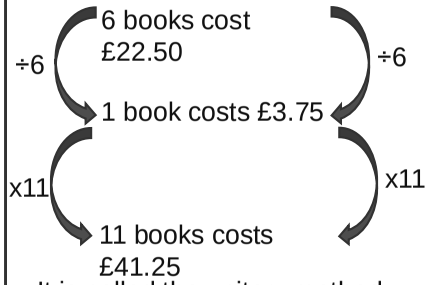
P1: Ratio and Proportion

Use a ratio to solve a problem, turning one ratio into another equivalent ratio

Changing an amount in proportion. The unitary method

Change an amount to compare two values

P1.5 Use ratio to solve a problem, turning one ratio into another equivalent ratio. e.g. A model ship is made using scale 1:600. The model ship length is 40cm. What is the real length of the ship?	e.g. A model ship is made using scale 1:600. The model ship length is 40cm. What is the real length of the ship?  Want to find what 40cm will be. So multiply 1 by 40 gives 40. Do the same to the other side of the ratio. Convert answer into sensible units. 24000cm = 240m

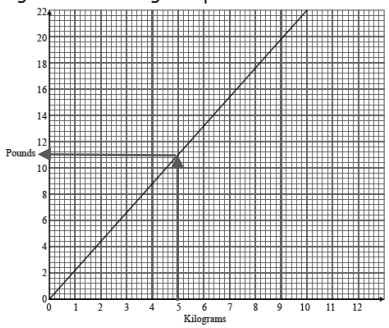
P1.6 Changing an amount in proportion. The unitary method. e.g. If 6 books cost £22.50, how much will 11 books cost?	 It is called the unitary method because you find what 1 would be before multiplying up to find the amount you need.
P1.7 Change an amount to compare two values. A best buy problem. e.g A pack of 5 pens cost £6.10 A pack of 8 pens cost £9.20 Which is the best value?	Find the cost or value of one item in each case. Divide the cost by how many. 5 cost £6.10, so 1 costs £6.10 ÷ 5 So 1 pen costs £1.22 8 cost £9.20, so 1 costs £9.20 ÷ 8 So 1 pen costs £1.15 The pack of 8 pens is the best value as the price of 1 pen is lower than in a pack of 5

P1: Ratio and Proportion

Reading a conversion graph

Dividing into a given ratio

Use multiplier to increase by a percentage

P1.8 Reading a conversion graph One unit will be on the x-axis, the other unit will be on the y-axis. Find the unit value on one axis draw a line to the graph's line and another to the other axis. Read off your value. e.g. Convert 5kg into pounds.	e.g. To convert kg and pounds  • Draw lines on to take readings • Read the scale carefully e.g. Convert 5kg into pounds. From the line we can see 5kg = 11lbs
P1.9 Dividing into a given ratio Finding different amounts given a total and different ratios e.g. Divide £40 in the ratio 1:3:4	e.g. Divide £40 in the ratio of 1 : 3 : 4 Total number of shares = 1+3+4 = 8 1 share = £40 ÷ 8 = £5 3 shares = 3 x £5 = £15 4 shares = 4 x £5 = £20 1:3:4 = £5:£15:£20

P1.10 Dividing into a given ratio Using a quantity and a number of shares to find another quantity. e.g A and B share some sweets in ratio 3:2 A gets 12 sweets, how many sweets does B get?	e.g A and B share some sweets in ratio 3:2 A gets 12 sweets, how many sweets does B get? so 3 shares = 12 1 share = 12 ÷ 3 = 4 B gets 2 x 4 = 8 sweets
P1.11 Use multiplier to increase by a percentage. e.g. What is the multiplier to increase an amount by 5%?	e.g. To increase a quantity by 5% Amount Increased from 100% by 5% so 100 + 5 = 105 105% as a decimal = 1.05 Multiply the quantity by 1.05

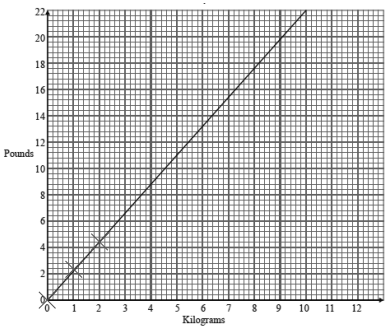
P1: Ratio and Proportion

Use multiplier to decrease by a percentage

Calculate the original amount before a percentage change (Reverse percentage)

Plotting a conversion graph

P1.12 Use multiplier to decrease by a percentage. e.g. What is the multiplier to decrease an amount by 5%?	e.g. To decrease a quantity by 5% Amount decreases from 100% by 5% so 100 - 5 = 95 95% as a decimal = 0.95 Multiply the quantity by 0.95
P1.13 Calculate the original amount before a percentage change. (Reverse Percentage) e.g. A bag costs £40 in a sale where everything has 20% off What was the original price of the bag?	e.g. A bag costs £40 in a sale where everything has 20% off What was the original price of the bag? If 20% has been taken off, then the bag is 80% of its original value. (100 - 20 = 80) So the original multiplier was 0.8 for 80% Original x 0.8 = 40 So Original = 40 ÷ 0.8 = £50

P1.14 Plotting Conversion Graphs e.g. Plot a conversion graph for Kilograms to pounds. If 1kg = 2.2lbs	e.g. Plot a conversion graph for Kilograms to pounds. If 1kg = 2.2lbs Draw suitable axes with Kilograms on one axis and Pounds on the other axis. As 1kg = 2.2lbs, plot this point on your graph. You need two more points. Double both values 2kg = 4.4lbs, plot this point Make one value zero, what happens to the other? 0kg = 0lbs, plot this point Draw a straight line through the three points with a ruler. 

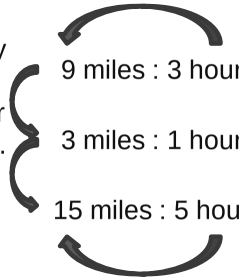
P2 Proportion and Repeated Percentage Change

Understand how direct proportion affects two variables

Understand how inverse proportion affects two variables

Solve problems of direct proportion

P2.1 Understand how direct proportion affects two variables e.g. If two variables A and B are in direct proportion to one another what happens as A increase?	If A and B are in direct propotion. Then If A increases then B increases If A decreases then B decreases If A is multiplied by 2 then B is multiplied by 2. If 1 worker costs £200 to hire Then 2 workers cost £400 to hire The cost to hire is in direct proportion to how many workers are hired
P2.2 Understand how inverse proportion affects two variables e.g. If two variables A and B are in direct proportion to one another what happens as A increase?	If A and B are in inverse propotion. Then If A increases then B decreases If A decreases then B increases If A is multiplied by 2 then B is divided by 2. If 1 worker takes 2 hours to complete a job Then 2 workers will take 1 hour to complete the same job. The time taken to complete a job is inversely proportional to the amount of workers..

P2.3 Solve Problems of Direct Proportion e.g. The distance you walk is directly proportional to the time you spend walking. If I can walk 9 miles in 3 hours, how far can I walk in 5 hours?	Use Unitary Method to find how far in one hour. Divide by three then multiply by 5  9 miles : 3 hours 3 miles : 1 hour 15 miles : 5 hours Or recognise the scale factor from one value to the other. Multiply the number of hours by 3

P2 Proportion and Repeated Percentage Change

Solve problems of inverse proportion

Use similarity to find missing lengths

P2.6
Solve Problems of Inverse Proportion

The amount of time you spend on a job is inversely proportional to the amount of people doing the job.
If it takes 5 workers 6 days to build a shed. How long will it take 2 workers?

Find how long it will take for 1 worker.

÷5 x2

5 Workers : 6 Days

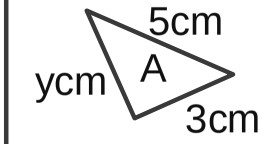
1 Worker: 30 Days

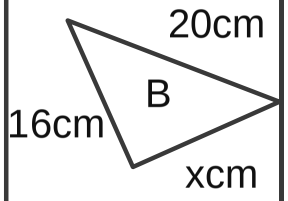
2 workers : 15 Days

x5 ÷2

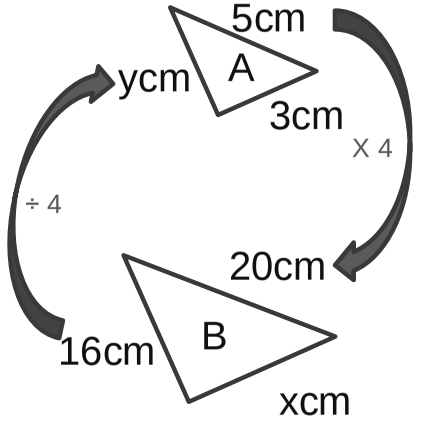
Because it is inverse proportion what you do to one value, you do the inverse to the other. So when you divide the number of workers to find 1 worker, you multiply the time by 5

P2.7
Use Similarity to Find Missing Lengths





e.g. Triangle A and B are similar. What are the lengths of the missing sides?



The multiplier from one shape to the other is the same for every corresponding side
From A to B you go from 5 cm to 20cm
20 ÷ 5 = 4. So you multiply by 4
3 x 4 = 12cm, so x = 12cm
To go from B to A you do the inverse and divide by 4.
16 ÷ 4 = 4cm so y = 4cm

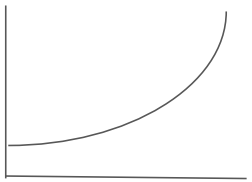
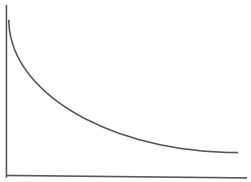
P2 Proportion and Repeated Percentage Change

Write the formula for a repeated percentage change

Use calculations of repeated percentage change

Recognise graphs of exponential growth and decay

P2.8 Write the formula for a repeated percentage change	Find the multiplier for the percentage increse or decrease. Remember Increase by 20% then multiplier is 1.2 Decrease by 20% the multiplier is 0.8 Final amount = (multiplier)$^{\text{number of years}}$ x initial amount
P2.9 Use calculations of repeated percentage change e.g. £400 is placed in a savings account that pays 5% interest PA. How much money will be in the savings account after 5 years? Round you answer to 2d.p.	Use the formula: Final amount = (multiplier)$^{\text{number of years}}$ x initial amount PA stands for per annum which means every year. So there is a 5% increase every year. The multiplier for a 5% increase is 1.05 Using the formula Final Amount = 1.05^5 x 400 = 510.512625.... =£510.51 to 2d.p.

P2.10 Recognise Graphs of Exponential Growth and Exponential Decay e.g. What would a graph of bacteria growth look like? e.g. What would a graph of radioactive decay look like?	e.g. What would a graph of bacteria growth look like? This would be a repeated percentage increase.  e.g. What would a graph of radioactive decay look like? This would be a repeated percentage decrease 

P2 Proportion and Repeated Percentage Change

To find a formula for two variables in direct proportion

To find a formula for two variables in inverse proportion

P2.11 To Find a Formula for Two Variables in Direct Proportion e.g. y is directly proportional to x. When y = 21, x = 3. Find a formula for y in terms of x	The symbol □ means 'varies as' or 'is proportional to'. Direct proportion If y □ x then y = kx If y □ x^2 then y = kx^2 If y □ x^3 then y = kx^3 e.g. y is directly proportional to x. When y = 21, x = 3. y □ x therefore y = kx 21 = k x 3 k = 7 so, y = 7x

P2.12 To Find a Formula for Two Variables in Inverse Proportion e.g. a is inversely proportional to b. When a = 12, b = 4. Find a formula for a in terms of b	The symbol □ means 'varies as' or 'is proportional to'. Inverse proportion If y □ 1/x then y = k/x If y □ $1/x^2$ then y = k/x^2 If y □ $1/x^3$ then y = k/x^3 e.g. a is inversely proportional to b. When a = 12, b = 4. Find a formula for a in terms of b a □ 1/b therefore a = k/b 12 = k/4 k = 48 so, a = 48/b

P2 Proportion and Repeated Percentage Change

Finding the multiplier or percentage change for a repeated change

Use trial and error to find the year term of a repeated change

P2.13 Finding the multiplier or percentage change for a repeated percentage change. e.g. A savings account had £2000 in it, after three years of interest, the amount in the account was £2315.25. What was the percentage interest rate on the savings account?	Formula for repeated percentage change is Final amount = (multiplier)$^{\text{number of years}}$ x initial amount e.g. A savings account had £2000 in it, after three years of interest, the amount in the account was £2315.25. What was the percentage interest rate on the savings account? Initial amount = 2000 Final amount = 2315.25 Number of years =3 Substitute into the formula $2315.25=(\text{multiplier})^3 \times 2000$ Divide by 2000 $1.157625 = (\text{multiplier})^{3`}$ Take cube root of both sides to undo the power 1.05 = multiplier 1.05 = 105% So increase has been 5% each year.

P2.14 Use Trial and Error to find the year term of a repeated percentage change e.g. A savings account had £2000 in it, after x years of interest of 5% PA, the amount in the account was £2315.25. How long were the savings in the account?	Formula for repeated percentage change is Final amount = (multiplier)$^{\text{number of years}}$ x initial amount e.g. A savings account had £2000 in it, after x years of interest of 5% PA, the amount in the account was £2315.25. How long were the savings in the account? Initial Amount = 2000 Percentage interest per year =5% 100+5 = 105 So multiplier = 1.05 Substitute these into the formula Keep trying the next value of x. Final amount = $1.05^x \times 2000$ Try x=1, then 1.05 x 2000 = 2100 (not the final amount) so try x=2 1.05^2 x 2000 = 2205 (not the final amount) so try x=3 1.05^3 x 2000 = 2315.25 9correct amount) So x=3 years

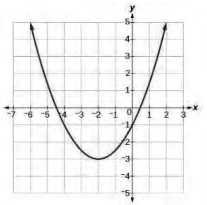
P2 Proportion and Repeated Percentage Change

Find the average or instantaneous rate of change from graph

What is the rate of change where x=0

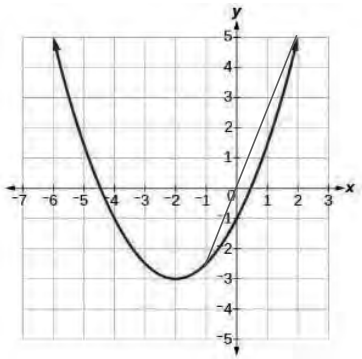
P2.15
Find the average or instantaneous rate of change from a graph

What is the average rate of change between x = -1 and x = 2?

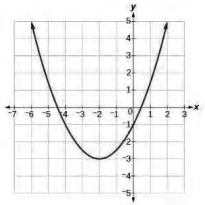


The rate of change is represented on a graph by the gradient.
The average gradient of a curve between two points is the gradient of the chord joining the two points

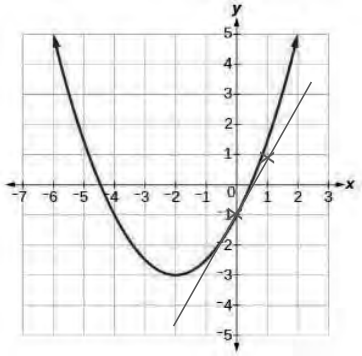
What is the average rate of change between x = -1 and x = 2?
Draw a chord on the graph between x = -1 and x = 2.
Find the gradient of the chord.
The chord passes through (-1 , -2.5) and (2 , 5)
Gradient = $\frac{5 - -2.5}{2 - -1} = \frac{7.5}{3} = 2.5$



P2.16
What is the rate of change where x = 0?



The instantaneous rate of change is the gradient at a point on the curve.
Rate of change at a point on a curve = gradient of the tangent
Draw a tangent to the curve at that point and find the gradient of the tangent.
Two points on the tangent are (0 , -1) and (1 , 1)
Calculate Gradient
= $\frac{1 - -1}{1 - 0} = 2$
Rate of change at x = 0 is 2



P2 Proportion and Repeated Percentage Change

Interpret the rate of change of graph

Using similarity to find missing areas

Using similarity to find missing volumes

P2.17 Interpret the rate of change of graph e.g. What would the rate of change represent on A) A graph of number of bacteria against time. B) A graph of the number of radioactive atoms In a substance against time. C) A Distance / Time graph D) A Speed / Time graph	The rate of change of a graph is its gradient. A gradient is how much the y-axis value changes for every one value on the x-axis. e.g. What would the rate of change represent on A) A graph of number of bacteria against time. B) A graph of the number of radioactive atoms In a substance against time. C) A Distance / Time graph D) A Speed / Time graph Answers A) The rate of growth of the bacteria B) The rate of decay of the radioactive substance C) The rate of change of distance over time which is SPEED D) The rate of change of speed over time which is ACCELERATION

P2.18 Using similarity to find missing areas. If height of shape A is 4cm, height of shape B is 6cm A and B are similar shapes. If the surface area of A is $20cm^2$ what is the surface area of B?	If Length scale factor = k Then Area scale factor = $\mathbf{k^2}$ If height of shape A is 4cm, height of shape B is 6cm A and B are similar shapes. If the surface area of A is $20cm^2$ what is the surface area of B? Length scale factor = 6 ÷ 4 = 1.5 Area scale factor = 1.52 = 2.25 Surface area of B = 20 x 2.25 = $45cm^2$
P2.19 Using similarity to find missing volumes. If height of shape A is 4cm, height of shape B is 6cm A and B are similar shapes. If the surface area of A is $10cm^3$ what is the volume of B?	If Length scale factor = k Then Volume scale factor = $\mathbf{k^3}$ If the surface area of A is $10cm^3$ what is the volume of B? Length scale factor = 6 ÷ 4 = 1.5 Volume scale factor = $1.5^3 = 3.375$ Volume of B = 10 x 3.375 = $33.75cm^3$

S1: Data Handling

Understand how to collect data

Understand the concept of bias when collecting data

Reading data from a table

S1.1 Understand how to collect data e.g. describe different methods of data collection.	Ways to collect data: **Data collection sheets** which are also called tally charts. (see S1.4) **Two-way tables** are a way of sorting data from more than one category, so that the frequency of each category can be seen quickly and easily. **Questionnaires** are used for most surveys. They have questions and choices of responses.
S1.2 Understand the concept of bias when collecting data e.g. explain what is meant by bias.	**Bias** occurs when one answer is favoured over another. It can lead to unreliable results. Data collection should be planned to minimise **bias**. Random samples minimise **bias**.

S1.3 Reading data from a table e.g. using the table, answer the questions.  (a) How many Gold medals did Australia win? (b) Which country won the most Silver medals? (c) Which countries won more than 12 Bronze medals?	Read the table carefully. Cross reference the columns and rows to find the values you are looking for. a) Australia won 8 gold medals b) France won the most silver medals (18) c) France, Germany and Japan won more than 12 Bronze medals

Country	Gold	Silver	Bronze
Spain	7	4	6
France	10	18	14
Germany	17	10	15
Italy	8	12	8
Japan	12	8	21
Australia	8	11	10

S1: Data Handling

Collect data in a tally chart
Draw a bar chart
Interpret a bar chart
Draw a pictogram

S1.4
Collect data in a tally chart
e.g. 10 students were asked which type of movie they preferred. Their responses were horror, action, comedy, action, action, romance, comedy, action, action, horror.
Show this data in a tally chart.

On a tally chart each occurrence is shown by a tally mark.

Every fifth tally is drawn across to make a "gate".

The tallies are counted to give the frequency (f).

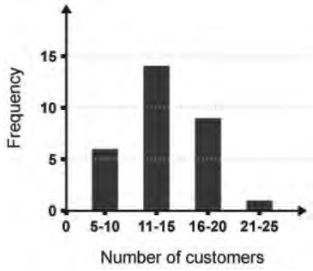
Movie Type	Tally	f
Action	𝍸	5
Horror	II	2
Romance	I	1
Comedy	II	2

S1.5
Draw a bar chart

e.g. draw a bar chart from this table

Customers	f
5 - 10	6
11 – 15	14
16 - 20	9
21 - 25	1

On a **bar chart** the height of the bar is the frequency.



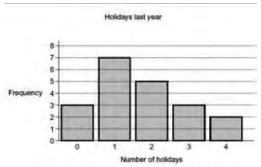
A bar chart is used for discrete data. There must be gaps between the bars.

S1.6
Interpret a bar chart

e.g. how many people went on 1 holiday?

The x axis shows the category.
The y axis shows the frequency.

The number of people who went on 1 holiday was 7.

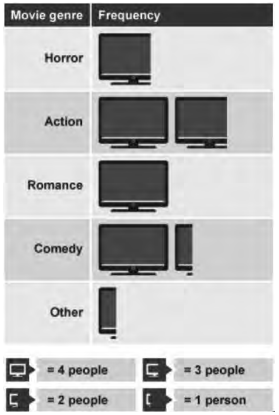


S1.7
Draw a pictogram

e.g. draw a pictogram for this table.

Movie Genre	f
Horror	3
Action	7
Romance	4
Comedy	5
Other	1

A **pictogram** shows frequency using pictures.
A key shows what each picture is worth.



S1: Data Handling

Interpret a pictogram
Calculate a mean from a list of numbers
Find the mode of a list of numbers
Find the median for a list of numbers

S1.8 Interpret a pictogram e.g. how many Golden Delicious were there?  	Use or interpret part of a symbol to count quantities. For Golden Delicious: 2 whole apples = 20; 1 half apple = 5; 25 apples in total.
S1.9 Calculate a mean from a list of numbers e.g. calculate the mean of 3, 4, 6, 7.	Add all the numbers. Divide by how many there are. Mean of 3, 4, 6, 7 $\frac{3+4+6+7}{4} = 5$ The mean is 5

S1.10 Find the mode of a list of numbers e.g. what is the mode of 1, 2, 3, 3, 3, 3, 5, 5? 1, 1, 2, 2, 4, 6, 7, 8, 9? 1, 2, 3, 4, 5?	The Mode is the most common number or object. 3 occurs the most so 3 is the mode. 1 and 2 occur twice, so they are the modes. The data set is bimodal.
S1.11 Find the median for a list of numbers. e.g. find the Median of 2, 7, 4, 3, 5 2, 6, 4, 7, 5, 3	All occur once so there is no mode. The Median is the middle number, or middle value of a middle pair, in an ordered list. Order the numbers - 2, 3, 4, 5, 7. 4 is in the middle, so 4 is the median. Order the numbers – 2, 3, 4, 5, 6, 7. 4 and 5 are in the middle. The middle of 4 and 5 is 4.5, so 4.5 is the median.

S1: Data Handling

Find the range of a list of numbers
Compare data distributions using averages and range
Draw a stem and leaf chart
Interpret a stem and leaf chart

S1.12 Find the range of a list of numbers e.g. what is the range of 1, 2, 3, 4? -4, 2 , 7 , 8?	The Range is the difference between the largest and smallest value. It is the largest value minus the smallest value. 4 - 1 = 3, so the range is 3. 8 - -4 = 8 + 4 = 12, so 12 is the range.
S1.13 Compare data distributions using averages and range e.g. compare the heights of boys and girls using this table. | | B | G | | Mean | 1.75m | 1.69m | | Range | 32cm | 25cm |	To compare two or more data sets you <u>must;</u> Compare an average for each data set, Compare the spread of each data set. Comments should relate to the context of the data sets. The boys are taller, on average, than the girls since the mean is larger for the boys. The heights of the girls are more consistent since the range for the girls is lower.

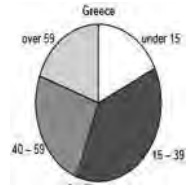
S1.14 Draw a stem and leaf chart e.g. draw a stem and leaf chart for these data; 8, 8, 9, 11, 12, 13, 14, 14, 18, 19, 20, 23, 25, 25, 27, 27, 28, 32, 32, 33, 33, 36, 36, 38, 38, 41, 42, 43, 43, 45	Make sure data is in order. Include a key. 0 | 8 8 9 1 | 1 2 3 4 4 8 9 2 | 0 3 5 5 7 7 8 3 | 2 2 3 3 6 6 8 8 4 | 1 2 3 3 5 Key: 1 | 3 = 13 This number here is 42.
S1.15 Interpret a stem and leaf chart. e.g. find the median, range and mode from this stem and leaf. Key: 3 | 1 means 31 Stem | Leaf 1 | 9 9 2 | 0 4 7 8 3 | 1 2 2 2 6 4 | 0 5 5 5 | 5	Key: 3 | 1 means 31 Stem | Leaf 1 | 9 9 2 | 0 4 7 8 3 | 1 2 2 2 6 4 | 0 5 5 5 | 5 Median = middle number = 32. Mode = 32 (this occurs three times). Range = 55 – 19 = 36.

S1: Data Handling

Construct a pie chart

Interpret a pie chart

Understand the different types of data

S1.16 Construct a pie chart e.g. if the frequency is 60, what is the angle that represents each person?	Divide 360 degrees by the total frequency Multiply each frequency by this number to find the angle of each sector. Number of people = 60. 360º ÷ 60 = 6º so each person = 6º.
S1.17 Interpret a pie chart e.g. which country has more people under 15?  	Pie charts show proportion. Without information on the size of the survey, actual numbers are not known. Here we are not told how many people are in each population. We can only comment on proportion by comparing the sizes of sectors in each pie chart. There is a larger proportion of the population under 15 in Ireland than there is in Greece.

S1.18 Understand the different types of data e.g. describe the following data types.	**Data** is a collective name for information recorded for statistical purposes. There are many types of data.
Qualitative	**Qualitative data** can only be written in words, e.g. the colours of cars.
Quantitative	**Quantitative data** can be written in numbers, e.g. heights of children.
Discrete	**Discrete data** is numerical data that are usually integer values, e.g. the number of children in a classroom.
Continuous	**Continuous data** is numerical data that can be shown in decimals, e.g. the weights of babies.
Primary	**Primary data** is data collected from the original source, e.g. via a survey.
Secondary	**Secondary data** is data collected from other sources, e.g. national statistics.

S1: Data Handling

Understand how to take and use a sample of data

Find the median and quartiles from a list of data

S1.19 Understand how to take and use a sample of data. e.g. describe how to take a sample.	A sample should be: a small group of the population, an adequate size, representative of the population. <u>Simple random sampling</u> Everyone has an equal chance of being part of the sample. <u>Systematic sampling</u> Arranged in some sort of order. e.g. every 10th item in the population.

S1.20 Find the median and quartiles from a list of data e.g. find the median, lower quartile, upper quartile and interquartile range from the data set; 1, 4, 7, 8, 9, 13, 16	n is the number of items in the data set (in this case 7 items). Write the values in order. M**edian** is the $\frac{(n+1)}{2}th$ value. $\frac{7+1}{2}$ = 4. 4th item is 8. **Lower Quartile (LQ)** is the $\frac{(n+1)}{4}th$ value. $\frac{7+1}{4}$ = 2. 2nd item is 4. **Upper Quartile (UQ)** is the $\frac{3(n+1)}{4}th$ value. $\frac{3(7+1)}{2}$ = 6. 6th item is 13. **Interquartile Range (IQR)** IQR = UQ – LQ = 13 – 4 = 9.

S1: Data Handling

Compare distributions by comparing mean and range in context of the distributions

Draw a two way table

Interpret a two way table

S1.21
Compare distributions by comparing the mean
and the range in context
of the distributions

e.g. compare the heights of boys and

	B	G
Median	1.65m	1.54m
IQR	33cm	27cm

To compare two or more data sets you must:
Compare an average for each data set,
Compare the spread of each data set,
Comments should relate to the context of the data sets.

The boys are taller on average than the girls since the median is higher for the boys.

The heights of the girls are more consistent since the IQR is lower.

S1.22
Draw a two-way table

e.g. draw a two way table for data about how boys and girls travel to school.

The IQR covers the middle 50%.

Two-way tables are a way of sorting
data with two variables, showing the frequency of each category quickly and easily.

To sort data by category
e.g. how students travel to school

	Bus	Walk	Cycle	Total
Boys				
Girls				
Total				

S1.23
Interpret a two way table

e.g. from the table: what is the probability a student walks?

What is the probability
of walking, given you

	Walk	Bus	Other	Total
Boys	20			55
Girls		12		
Total	36		42	100

Complete the information in the table

	Walk	Bus	Other	Total
Boys	20	**10**	**25**	55
Girls	**16**	12	**17**	**45**
Total	36	**22**	42	100

From the completed two way table:

P(Walk) = $\frac{36}{100} = \frac{9}{25}$

P(Walk given you are a girl) = $\frac{16}{45}$

S1: Data Handling

Understand how to take a stratified sample

S1.24
Understand how to take a stratified sample

e.g. given the table below, show how to take a stratified

Language	Number of students
Greek	145
Spanish	121
German	198
French	186
Total	**650**

Sample is divided into groups according to criteria. These groups are called strata.
A simple random sample is taken from each group in proportion to its size using the formula:

Number from each group = $\frac{\text{stratum size}}{\text{population}}$ x sample size.

Number from Greek
= $\frac{145}{650}$ x $70 \approx 16$

Number from Spanish
= $\frac{121}{650}$ x $70 \approx 13$

Number from German
= $\frac{198}{650}$ x $70 \approx 21$

Number from French
= $\frac{186}{650}$ x $70 \approx 20$

This only tells us 'how many' to take. Take a random sample from each Language.

S2: Grouped Frequency

To be able to group data into a grouped frequency table

Draw and interpret a frequency polygon

Find mean from a frequency table

S2.1
To be able to group data into a grouped frequency table

e.g. put these number of customers in a grouped frequency table.

13	8	16	12	12	16
7	18	11	16	15	7
11	12	13	21	17	19
11	14	10	19	13	12
7	16	6	14	12	18

When a lot of **data** needs to be sorted, use a **grouped frequency table**.

Consider class width carefully. The smallest number is 6 and the biggest number is 21, so groups with a width of 5 are reasonable.

Customers	Tally	Frequency
6 - 10	𝍸 I	6
11 – 15	𝍸 𝍸 IIII	14
16 – 20	𝍸 IIII	9
21 - 25	I	1

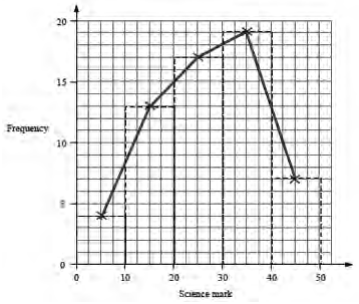
S2.2
Draw and interpret a frequency polygon.

e.g. draw a frequency polygon for the following information.

Science Mark	Frequency
0 - 10	4
10 – 20	13
20 – 30	16
30 – 40	19
40 – 50	7

A **frequency polygon** shows the frequencies for different groups.

To plot a frequency polygon of grouped data, plot the frequency at the midpoint of each group.



S2.3
Find mean from a frequency table

e.g. find the mean from this table.

Goals (x)	Frequency (f)
0	2
1	2
2	5
3	1
	10

The **mean** is found by adding up all the numbers and dividing by how many numbers there are.

The total amount of goals can be worked by multiplying goals (x) by the frequency (f), to give fx.

Goals (x)	Frequency (f)	fx
0	2	0 x 2 = 0
1	2	1 x 2 = 2
2	5	2 x 5 = 10
3	1	3 x 1 = 3
	10	15

The total number of goals is 15.
There were 10 football games.
15 ÷ 10 = 1.5, so the mean is 1.5.

S2: Grouped Frequency

Find median from a frequency table
Find range from a frequency table
Find the mode from a frequency table
Construct a scatter graph

S2.11
Find median from a frequency table

e.g. find the median from this table.

Goals (x)	Frequency (f)
0	2
1	2
2	5
3	1
	10

The **median value** is the middle value
when all items are in order.
Median = $\frac{n+1}{2}$ th value.
n (total frequency) is 10.
Median = $\frac{10+1}{2} = \frac{11}{2}$ = 5.5th value.
The median is halfway between the 5th and 6th items of data.

Goals (x)	Frequency (f)	Cumulative
0	2	2
1	2	2 + 2 = 4
2	5	4 + 5 = 9
3	1	9 + 1 = 10

The 5th item of data is 2.
The 6th item of data is 2.
The median number of goals is 2.

2.4
Find range from a frequency table

e.g. find the range from this table.

Goals (x)	Frequency (f)
0	2
1	2
2	5
3	1
	10

The **range** is the highest value take away the lowest value.

The highest value in the table is 3 goals.
The lowest value is 0 goals.
The range is 3 – 0 = 3 goals.

2.5
Find the mode from a frequency table

e.g. find the mode from this table.

Goals (x)	Frequency (f)
0	2
1	2
2	5
3	1
	10

The **modal value** is the value with the
highest **frequency**.

There were five football matches where 2 goals were scored, which is a higher frequency than any other amount of goals.

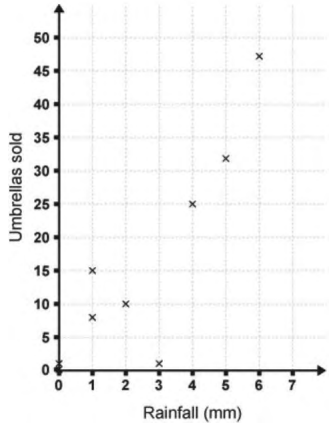
The modal amount of goals scored is 2.

2.6
Construct a scatter graph

e.g. construct a scatter graph from this data.

Rainfall (mm)	Umbrellas Sold
3	1
2	10
4	25
0	0
0	1
5	32
6	47
1	8
1	15

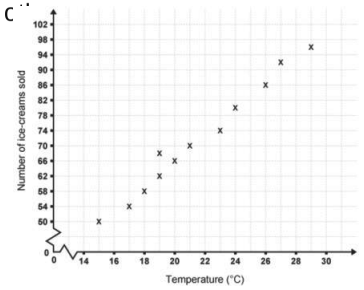
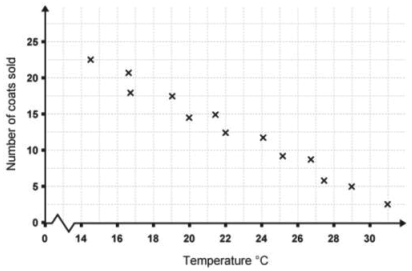
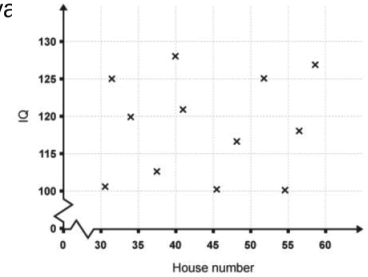
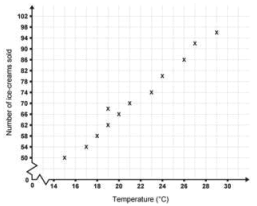
Scatter graphs are used to see if there is a **correlation** between two sets of data.



S2: Grouped Frequency

Identify the correlation of a scatter graph

Describe the relationship presented by a scatter graph

2.7 Identify the correlation of a scatter graph e.g. sketch a scatter graph showing positive correlation and a scatter graph showing negative correlation.	Graphs can either have positive correlation, negative correlation or no correlation. **Positive correlation** means as one variable increases, so does the c…  **Negative correlation** means as one variable increases, the other decreases. 
	No correlation means there is no connection between the two va… 
2.8 Describe the relationship presented by a scatter graph e.g. describe the relationship shown in this scatter graph. 	The relationship presented by a scatter graph is described by its correlation. It is important that you mention both variables in your description of the relationship. There is a positive correlation between sales of ice cream and the temperature, so temperatures rises so does the sale of ice cream.

S2: Grouped Frequency

Find Draw a line of best fit for a scatter graph

Use a scatter graph to estimate results

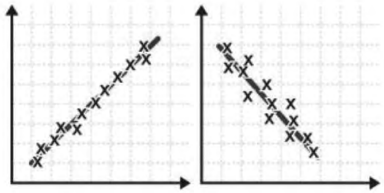
Estimate the mean from a grouped frequency table

2.9
Draw a line of best fit for a scatter graph.

e.g. draw a line of best fit for positive and negative correlation.

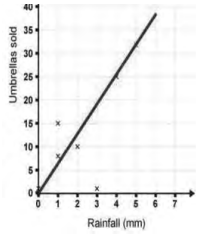
A **line of best fit** is a sensible straight
line that goes as centrally as possible
through the coordinates plotted.

There should roughly be the same

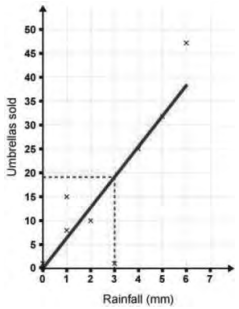


2.10
Use a scatter graph to estimate results

e.g. estimate how many umbrellas will be sold given 3mm of rainfall?



Estimate results using the line of best fit.
Find 3 mm of rainfall on the graph.
Draw a line going up from 3 mm, then draw a line across to the y axis.



2.12
Estimate the mean from a grouped frequency table.

e.g. estimate the mean from this table.

Minutes Late (m)	Frequency
0 < m ≤ 4	11
4 < m ≤ 8	13
8 < m ≤ 12	7
12 < m ≤ 16	9
16 < m ≤ 20	4

We don't know the exact value of each item of data in each group.

The best estimate we can make is to use the midpoint of each group.

Minutes Late (m)	Frequency	Midpoint
0 < m ≤ 4	11	2
4 < m ≤ 8	13	6
8 < m ≤ 12	7	10
12 < m ≤ 16	9	14
16 < m ≤ 20	4	18

The total number of minutes late can be found by multiplying the frequencies by the midpoints.

Minutes Late (m)	Frequency	Midpoint	mp x f
0 < m ≤ 4	11	2	22
4 < m ≤ 8	13	6	78
8 < m ≤ 12	7	10	70
12 < m ≤ 16	9	14	126
16 < m ≤ 20	4	18	72
	44		368

The estimate of the mean is calculated by dividing the total minutes late by the total number of trains (total frequency).

Mean $\approx \frac{368}{44} \approx 8.4$ minutes.

S2: Grouped Frequency

Identify the modal class of a grouped frequency table

Identify the class containing the median from a grouped frequency table

Understand the terms extrapolation and interpolation related to scatter graphs

Calculate cumulative frequency

2.13
Identify the modal class of a grouped frequency table.

e.g. find the modal class from this frequency table.

Minutes Late (m)	Frequency
$0 < m \leq 4$	11
$4 < m \leq 8$	13
$8 < m \leq 12$	7
$12 < m \leq 16$	9
$16 < m \leq 20$	4

The modal class is the group with the highest frequency.

The group with the highest frequency is $4 < m \leq 8$ which occurs 13 times.

The modal class is $4 < m \leq 8$.

2.14
Identify the class containing the median from a grouped frequency table

e.g. find the class containing the median from this table.

Minutes Late (m)	Frequency
$0 < m \leq 4$	11
$4 < m \leq 8$	13
$8 < m \leq 12$	7
$12 < m \leq 16$	9
$16 < m \leq 20$	4

The **median value** is the middle value when all items are in order.

Median = $\frac{n+1}{2}$ the value.

n (total frequency) is 44.

Median = $\frac{44+1}{2} = \frac{45}{2}$ = 22.5th value.

The median is halfway between the 23rd and 24th items of data.

Using cumulative frequency, the 24th item is at the end of the $4 < m \leq 8$ class, so the 23rd item is also in that class.

The median value is in the $4 < m \leq 8$ class.

2.15
Understand the terms extrapolation and interpolation related to scatter graphs

Interpolation is predicting within the range of the data.
This is seen as a reliable estimation.

Extrapolation is predicting from outside of the range of the data.
It is subject to greater uncertainty.

2.16
Calculate cumulative frequency

e.g. use this table to calculate cumulative frequency.

Length (cm)	Frequency
$30 < l \leq 35$	4
$35 < l \leq 40$	10
$40 < l \leq 45$	11
$45 < l \leq 50$	12
$50 < l \leq 55$	3

To calculate the cumulative frequencies, add the frequencies together.

Length (cm)	Frequency	Cum Freq
$30 < l \leq 35$	4	4
$35 < l \leq 40$	10	14
$40 < l \leq 45$	11	25
$45 < l \leq 50$	12	37
$50 < l \leq 55$	3	40

S2: Grouped Frequency

Plot a cumulative frequency chart

Read median and quartiles from cumulative frequency chart

2.17
Plot a cumulative frequency chart

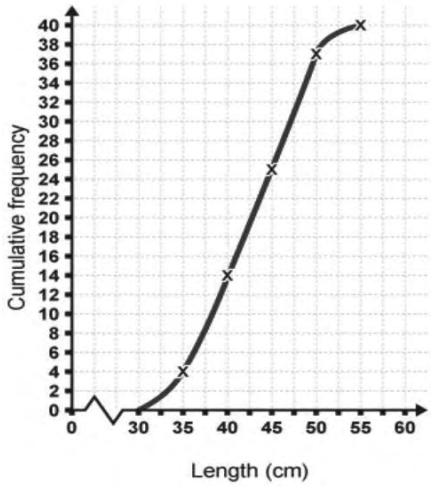
e.g. plot a cumulative frequency chart or graph from this table.

Length (cm)	f	Cum Freq
$30 < l \leq 35$	4	4
$35 < l \leq 40$	10	14
$40 < l \leq 45$	11	25
$45 < l \leq 50$	12	37
$50 < l \leq 55$	3	40

A cumulative frequency diagram is drawn by plotting the upper class boundary with the cumulative frequency.

Cumulative frequency is plotted on the vertical axis and length is plotted on the horizontal axis.

Points are joined with a smooth curve.



2.18
Read median and quartiles from cumulative frequency chart

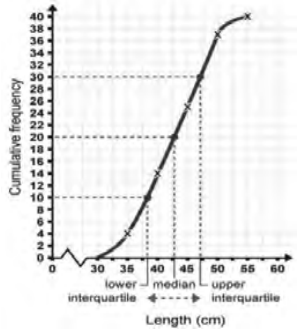
e.g. find the median, lower quartile and upper quartile from the cumulative frequency graph in section 2.17.

To find values, draw a line across from the position and read down from the curve.
s the number of items in the data set (40).
M**edian** is the $\frac{n}{2}th$ value.
$\frac{40}{2}$ = 20. 20th item is approximately 43.

Lower Quartile (LQ) is the $\frac{n}{4}th$ value.
$\frac{40}{4}$ = 10. 10th item is approximately 38.

Upper Quartile (UQ) is the $\frac{3n}{4}th$ value.
$\frac{3(40)}{4}$ = 30. 30th item is approximately 47.

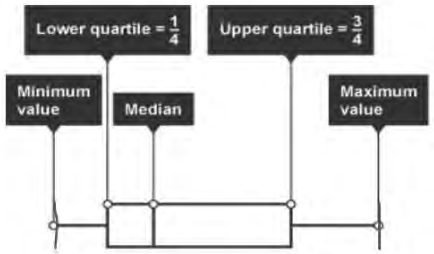
Interquartile Range (IQR)
IQR = UQ – LQ = 47 – 38 = 9.

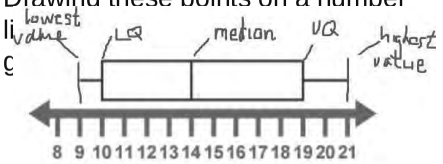


S2: Grouped Frequency

Draw a box plot

Draw a box plot from a list of numbers

2.19 Draw a box plot e.g. show the values required to draw a box plot.	A **box plot** is a visual representation of the **median** and **quartiles** of a set of **data**. To draw a box plot, the following values are needed: minimum; **lower quartile;** median; **upper quartile;** 

2.19 a) Draw a box plot from a list of numbers. e.g. draw a box plot from this list of numbers: 9, 10, 10, 12, 13, 14, 17, 18, 19, 21, 21.	Box plots can be created from a list of numbers by finding the median, lower and upper quartiles. Minimum value = 9. Maximum value = 21. M**edian** is the $\frac{n+1}{2}th$ value. $\frac{11+1}{2}$ = 6. 6th item is 14. **Lower Quartile (LQ)** is the $\frac{n+1}{4}th$ value. $\frac{11+1}{4}$ = 3. 3rd item is 10. **Upper Quartile (UQ)** is the $\frac{3(n+1)}{4}th$ value. $\frac{3(11+1)}{4}$ = 9. 9th item is 19. Drawing these points on a number li g 

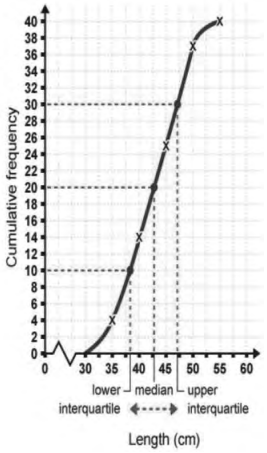
S2: Grouped Frequency

Drawing a box plot from a cumulative frequency graph

Compare distributions displayed as box plots by comparing the median and the interquartile range in context

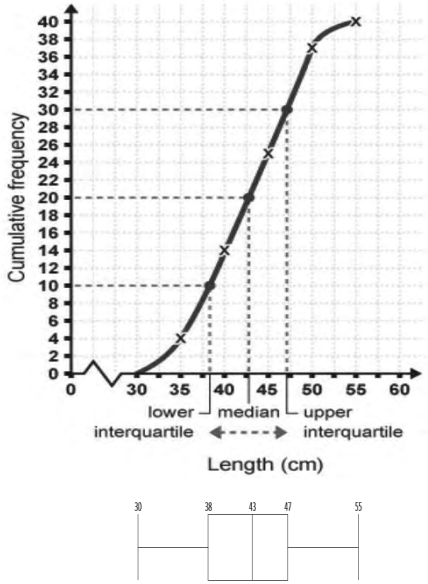
2.19
b) Drawing a box plot from a cumulative frequency graph

e.g. draw a box plot for the cumulative frequency chart.



Find the maximum, minimum, median and quartiles from the **cumulative frequency** graph.

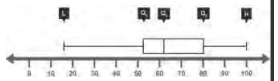
The minimum and maximum values of the box plot are where the cumulative frequency begins and ends



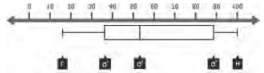
2.20
Compare distribution displayed as box plots by comparing the median and the interquartile range (IQR) in context

e.g. give two comparisons for these two boxplots.

Mr Wilson's Maths class.



Mr Galbraith's English class.



Compare the median for both box plots.

The median for Mr Wilson's results (62) is higher than median for Mr Galbraith's results (53).
On average, Mr Wilson's class performed better in the test in Maths than Mr Galbraith's class did in English.

Compare the IQR for both box plots.

The pupils in Mr Galbraith's class had more varied results as their IQR (53) is greater than the IQR (28) in Mr Wilson's class.

S2: Grouped Frequency

Know how to calculate frequency density for a histogram of unequal widths

Calculate frequencies from a histogram of unequal widths

2.21
Know how to calculate frequency density for a histogram of unequal widths

e.g. calculate the frequency density from these values.

Age (a)	Frequency
5 ≤ a < 11	6
11 ≤ a < 16	15
16 ≤ a < 17	4

On a **histogram** the area of the bar shows the frequency of the **data**.

Histograms are typically used when the data is in groups of unequal width.

Frequency density is used instead of frequency.

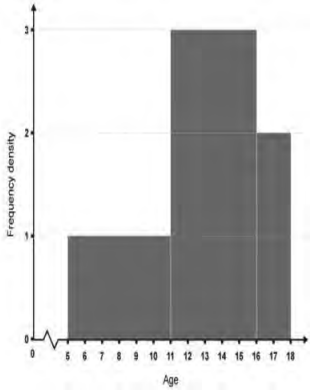
Frequency density (FD) = $\frac{frequency}{class\ width}$

Age (a)	Frequency	Class Width	FD
5 ≤ a < 11	6	6	1
11 ≤ a < 16	15	5	3
16 ≤ a < 17	4	2	2

2.22
Plot a histogram of unequal widths.

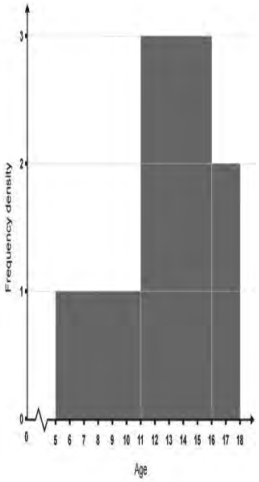
e.g. plot a histogram from this table in section 2.21.

Plot Frequency Density on the y axis.



2.23
Calculate frequencies from a histogram of unequal widths

e.g. calculate the frequency for each category from the histogram.



Frequency = Frequency Density x Class Width

Children aged 5 – 11:
Frequency = 1 x 6 = 6.

Children aged 11 – 16:
Frequency = 3 x 5 = 15.

Children aged 16 – 18:
Frequency = 2 x 2 = 4.

S3: Probability

Calculate the theoretical probability of an event
Use the exhaustive rule of probability,
Use a sample space to find the probability of a combined event
Use the property that the sum of mutually exclusive probabilities is 1

S3.1
Calculate the theoretical probability of an event

e.g. What is the theoretical probability of rolling a 6 on a single die?

- **Calculate probability**

$$P(\text{event}) = \frac{\text{No. of outcomes which give the event}}{\text{Total number of outcomes}}$$

Probability of rolling a 6
There is only one 6 on the die
There are 6 numbers on the die

$$P(6) = \frac{1}{6}$$

S3.2
Use the exhaustive rule of probability, the probability of an event + the probability of that event not happening = 1

e.g. The probability it will rain today is 0.7. What is the probability it won't rain today?

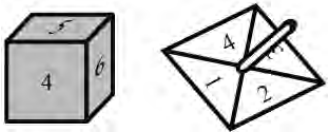
Probability of an event NOT happening

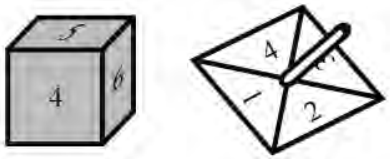
If P (event) = p
P (event NOT happening) = 1 – p

e.g. P (rain) = 0.7
P (not rain) = 1 – 0.7 = 0.3

S3.3
Use a sample space to find the probability of a combined event

e.g. A dice is rolled and a spinner is spun and the scores are added together. Create a sample space diagram to show all possible outcomes from spinning a spinner and rolling a dice.





		Dice					
	+	1	2	3	4	5	6
Spinner	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10

S3.4
Use the property that the sum of mutually exclusive probabilities is 1

e.g. If outcomes A and B are mutually exclusive and the probability of A occurring is 0.47 … what is the probability of B occurring?

If 2 outcomes cannot occur together they are mutually exclusive
If 2 outcomes A and B are mutually exclusive
P(A) + p(B) = 1

1 - P(A) = P(B)
1 - 0.47 = P(B)
P(B) = 0.53

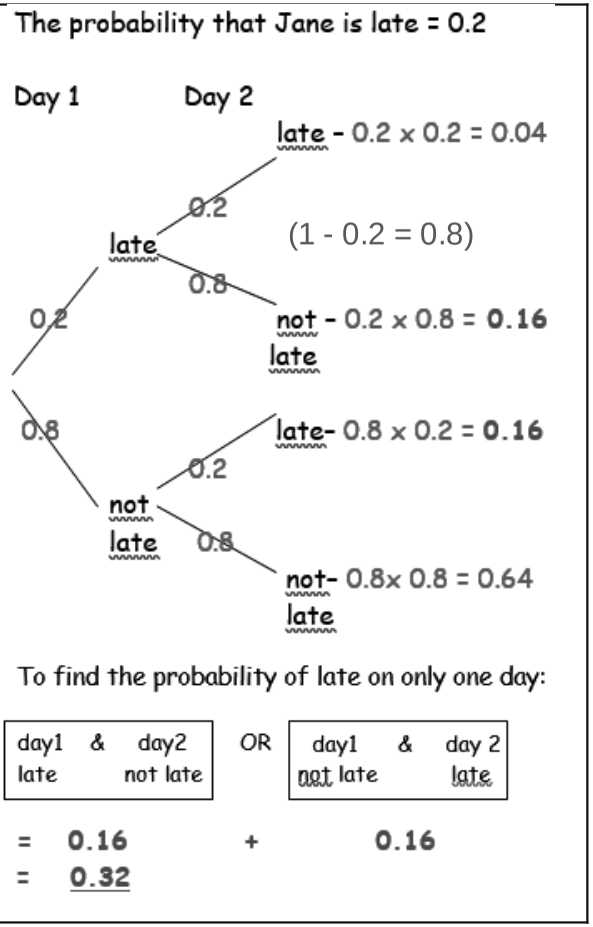
S3: Probability

Calculate relative frequency

Understand the limitations and use of elative frequency

Draw a tree diagram for independent events

S3.5 Calculate relative frequency e.g. St Benedict's Football Club has won 7 matches out of the 10 this season. What is the probability they will win their next match?	Relative frequency = $\frac{\text{Number of times outcome occurs}}{\text{Total number of trials}}$ $= \frac{7}{10}$ = 0.7
S3.6 Understand the limitations and use of relative frequency e.g. Lily scored 4 out of the 10 shots during netball training. Lily says "The probability of me scoring is 40%". Is Lily correct? How could Lily improve the accuracy of her estimate?	Yes Lily is correct. $\frac{4}{10}$ = 40% Increase the amount of trials. The more times that an experiment has been carried out, the more reliable the relative frequency is as an estimate of the probability.

S3.7 Draw a tree diagram for independent events e.g. The probability Jane is late for school is 0.2. What is the probability she is only late one day on Monday and Tuesday next week?	

S3: Probability

Draw a tree diagram for dependent events
Add two probabilities using the OR rule
Multiply two probabilities using the AND rule

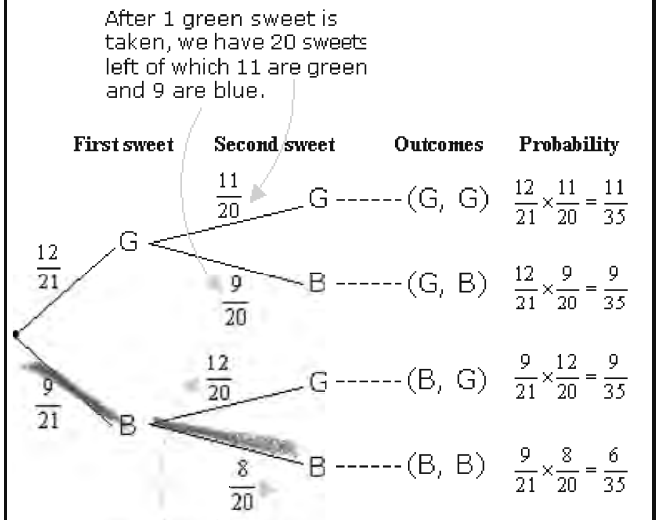
S3.8
Draw a tree diagram for dependent events

And

S3.11
Calculate probabilities from a tree diagram

e.g. A jar consists of 21 sweets. 12 are green and 9 are blue. William picked one sweet and then picked another without replacing the first.

Draw a tree diagram to represent the experiment and find the probability that both sweets are blue.



P(both sweets are blue) = P(B, B)

$$= \frac{9}{21} \times \frac{8}{20} = \frac{6}{35}$$

S3.9
Add two probabilities using the OR rule.

e.g. The probability of picking a spade from a deck of cards is $\frac{1}{4}$. The probability of picking a club from a deck of cards is $\frac{1}{4}$. What is the probability of picking a spade or a club?

P(A or B) = P(A) + P(B)

Use this addition rule to find the probability of either of two mutually exclusive events occurring.

P(S or C) = P(S) + P(C)

$$P(S \text{ or } C) = \frac{1}{4} + \frac{1}{4}$$

$$= \frac{2}{4} = \frac{1}{2}$$

S3.10
Multiply two probabilities using the AND rule.

e.g. A fair die is rolled. What is the probability that the number is even and less than 4?

P(A and B) = P(A) x P(B)

Use this multiplication rule to find the probability of both of two independent events occurring.

P(E and <4) = P(E) x P(<4)

$$= \frac{1}{3} \times \frac{1}{2}$$

$$= \frac{1}{6}$$

S3: Probability

Draw a Venn diagram from given information or probabilities

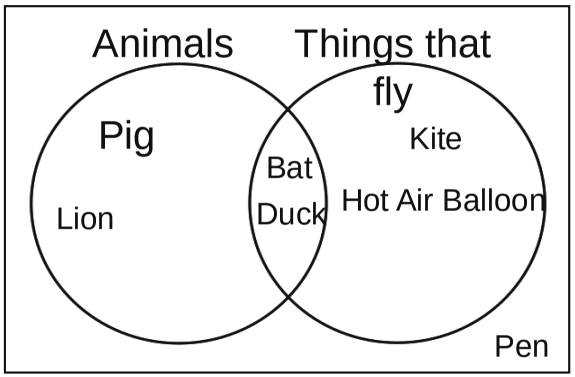
Use set notation

S3.12
Draw a Venn diagram from given information or probabilities.

e.g. Draw a Venn diagram to show categories of "Things that fly" and "Animals" for the following;

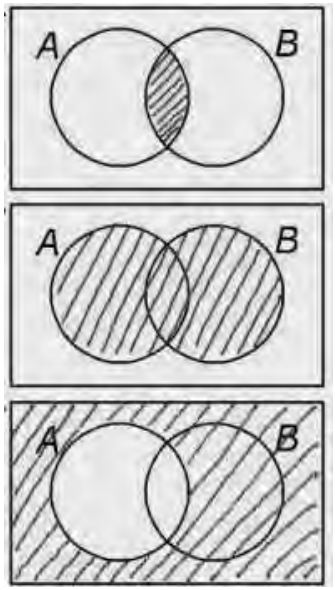
- Pig
- Hot Air Balloon
- Pen
- Bat
- Lion
- Kite
- Duck

1. Draw a rectangle
2. Draw two or three circles according to how many categories you have. There are two categories in the sample question: Make sure the circles overlap.
3. Write your items in the relevant circle. If items fit both categories, write those where the circles overlap (the "intersection").
4. If you have something which doesn't fit a category (pen) write it within the rectangle but outside the circles.



S3.13
Use set notation

e.g. Write the three areas shaded set notation.



U: Union of two sets.
Things that are in either set A or set B

∩: Intersection of two sets.
Things that are in set A and also in set B.

A′: Complement of a set.
The elements not in Set A.

1. $A \cap B$
2. $A \cup B$
3. A'

S3: Probability

Use intersection, union and complement with sets and Venn diagrams

Find probabilities using a Venn diagram

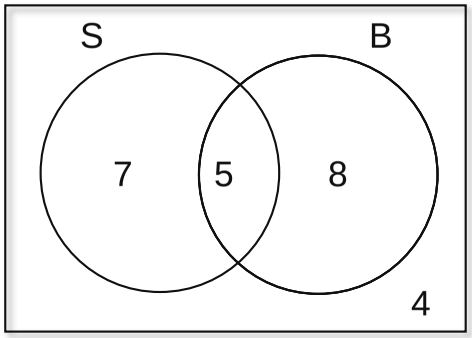
S3.14
Use intersection, union and complement with sets and Venn diagrams.

e.g. Mr Peake asks 24 pupils in his class about their families.
He sorts them into:
S - Has sisters
B - Has brothers

He then displays his findings in a Venn diagram.

Using this Venn diagram, work out:

1. $S \cap B$
2. $S' \cap B$



(See previous page for Set Notation)

1. Means S AND B so people who have sisters and brothers - the intersection.

= **5**

2. S' means NOT S.
$\cap B$ Means AND B

There are 12 people who do not have sisters but only 8 of those don't have a brother.

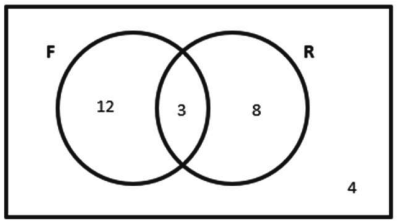
= **8**

S3.15
Find probabilities using Venn diagrams

e.g. The Venn Diagram below shows if students play Football or Rugby.

A pupil is chosen at random.
What is the probability:

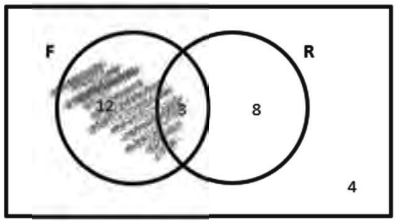
a) They play football
b) They play football and rugby
c) The don't play either



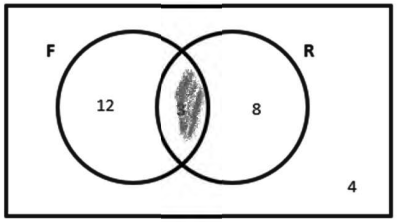
Total number of students = 12 + 3 + 8 + 4 = 27
This is the denominator!

a) 12 + 3 = 15

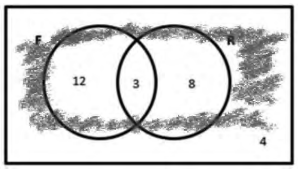
$\frac{15}{27}$



b) $\frac{3}{27}$



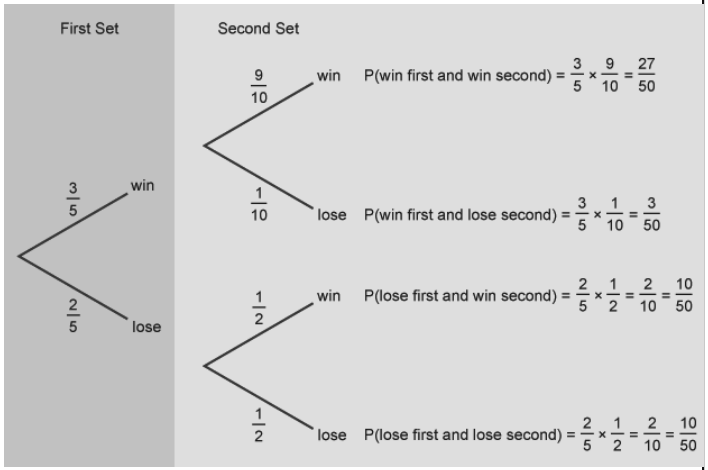
c) $\frac{4}{27}$



S3: Probability

Calculate conditional probability

Use formula to prove two events are independent

S3.16 Calculate conditional probability. e.g. The probability that a tennis player wins the first set of a match is $\frac{3}{5}$. If she wins the first set, the probability that she wins the second set is $\frac{9}{10}$. If she loses the first set, the probability that she wins the second set is $\frac{1}{2}$. Given that the tennis player wins the second set, find the probability that she won the first set.	First, represent the information on a tree diagram:  From the tree diagram, the probability of winning the second set = $\frac{27}{50} + \frac{10}{50} = \frac{37}{50}$. This means that in every 50 matches, she may win the second set 37 times (37 becomes the denominator of the conditional probability). Out of those 37 times, on 27 occasions she won the first set and on 10 occasions she lost the first set. Therefore, given that she wins the second set, the probability she won the first set is $\frac{27}{50}$. There is also a formula that can be used for conditional probability: $P(A \text{ given } B) = \frac{P(A \text{ and } B)}{P(B)} = \frac{\frac{27}{50}}{\frac{37}{50}} = \frac{27}{37}$

S3.17 Use formula to prove two events are independent e.g. You toss a coin and roll a dice. Are these events independent?	An independent event is an event that has **no connection** to another event's chances of happening. Events A and B are independent if: P (A ∩ B) = P(A) x P(B). P (5 on the dice) = $\frac{1}{6}$ P (Heads) = $\frac{1}{2}$ P (5 and Head) = $\frac{1}{12}$ (a sample space would show this) Since $\frac{1}{6}$ x $\frac{1}{2}$ = $\frac{1}{12}$ they are independent.

S3: Probability

Find combinations and permutations

S3.18 Find combinations and permutations.	When you make a selection of items from a group and the order doesn't matter, it is a **Combination**. Like ingredients in a smoothie - they're all getting blended together!
e.g. A pizza restaurant offers a choice of toppings: ham (H), pepperoni (P), mushroom (M) and chicken (C). How many ways can two different toppings be chosen?	List the combinations: HP, HM, HC, PM, PC, MC. There are 6 combinations.
	When you select all the items in a group and the order **does** matter it is a **Permutation**. Like the code to a safe - it only works if you put the numbers in in the right order.
e.g. A man owns three cars: 1 red, 1 blue and 1 white. How many ways can they be parked on his drive?	List the permutations: RBW, RWB, BWR, BRW, WRB, WBR. There are 6 permutations.

Year 9 – Advent 1

Contents

Creation and Dignity

Creation and Dignity

Key Terms

These words will form part of your assessment:
It is important you learn them and their meaning.

Key Term	Definition
Dignity	Something given to someone by the divine. Catholics believe God has given life and therefore human life is sacred.
Discrimination	The unjust or prejudicial treatment of different categories of people, especially on the grounds of ethnicity, age, sex, or disability
Equality	Being equal to others, especially in status, rights, or opportunities.
Equity	The quality of being fair and just.
Prejudice	A preconceived opinion not based on reason or actual experience.
Rights	A moral entitlement or to have to do something.
Objectification	Degrading someone to the status of a mere object
Sanctity of life	A principle that believes life that is so valuable, it should be protected. Christians believe God gave life.

Creation and Dignity

The Purpose and Value of Life

The Value of Life

Christians believe human life is sacred and should be respected.
All humans are created in God's image.
Life is a gift from God and should be protected.
The sanctity of life teaches life is God-given.
The Bible teaches human beings are created in the image of God.
Jesus taught God has counted every hair on a person's head.

> And even the very hairs of your head are all numbered… Indeed, the very hairs of your head are all numbered.
>
> **Luke 12:7**

The Purpose of Life

Christians believe the purpose of life is to become closer to God.
Jesus instructed his followers to love God and love their neighbour.
To get close to God means to see him in each other
Following Jesus' teaching will ensure a person can achieve eternal life in heaven with God.
Heaven is the ultimate purpose of life.

Creation and Dignity

The Purpose and Value of Life

How to Live a Good Life

God gave humans **free will** to choose their actions.
God gave humans a **conscience**.
God gave humans the ability to **reason**.
Christians believe humans can **make their own** decisions.
Humans are **responsible** for their decisions

God gave humans **commandments** to follow.
God's commandments tell humans what they **should choose and should avoid**.
God sent his Son, **Jesus**, to the world as an example.
Jesus showed that in difficult situations, humans can still **make the right choice**.

What did Jesus teach

Jesus taught **The Beatitudes.**
The Beatitudes are a set of **conditions to aspire** to.
They help Christians **know how** to behave.
They are contrary to human materialistic aspirations

Jesus taught '**Love your enemies**' Matthew 5:44
Love is to seek or **desire good** for another.
Christians should **seek and pray** that people who do evil understand their actions and **change their ways.**

Following Jesus' example is the purpose of christian life.
This would show value to all life.
This is not an easy route, but the right one.

These encompass the **most basic rights** and **freedoms** that a person can have.
All humans have rights, **from birth to death.**
Rights are **not dependant** on race, gender, religion, or ethnicity.

After World War II, a **universal set of rights** was written to show this belief
This was called **The Universal Declaration of Human Rights** and applied to all people
It covers rights from how to live, where a person can live, protection from harm and others.

> "All human beings are born free and equal in dignity and rights"
>
> **Universal Declaration of Human Rights, 1947**

There are 30 **articles** outlining our human rights.
These are separated into categories

Articles 1 and 2
Reaffirm human dignity and equality.

Articles 3-11
The **rights of the individual**: to life, outlawing slavery and torture, being equal in law, the right to a fair trial etc.

Articles 12-17
The **individual rights in society**, such as freedom of movement, the right to a nationality, the right to marry and have a family, and the right to own property.

Articles 18-21
The **spiritual, religious and political rights** of individuals, such as freedom of thought, the right to your own opinion, the right to gather peacefully and protest, the right to vote.

Articles 22-27
The **social, economic and cultural rights of the individual**, including the right to work, rest and leisure, a decent standard of living, and education.

Articles 28-30
Remind us that **rights come with obligations** and we do not have the right to violate anyone else's human rights.

Creation and Dignity

Animal Rights

Many people believe that **all living things** should be treated with respect.
Animals have a **right to be protected** from ill-treatment, just like humans.

Most people believe that humans are **capable of more** than other animals
Example, humans have the ability to make moral decisions.
It is widely agreed that they should be **looked after carefully and protected.**

Not all humans agree that animals should be treated equally

Companionship - Pets are usually treated well as part of the family

Help - Used to help people: guide dogs for the blind.

Work - Animals can be used to carry or find items.

Sport - Animals used for sport. Greyhound or horse racing.

Food - Many people eat meat and animal products

Fashion or leisure - Used for clothing or household accessories

Education and conservation - Zoos or wildlife parks help to understand animals

Experiments and scientific developments - Cosmetic testing is illegal in the UK.

Entertainment - Animals form part of circus acts.

Creation and Dignity

Animal Rights

Why animals should have rights

Human animals have rights, **so non-human** animals should also have them.
No **morally relevant difference** between human animals and adult mammals.
Humans and other mammals have **similar levels of biological complexity**.

Non-human animals are **conscious**, **aware** of their existence and **know what is happening** to them.
Non-human animals **prefer some things and dislike others** and make conscious choices.
The **quality and length of their life** matters to them.

Why animals should not have rights

Animals **don't think** and are not really conscious.
Animals were put on earth **to serve human beings**.
Animals **don't have souls.**

Animals **don't behave morally** and are not members of the 'moral community' like humans are.
Animals **lack the capacity** for free **moral judgment**.

to treat animals as lesser than humans is **speciesism** in action.
Peter Singer

animals act purely on instinct while human beings engaged in **rational thought**.
St. Thomas Aquinas

Creation and Dignity

Equality and Equity

Equality means that every individual has an equal opportunity to make the best of their lives and talents.

No one should have poorer life chances because of where a person is from, how they were born, their beliefs, or if they have a disability.

Equality recognises that groups of people with protected characteristics have experienced discrimination.

in the UK it is unlawful to treat anyone differently in society because of factors such as age, disability, gender, race or sexual orientation

The Equality Act (2010)

Equity is about giving people what they need, in order to make things fair.

It is giving more to those who need it, taking into consideration their circumstances, so everyone has the same opportunities.

Social justice is about making society function better – providing the support and tools to help turn lives around.

Social justice includes fairness in healthcare, employment, housing, and more.

Social justice cannot be achieved without the principles of human rights, access, participation, and equity.

Creation and Dignity

Equality and Equity

Should we all be equal?

Social justice isn't possible if only some voices are heard.

The voices of marginalized and vulnerable people are silenced.

"All are equal before the law and are entitled without any discrimination to equal protection of the law."

Article 7

Universal Declaration of Human Rights

Should criminals be equal?

A balance needs to be met between the **rights of the individual and wider society.**

If there is a clear **legal basis for restrictions**, they are legal as long as there is good reason and **restrictions are proportionate**.

Some would argue criminals have **not lost their dignity** or their **right to equality in the law.**

Should animals be seen as equal to humans?

Animal equality seeks to ensure **all animals are respected and protected.**

Animal rights groups like **PETA** fight against human use of animals

It could be argued animals **do not have the same morality** as humans do and **pose a danger to humans**.

Creation and Dignity

Prejudice and discrimination

Prejudice - an attitude held
Comes from the words 'to judge before'.
When someone forms an negative opinion or feeling about a person or people without all of the information.
Exists wherever there is difference between people.

Discrimination - an action performed
Forming an opinion based on the group they belong to, instead of personal merit.

Discrimination includes verbal slurs, failure to provide reasonable adjustments, media portrayal, preferential pay, hiring or admissions policies and hate crimes.

Discrimination can be committed by individuals, groups or institutions.

Every form of social or cultural discrimination in fundamental personal rights on the grounds of sex, race, colour, social conditions, language or religion must be curbed and eradicated as incompatible with God's design.

Gaudium et Spes

Examples
Prejudice based on **gender** is called **sexism**.
Prejudice based on the national grouping or **race** is known as **racism**.
Prejudice towards Jews is called **anti-Semitism**.
Prejudice towards Muslims is called **Islamophobia**.
Prejudice towards **homosexual** people is called **homophobia**.
When people, young or old, suffer from prejudice because of their age, it is called **ageism**.

Creation and Dignity

Stephen Lawrence

Institutional racism is when racial discrimination is established as a normal behaviour within organisations that make up a society.

It suggests people from **Black or other minority backgrounds** have to **work harder** in society in order to get the same results as white people.

A report looking at the death of Stephen Lawrence suggested his case had been handled in an **institutionally racist way**

The police investigation had not been handled with **the same care** that a case involving a white person would have been.

The case
An 18-year-old Black teenager who lived in South London.

Killed in 1993 in an attack motivated by skin colour

Had been waiting for a bus with a friend, when a gang of white men attacked them.

The police thought it was drug related, and did not provide first aid.

The friend escaped unhurt, Stephen died from his injuries.

Police started to investigate suspects they believed were responsible for the attack.

Suspects were not arrested swiftly and given time to dispose of evidence

Some suspects were charged with murder, these charges were then dropped before a trial could happen.

The decision makers didn't think that there was enough evidence so it did not go to trial.

Creation and Dignity

Stephen Lawrence

In 2012, two of the original suspects in Stephen's killing, Gary Dobson and David Norris, were found guilty of his murder and sent to prison, after new evidence was found.

The other suspects in Stephen's murder were not brought to trial

August 2020, the Metropolitan police declared the investigation into the murder "inactive".

"All identified lines of inquiry have been completed", which means no one else can be taken to trial and held responsible for Stephen's death unless the case is later reopened.

Stephen Lawrence Day

First celebrated in 2019

Celebrated annually on the 22nd April.

The family set up a foundation to grow awareness of racial inequality.

Aims to inspire a more equal, inclusive society, and to foster opportunities for marginalised young people in the UK.

The foundation works in schools, communities and businesses to inspire, support and provide opportunities for the young and marginalised.

Creation and Dignity

Homophobia

People who identify as lesbian, gay, or bisexual may experience harassment or discrimination from people who are uncomfortable with these identities.

Happens in many different ways and includes negative attitudes and beliefs about or prejudice against bisexual, lesbian, and gay people.

Often based on irrational fear and misunderstanding.

Sometimes comes from fundamental religious beliefs.

Often handed on through generations.

In 2017 Stonewall ran a research survey:

45% of lesbian, gay and bisexual young people experienced homophobic bullying in Britain's schools.

40% of lesbian, gay and bisexual pupils who experience bullying have skipped school because of bullying.

86% of LGBTQIA+ students regularly hear phrases such as ‘that’s so gay’ or ‘you’re so gay’ in school.

Why is it so common?

Many phrases and words may appear as harmless but care homophobic.

The fact the word ‘gay’ is being used in a negative light means it can be regarded as homophobic.

Creation and Dignity

The Catholic Church and Homophobia

Catholics believe all humans were made in the image of God, therefore have dignity.

A person does not choose to be either homosexual or heterosexual, so being gay **is not inherently sinful.**

Catholics believe that only God can judge us on our actions, we should do our best in life following God's rules.

Only God can judge our actions, our job is love and nurture each other to be the best we can be.

> "Homosexual people have a right to be in a family. They are children of God and have a right to a family. Nobody should be thrown out or be made miserable over it."
>
> **Pope Francis**

Creation and Dignity

Stereotyping

A generalised belief or idea about a group of people.

Often unfair or untrue.

Often associated with a negative expectation of a group or person, such as their ability, preferences, appearances or personalities.

Group stereotyping can sometimes be useful when making a quick decision, but often they are wrong when applied to an individual person.

Can be limiting, and can lead to discrimination which causes harm.

Famine in Ethiopia

A country on the African continent, known for a great famine in the 1980s.

Seen as a poor and underdeveloped country.

Agriculture, the main source of income, was affected by droughts.

The government was replaced by a repressive regime that stopped Ethiopia prospering.

Many people, particularly in the west, have the stereotype that the whole of Africa is in extreme poverty.

Ethiopia has one of the world's fastest growing economies.

Creation and Dignity

Objectification and Othering

Martha Nussbaum said that there are seven ways someone can be treated that would objectify them:

Instrumental – treating as a tool for another's uses

Denial of autonomy – treating as lacking in self-determination

Inertness – treating as lacking in activity

Fungibility – treating like an object

Violability – treating like something that can be broken

Ownership – treating as though they can be owned,

Denial of subjectivity – treating as though there is no need for concern for them

Rae Langton says objectification can also happen through:

Reduction to body – the view asbeing no more than their body, or body parts

Reduction to appearance – treating in terms of their look or how they appear to the senses

Silencing – treatment as if they are unable to speak

Key Terms	Definition
Objectification	Degrading to the status of an object
Othering	Labelling as not fitting in within the norms of a social group
Dehumanisation	Denying fullness of human status causing cruelty and suffering

Component 3: Judaism

Contents

Component 3: Judaism

Key Terms

Key Concept	2 Mark Definition.
Synagogue	A place of worship, study and of meeting in the Jewish faith.
Shekinah	The dwelling or divine presence of God – usually found where the Torah is kept. The place where God's presence rests and can be felt
Shabbat	Day of spiritual renewal and rest. A day to remember God creating the world and resting on the seventh day.
Kosher	Meaning 'clean' or 'fit' – a word used to describe food that Jewish people can eat.
Messiah	The 'anointed' or 'chosen' one who is the promised deliverer of the Jewish nation – Jewish people believe a king will be sent by God to save them.
Covenant	A promise or agreement – Jewish people believe God has chosen them and has made several covenants with them throughout history.
Mitzvot	Actions Jewish people must perform or avoid – there are 613 actions in Judaism **including** the 10 commandments.
Torah	The Jewish written Law – The first five books of the Hebrew Bible.

Component 3: Judaism

What do Jews believe?

There is a **great diversity** within Jewish beliefs and practices.

The Jewish community is a **Diaspora**, being spread over the world, and so differnet cultures influence different beliefs and customs.

In the 12th century a Rabbi called **Maimonides** put together 13 principles beliefs that were in the Torah.

For many Orthodox Jews, these remain central beliefs.

Some principles are accepted by all Jews, such as the belief in one God.

For some principles such as a belief in a Messiah, there are many different views and interpretations.

The 13 principles of faith

1. God exists, is perfect and created everything in existence
2. Belief in God's unity
3. God does not have a physical body and so is not affected by the same needs as humans
4. God is eternal
5. Only God should be worshipped
6. God communicates with people through prophets
7. Moses is the most important prophet
8. The Torah was given to Moses by God
9. The Torah is God's law and cannot be changed
10. God is all knowing and knows everything that is going to happen
11. God will reward good and punish evil
12. The belief that the Messiah will come
13. The dead will be resurrected

Component 3: Judaism

What do Jews believe?

Judaism

There is only One God

Being Jewish is based on Mothers religion

Secular Judaism

Do not believe in God.

Do not see teachings and Torah as sacred.

Born to Jewish parents.

Do not practice religious observances.

Orthodox Judaism

Largest branch of British Jews

Torah is from God and cannot be changed

The laws do not change and should not be interpreted

All laws must be followed as closely as possible

Scientific and technological advances must be considered inside Jewish teaching

Reform Judaism

Often follow only the Ethical laws

Other laws were relevant in a certain time and place, not now.

The other laws are not absolute.

Torah and religion are important, but should be harmonised with modern life..

Reason and conscience are important in understanding how to live well.

Component 3: Judaism

Nature of God

God as One

There is only **one God** who is omniscient, omnipotent and omnipresent.

"I am the Lord and there is no other, besides Me there is no God."

Isaiah 45:5

Everything in the world is divisible except for God.

Belief in One God makes Jews monotheists.

All things are united within One God

"Hear, O Israel, the Lord your God is One."

The Shema, Deuteronomy 6:4

Creator

Reform and Orthodox Jews understand this differently

All Jews see God as the author of Creation, or responsible for it.

Creation is inherently good, as God is inherently Good.

"In the beginning God created heaven and earth" Genesis 1:1

Law-Giver

God established moral laws

The law allows a follower to live in harmony with God and his creation.

Obedience to the law brings Jews closer to God and fulfils their duty

The Ten Commandments

Exodus 20

Judge

Uses both Justice and Mercy

Will judge each person on their adherence to the law

Judges yearly during the festival of Rosh Hashanah

"You are not a God that has pleasure in wickedness"

Psalm 5:4

Component 3: Judaism

The nature and significance of Shekinah

What is it?

Sometimes used to refer to God Himself, but more often to God's presence in the world.

Some believe that the Shekinah refers to the feminine characteristics of God.

The Shekinah is more than just where God is, it is where the presence of God can be felt.

The shekinah rested in the temple, in Jerusalem.

After the destruction of the Temple.

Some believe Shekinah followed the Jews into exile.

Some believe the Shekinah never left the Temple area.

Sources

The actual word Shekinah is not mentioned in the Torah however there are several references to God's presence.

> "They heard the sound of Yahweh walking in the Garden"
>
> **Genesis 3:8**

Impact

The divine presence of God means they can have a personal relationship with God.

God is especially present in prayer when two faithful share the words of the Torah.

Component 3: Judaism

The Messiah and the Messianic Age.

The Messianic Age is a term used for a future time of peace on earth with no violence, hunger or crime.

There are no direct references to the Messianic Age in the Torah so scriptures are interpreted to understand it.

The first step to this age is the coming of the Messiah and the resurrection of the dead.

Differences in belief

A Jewish philosopher said that a belief in the Messiah was one of the 13 principles of Judaism.

For some, the Messiah remains central to their faith.

Many Reform Jews believe that the good actions of humans will bring a Messianic Age of peace.

Who is the Messiah?

The Torah contains no definite teachings about the Messiah.

Passages that Jews might think are relevant have to be interpreted.

Due to the lack of clear information, there is a strong belief that humans should focus on the here and now.

The world to come is beyond human understanding.

> talks of it being a time in which the wolf shall live with the lamb, and in which the lion, like the ox, shall eat straw.
>
> **Isaiah 11: 1-9**

Component 3: Judaism

The Messiah and the Messianic Age.

When might the Messiah come?

The Torah has no specific references about when the Messiah will come.

The Torah was written to show people that the idea of the Messianic Age is beyond human understanding.

Some Rabbis have tried to calculate the exact arrival of the Messiah leading several false Messiahs.

The focus

Many do not focus on a date of arrival, but the actions required to bring him.

Some Orthodox Jews believe that God has a specific date for the coming of the Messiah.

Most believe his coming will depend upon when he is most needed.

The sin of the world may bring the Messiah

A perfect world may bring the Messiah.

Reform Jews

There is little focus about the coming of the Messiah.

The main focus is on how to create a better society and working to that goal.

Component 3: Judaism

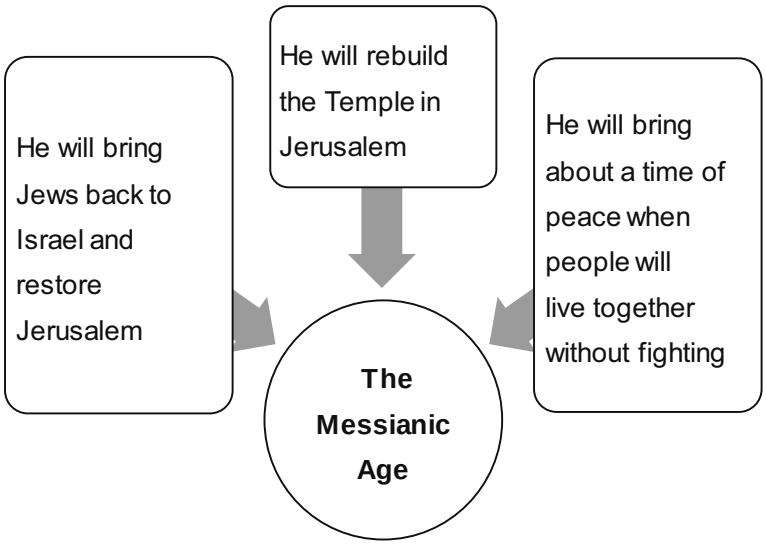
The Messiah and the Messianic Age.

What will the Messiah do?

The traditional belief is that the Messiah will be a great political leader and judge who will bring the world to an end.

Some Jews believe he will not be a supernatural being but a human who is descended from King David and an inspiration to others.

Many Jews believe that in every generation a person is born with the potential to be the Messiah.



Component 3: Judaism

The Messiah and the Messianic Age.

What will the Messiah be like?

The expectations of the Messiah come from the prophets.

Their writings in the Nevi'im

The Prophets can be interpreted in multiple ways leading to multiple views

The Messiah will be; kingly, righteous and powerful

Isaiah

The Messiah will bring peace to the nations.

Micah

The Messiah will bring the exiles back from the nations

Ezekiel

The Messiah will be a true descendent of King David.

Micah

The Messiah will end idolatry

Ezekiel

The Messiah will come unexpectedly.

Malachi

Component 3: Judaism

Abrahamic Covenant.

Who was Abraham

Abraham was 40 years old when he became aware of his Creator.

When he recognised and knew Him, he began to share God with the people of Ur.

He challenged them for not following a proper path.

He broke their idols and began to teach the people that it is fitting to serve only the G-d of the world.

Why Abraham

Abraham is regarded as the founder of the Jewish people and is often called 'father'.

He was called as he was the first person to teach that there was only one God.

The scriptures state that because of Abraham's purity, God called out to him, commanding him to leave his homeland behind for a new life.

Component 3: Judaism

Abrahamic Covenant.

Abraham's role:

Abraham was called out of Ur, to a new land.

Abraham had to leave his polytheistic religion, and follow the One God

The Promise of Descendants

God promised Abraham that a great nation would arise out of him.

God changed his name from Abram to Abraham, meaning **'father of many nations'.**

This promise is **shown in Genesis** where God promises that 'nations and kings will descend from Abraham'.

Blessings and Redemption

God promised to bless Abraham and the families of the earth through him

"Those that bless your name will be blessed, and those that curse it will be cursed." **Genesis**

The Promised Land

God promised to give Abraham a land that he would give him.

Abraham found their new home in Canaan

The land called the Promised Land because of God's repeated promises to give it.

Jews lived here from the time of its original conquest until present day.

The sign / seal of the covenant

Abraham, all males, and all Jewish boys at 8 days old are circumcised to seal this covenant.

Component 3: Judaism

Mosaic Covenant.

Who was Moses?

Moses was born of a Hebrew slave in Egypt.

During a culling of the Hebrews, Moses was saved by God and raised as an Egyptian within the royal house.

Moses saw injustice and took the life of a slave master

He was banished into the desert.

He found a wife and his true identity.

He encountered God in the burning Bush and responded to His commands.

He returned to free the slaves from Egypt and led them to the promised land.

Moses' Importance

Moses is regarded by Jews as the greatest prophet.

Moses had a special relationship with God like no other.

Moses was the only person to see God face to face.
Moses was a great leader, teacher and the first Rabbi.

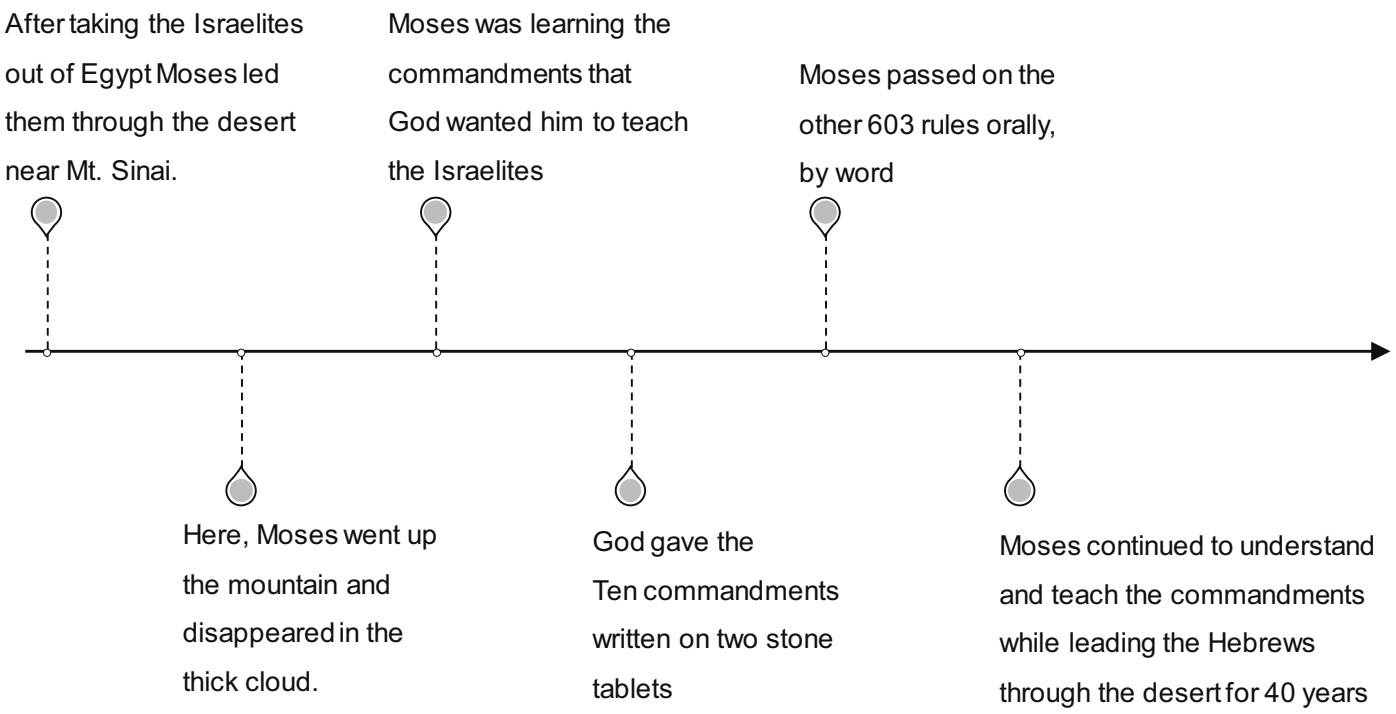
Moses rescued the slaves that were in Egypt through his trust in God.

Moses led the Hebrews through 40 years of wandering the desert.

This events are celebrated each year at Passover and Sukkot

Component 3: Judaism

Mosaic Covenant.



Component 3: Judaism

Ten Commandments.

Ten Commandments

The Ten Commandments are in the Torah in **Exodus**.

They should be kept by every Jew. It doesn't matter if they are young or old, reform or Orthodox

They are central to Jewish belief and practices.

The Ten Commandments were written on two different tablets because they have different concerns.

The first four are referring to humans and God and the next six are to do with relationships between humans.

Component 3: Judaism

Life on Earth

Jewish people emphasise life not death.

Humans should respect their life and live it to the fullest.

It is the way they live their life that they will be judged upon.

The Torah is described as "The tree of life" because it's mitzvot can only be followed in this world.

Like a tree takes root and sprouts, good deeds take root and sprout more good deeds.

After death, the relatives are wished a "long life"

During Jewish celebrations, such as weddings, 'L'Chaim' is said, which means, 'To Life'.

God is the only creator of life and therefore life is sacred. Only he can give and preserve life.

'My God, the soul you placed in me is pure. You created it, you fashioned it, You breathed it into me.

A morning prayer for Jews

'It is the tree of life for those who grasp it, and all who uphold it are blessed.

Proverbs 3

'Whoever destroys a single life is considered as if he had destroyed the whole world, and whoever saves a single life as if he had saved the whole world.

Talmud

Component 3: Judaism

Pikuach Nefesh

Pikuach Nefesh is the setting aside of certain mitzvot in order to save life.

To support life, all but three of the 613 mitzvot can be broken – idolatry, incest and adultery.

Torah is designed to promote life, and the saving of human life is more important than the observance of that law.

In the Talmud God says his people will 'live by' the Torah – as opposed to 'dying by' it.

To preserve a life it is permissible to:
remove organs from a dead body.
travel on the Shabbat
break the fast on Yom Kippur.

God is the only creator of life and therefore life is sacred. Only he can give and preserve life.

'Before I formed you in the womb I knew you... a prophet to the nations I made you. ' **Jeremiah 1:5**

'For You created my veins, You covered me in my mother's womb, I shall thank you, for in an awesome, wonderous way I was fashioned.'

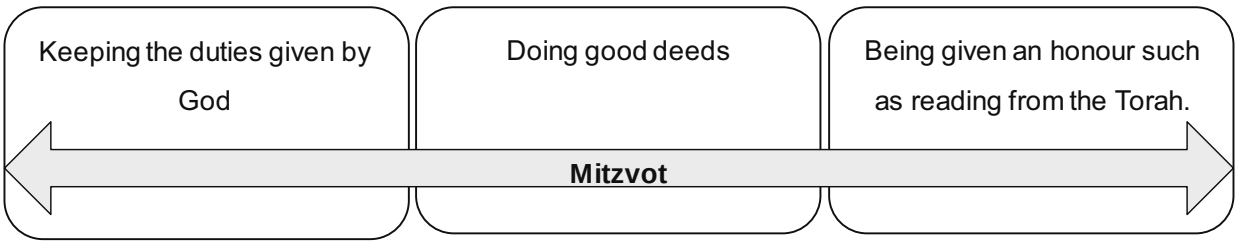
Psalm 139

'God said, "Let us make man in our own image and likeness...He created him, male and female He created them.'

Genesis 1

Component 3: Judaism

Mitzvot



Just as with the Ten commandments, the mitzvot either show how people should relate to God or other people.

Through these types of actions Jews believe they build a relationship with God.

The Torah explains that the purpose of human existence is to build a relationship with God which is attained through mitzvot.

Today it is impossible to keep them all as many were related to the Temple which is now destroyed.

For Orthodox Jews, keeping the mitzvot is an important principle of Judaism.

Reform Jews also try to keep the mitzvot many consider that some are no longer compatible to 21st century living.

Decisions about which to follow are based on personal choice and interpretation.

Component 3: Judaism

Free Will

Free will is the ability to make choices free from external control.

Jews have always discussed how far God intervenes in human lives and events, and how far humans have free will- that is, the ability to make their own choices

The Torah teaches that God has given Jews a choice whether to keep the mitzvot or not.

As humans they were made in the Image of God

They have the mind and soul to help with that choice

Judaism does not teach that people are born sinful

Each individual is born with the inclination to either do good or evil acts

Yetzer ha tov – The inclination or natural urge to do good actions

Yetzer ha ra – The inclination or natural urge to do evil actions

Jews believe it's human choices that make evil

It is not possible to hide acts of evil from God

Each act is considered separately by God on the 10 days of repentance

Any harm done to humans must be forgiven by them before God can forgive

Component 3: Judaism

The Afterlife

"This world is like a lobby before the Olan Ha-Ba. Prepare yourself in the lobby so that you may enter the banquet hall."

Mishnah.

The nature of the afterlife is not frequently considered in Judaism. There are two reasons for this;

1. What is important is **living a good life now** in preparation for the world to come.
2. The ways of God are **not for humans to understand**, so there's no point trying.

The afterlife in Judaism is called Olam Ha- Ba (The world to come).

This term is used to refer to a person's afterlife and also the Messianic Age.

There are many different views about the nature of the world to come but a view shared by all is the focus should be on this life.

Focus on this life includes studying the Torah and observing the mitzvot.

This doesn't earn a better afterlife.

Judaism is not focused on the question of how to get a better afterlife but on how to live now.

There are no specific teachings about the afterlife in the Torah.

There are references to a physical place called Sheol, to which one 'goes down' following this life, but the nature of this place and who goes there is unclear.

This means that many Jewish beliefs on the afterlife are their own interpretations of texts.

Component 3: Judaism

The Afterlife

Resurrection

Most Jewish ideas about the afterlife were developed in post-biblical times. Many have discussed interpretations of passages from the Torah and found different answers.

Some Jews believe:

Olam Ha-Ba would come after the resurrection of the dead.
Olam Ha-Ba refers to a time even beyond the world of the resurrected.
the resurrected will eventually die a second death.

Others believe:

the resurrection will follow the Messianic Age
only the righteous will be resurrected,
everyone will be resurrected and then the day of Judgement will follow

A Few Jews believe

there is no need for a Day of Judgement due to Rosh Hashanah

Component 3: Judaism

The Afterlife

Orthodox Jews

Many believe in some form of resurrection.

This is stated in daily prayers and at funerals

Some prayers refer to the soul being at rest under the wings of Shekinah

Some believe in a resurrection that includes the body as well as the soul

This influences Jewish attitudes to cremation, organ transplant and autopsies

Reform Jews

Most have rejected a belief in resurrection and references have been taken out of prayer books and worship.

Some believe that the memories of people live on through their actions and good deeds

Others believe that the soul lives on after death

Some Jews believe in reincarnation

In some form the soul of the person will take on a different body to live again on earth

Component 3: Judaism

Shabbat in the home

Starts

Shabbat starts a few minutes before sunrise on Friday night.

Ritual

The woman of the family lights two candles to bring the presence of Shabbat into the home. This is a ritual that happens worldwide at the same time.

In many families the father welcomes Shabbat in the Synagogue and when he returns the family share a meal

Family time

A big meal is held on Friday night, prepared the night before.

Meals begin with a blessing over two loaves of bread.

The Kiddush prayer is recited over a cup of wine at the beginning of Shabbat meals. The meal is a time of happiness and relaxation.

Saturday

In the morning the family usually go to the Synagogue.

Orthodox Jews will walk as driving would be considered as work.

Games, activities, reading, discussion and eating will follow

Ritual ending

At sunset on Saturday the family will say goodbye to Shabbat, this is shown through the lighting of the Havdalla candle.

Havdalla means separation and symbolises the distinction between Shabbat and the rest of the week.

Component 3: Judaism

Shabbat in the synagogue

Many attend synagogue services on Shabbat even if they do not do so during the week.

Services are on Shabbat evening, morning and afternoon.

Fixed periods of prayer correspond with the time sacrifices were offered in the Temple.

The Shabbat morning is the longest of the week and can last between 2-3 hours.

It will include such as the Shema, Amidah and Kaddish.

The rabbi may deliver a sermon about the Torah to help us to understand.

After the service a Kiddush is usually held. The special blessing recited over a cup of wine.

Reform Synagogues contains more of the home language and less Hebrew. As well as using music.

Exodus 20

Observing Shabbat means remembering the importance of it as a celebration of creation and also of the freedom of Israelites from slavery in Egypt.

Keeping Shabbat means showing it is holy through worship both in the home and synagogue.

For many Jews observing Shabbat means recognising the types of activities and work that are not allowed, such as creating or destroying.

Shabbat is considered by many Jews as the most important festival. It is seen as a gift from God when weekday worries can be forgotten.

There are many different opinions among Jews regarding what can and cannot be done on Shabbat.

For Orthodox Jews all forms of work must be avoided unless a matter of life and death.

Component 3: Judaism

Worship in the home.

The importance of the family home is greatly valued by many Jews who consider it a sanctuary

It is a place where the values and beliefs of Judaism are learnt and reinforced

In most Jewish homes there will be a **Pushke box** where money is collected to give to the poor.

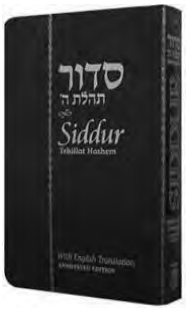
Children add to this to learn to be fulfil Mitzvot as well.

Pushke box

The siddur is an important part of Judaism that guides Jews through daily prayers both in the synagogue and elsewhere.

It begins with the Mode Ani and contains prayers for daily services as well as those for Shabbat. Just as the Torah is considered a gift from God, so the siddur is a gift.

The siddur is considered holy and if it falls it must be picked up and kissed.



The Siddur

Component 3: Judaism

Worship in the home.

Families will have a **Mezuzah** on the front of their house and each room within the house.

Inside, is a scroll and the Shema is written on it.

On the back of the parchment is the word 'Shaddai' this means 'almighty' and this is one of the many names for God.

The mezuzah case is on the right hand side of the door and placed at a slight angle with the top pointing to the room.

Often Jews will touch the case as they pass through the door and kiss their fingers as a reminder that family should live according to the words of the Shema.

For many, the mezuzah symbolises God's protection of the house.

Component 3: Judaism

Prayer.

Prayer is not simply something that happens in the Synagogue once a week but is part of everyday life.

Rabbis teach it is one of the best ways of communicating with God.

It forms a bridge between God and humans.

It is so important that it has a whole area of the Talmud, Berachot, dedicated to it.

Historically there were no special prayers but many set prayers have been established.

Some Jews will pray before performing mitzvot, seeing something unusual, when good or bad things happen, and when going to bed at night.

There are also prayers that are formal and said at the Synagogue.

Types of Prayer

Praising God and his qualities

Requests of God for what God wants not what people want

Thanksgiving for life and his blessings

The Shema is the most important prayer and speaks of the Oneness of God's nature.

The Amidah is the core of every Jewish worship service.

Literally translates to Standing Prayer.

The Modah Ani is the prayer spoken first thing in the morning.

It thanks God for restoring their Soul and granting them life.

Component 3: Judaism

Prayer.

Prayers may be said anywhere in Judaism.
For many though, it is important to join together for communal prayers.

For communal prayer to happen 10 men have to be present. (This is known as a Minyan)

In reform communities, 10 people may form a Minyan
The minyan creates a more spiritual experience than individual prayer.

It is believed that communal prayer is less selfish than individual prayers.

Although each synagogue usually has daily prayers, the main time communities come together is during Shabbat.

Each week the community comes together for Shabbat, this also happens for other key festivals.

The fixed period of prayer times often corresponds with the fixed times of temple sacrifice.

The prayer book, or **siddur,** contains these prayers and the versions for different points of the year.

Some Jews prefer to recite their prayers in Hebrew as they argue this is a holy language that unites all Jews.

Some Jews prefer to pray in their native language as it is more important to know what is being said.

Component 3: Judaism

Prayer.

The Amidah is the core of every Jewish worship service.

It is also referred to as HaTefillah.

Amidah literally means 'standing' and people stand throughout the prayer to show they are in God's presence.

The Amidah consists of 18 blessings and can be divided into three sections, each of which reflects a type of prayer.

The Amidah contains the three types of prayer; Praise to God, Requests of God and Thanksgiving.

The Amidah is recited silently by all members of the congregation or by individuals praying alone- and then aloud by the prayer leader.

The Amidah formally concludes with the recitation of the line,
"May God who brings peace to the universe, bring peace to us and all of the people, Israel, Amen."

This is recited while taking three steps backward, bowing to both sides, and taking three steps forward again.

Component 3: Judaism

Purpose of the Synagogue

The synagogue is the central focus of Jewish life.

In Hebrew it is called **Beth ha Knesset** meaning **house of assembly.**

It has three main purposes.

Beit Tefilah,

A house of prayer

A place where Jews come together for community prayer services.

Jews can pray anywhere, but there are certain prayers that can only be said in the presence of a minyan e.g The Kiddish.

Beit Midrash,

A house of study

Many Jews refer to their synagogue as 'shul' from the Yiddish word for school.

For the observant Jew, the study of sacred texts is a life-long task.

Will have a well-stocked library of sacred Jewish texts for members of the community to study.

It is also the place where children receive their basic religious education.

A Social Hall,

The synagogue often functions as a sort of town hall where matters of importance to the community can be discussed.

An important role of the synagogue is its function as a social welfare agency, collecting and dispensing money and other items for the aid of the poor.

Component 3: Judaism

Features of a Synagogue

There are many different designs of synagogue. Often, they reflect the architecture of the country they are in. Older synagogues are often large whereas modern synagogues are a lot smaller.

Aron Hakodesh (Ark)

The most important place in the synagogue as it is here that the Torah scrolls are kept.

During certain prayers the doors and curtain may be opened or closed.

Opening the ark emphasises the importance of the prayer.

The doors are kept open for Yom Kippur, signifying the opening of the gates of heaven.

Component 3: Judaism

Features of a Synagogue

Torah Scrolls

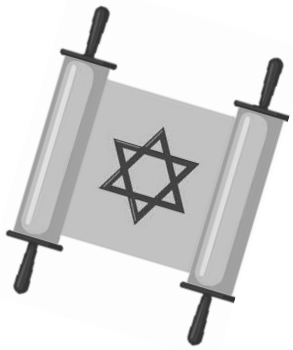
The Torah scrolls are the most sacred part of any synagogue.

They are made from animal skins and are handwritten.

Each scroll is one continuous Torah written in columns.

Each end is stitched to the "Tree of life".

Each scroll is wrapped in silk or velvet when not being used.



Ner Tamid

In front of and slightly above the Aron Hakodesh, is the Ner Tamid.

This is kept continually burning and should not be extinguished.

It symbolises the menorah which was kept burning in the Temple.

Many consider it a reminder of God's eternal presence.

Component 3: Judaism

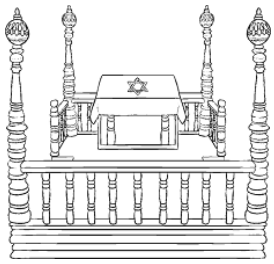
Features of a Synagogue

Bimah

The Bimah is a central platform in the synagogue on which the Torah scrolls are read.

In an Orthodox Synagogue this will be in the middle, so the rabbi faces the congregation.

In Reform synagogues this will be at the front, combined with the Ark.



Seating

Seating of women is one of the main differences for Orthodox and Reform synagogues.

Orthodox Jews will separate the men and women as The Talmud argues that men and women can concentrate more on worship if they are separated.

In Reform synagogues they have no separation between males and females and they may sit together during worship.

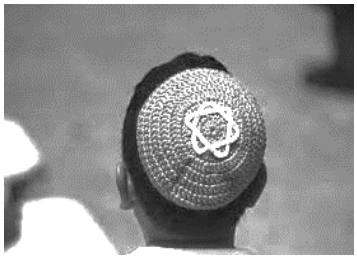
Component 3: Judaism

Items worn for worship

Many Jews consider it a duty to wear special clothing for worship.

There are many views about which items should be worn by whom.

Kippah



The exact meaning of the Kippah is unknown but for most Jews it is a symbol of identity and a sign of respect to God.

Throughout Jewish history the attitude to head covering has varied.

Drawings from the 3rd century depict Jews without hats but in the Middle Ages many wore it during both prayer and study.

There is a variation in views of whether it should be worn all of the time or just during worship.

The shape and size of it differs between communities.

Component 3: Judaism

Items worn for worship

Tallit

The tallit is a four-cornered garment which has fringes attached known as the Tzizit.

The Tzizit relates to the duty in **Numbers** to wear fringes in the corners of clothes.

Originally clothes were worn with fringes at each corner but later the practice was introduced of wearing a garment which had fringes to represent the 613 mitzvot.

There are two types of Tallit;

1. The **tallit gadol** is a large garment made of wool or silk. It is worn across the back and draped over the arms.

It is often called a prayer shawl as it is only worn during prayer and worship.

After death the tallit is sometimes wrapped around the body.

2. The **tallit katan** is a smaller garment.

Many observant Jewish males will wear this under their everyday clothes throughout the day.

Component 3: Judaism

Items worn for worship

Tefillin

Tefillin are worn by Orthodox Jewish males at morning prayer each day.

The Tefillin is made up of two leather boxes.

The tefillah shel rosh is bound to the head with a strap.

In each of its four compartments there is a small handwritten scroll containing the first two paragraphs of the Shema.

The tefillah shel rosh is a reminder that the wearer must serve God with his mind.

The second box is bound to the upper arm and leans towards the heart.

It has one compartment which contains a single scroll of the same passages from the Shema.

It is a reminder that the wearer should serve God with all his heart through acts of compassion. When the Tefillin is in place a special prayer is said.

Component 3: Judaism

Brit Milah

Brit Milah:
The Covenant of cutting

Why?

The Relationship with God is shown through circumcision as it is a representation of the covenant made with Abraham.

During the Brit a prayer is said which shows the importance of the ceremony in a child's relationship with God.

Identity is reinforced through the ceremony.

It is a reminder that the child has entered the covenant. Reform Jews do not think converts need to be circumcised.

What

It is traditional for the child to receive his or her name at the first public gathering after their birth.

Boys are usually named at a ceremony called Brit Milah.

This is a Hebrew term to describe circumcision of boys at eight days old.

The child sits on an empty chair known as the Elijah chair as a reminder that the prophet visits every circumcision.

Today

Brit Malah is a traditional ritual celebrated by most Jewish families.

Liberal and Reform Jews encourage all to be present regardless of gender.

In an Orthodox community only men will attend and a male must perform the circumcision

In the Reform movement women are able to perform the ceremony.

Component 3: Judaism

Bar Mitzvah

What?

At the age of 13 a boy becomes bar mitzvah – he enters Jewish adulthood.

From this time he is able to be part of the minyan.

According to Jewish law, the boy becomes fully responsible for fulfilling the mitzvot and Torah.

In the years before his bar mitzvah ceremony the boy learns Hebrew so he can read a portion from the Torah in the synagogue.

A rabbi teaches him about religious duties and importance of prayer.

How?

Traditionally the Jewish custom has been to mark the occasion with a ceremony.

This includes the boy being called to the bimah to recite from the Torah in Hebrew.

After this the boy recites a statement to thank God.

A boy is then able to wear the tefillin.

Component 3: Judaism

Bat Mitzvah / Bat Chayil

Traditionally girls did not have such large ceremonies because they don't have the same religious duties to fulfil.

Orthodox Jewish girls have a ceremony called bat chayil when they are 12.

Usually this includes a service and the girl giving a presentation of things she has learnt in her study of Judaism.

Reform Jewish girls become bat mitzvah at the age of 12 and can also form part of a minyan.

There are different customs among Reform synagogues but often there is a ceremony at her synagogue during the Shabbat morning.

She may lead prayers and read from the Torah scroll.

The bat mitzvah demonstrates that she is taking on these additional privileges and responsibilities.

Component 3: Judaism

Marriage

Marriage

Marriage is seen as an important religious and spiritual ceremony in Judaism. It allows procreation, fulfilling the duty to '*be fruitful and multiply'* (**Genesis)**. Marriage is considered as God given.

In twenty-first century Britain there are many different types of marriage services for Jews but most will try to include the main features. Differences might occur depending on whether the Jews are Orthodox or Reform or Ashkenazi or Sephardic. There are also differences if it is a same-sex wedding, as allowed in some synagogues.

Component 3: Judaism

Marriage

	Ketubah	This is the marriage contract between the bride and groom
	Intentions	Both parties must have the right intentions
	Down the aisle	The bride will walk down the aisle to meet the rabbi
	Declaration	In front of witnesses a ring is placed on the brides finger
	Under the Chuppah	The Bride and Groom wed under the Chuppah
	Stamping of the glass	At the end of the ceremony a glass is smashed by the groom
	Happiness	In Judaism is considered an important value.
	Index finger	The ring is after placed on the brides index finger on her right hand
	Nisuin	Seven further blessings are said to finalise the marriage.

Component 3: Judaism

Daily LIfe

Daily Life

Tenakh in daily life

For centuries Jews have copied the Torah onto scrolls, studied it and meditated on it. It influences the way they worship, their home and their values.

The Tenakh is made up of the Torah, Neviim and Ketuvim. Although the Neviim and Ketuvim are not seen as having the same authority as The Torah. Jews read and reflect upon the meaning of these stories to their own life. Some of them are used in personal and communal worship. Extracts from the Neviim are read in the synagogue after the Torah readings.

The Talmud is a combination of Mishnah and Gemara;

Mishnah- Oral Torah.

Gemara- This is the commentary on the Mishnah

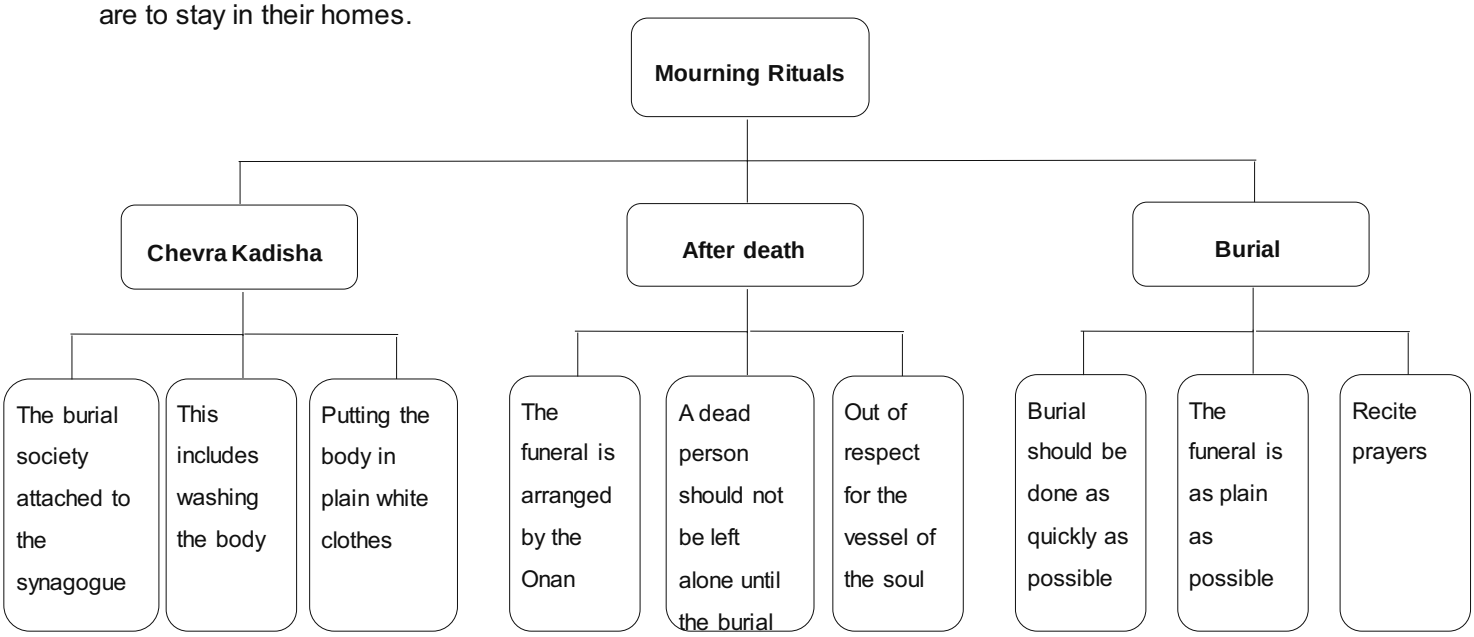
Extracts from the Talmud are used in public and private worship. When extracts of the Torah are unclear then explanations will be found in the Talmud. Today there are many colleges throughout the world where Jews continue to study The Torah and Talmud. These are called yeshiva.

Component 3: Judaism

Mourning Rituals

Mourning Rituals

There is a pattern of rituals that take place when someone has died. At death, if possible a person's last moments should be spent reciting the Shema. The first week of mourning is known as Shiva and mourners are to stay in their homes.



Component 3: Judaism

Kosher

Kosher Food **Laws** are found in the book of **Leviticus.**

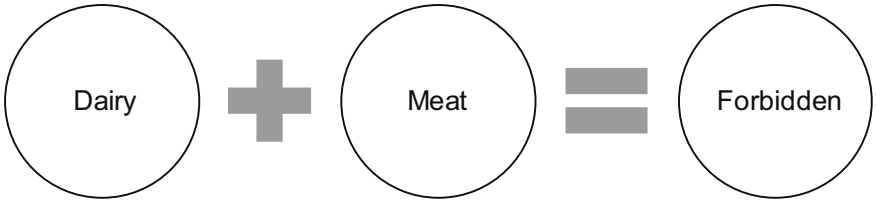
Kosher means something that **is fit or proper** according to Jewish law.

The opposite of Kosher is **trefah**, which is used to describe foods Jews cannot eat.

There are many references about not only what you can and cannot eat but also the way in which food is prepared.

According to Genesis the first humans were vegetarians, it was only after the flood God allowed Noah to eat meat.

"....bring the best of the first fruits of your soil to the house of the Lord your God. Do not cook a young goat in its mother's milk".



Component 3: Judaism

Kosher

A true Cloven Hoof – This is the divided hoof of an animal – sheep, goats, cattle

Chew the Cud– The process of rechewing partly digested foods such as grass to gain the fullness of its nutrients.

Fins and Scales– The parts of a fish that help protect it from predators, and enable it move easily through the waters

Component 3: Judaism

Kosher

Can't eat - Trefah	Can eat
Shellfish	Fish with fins and scales
Fish without Fins and scales	Animals that Chew the Cud and have a true cloven hoof
Animals that **don't** chew the cud or have true cloven hooves	Certain types of insect – according to the law
Many type so f birds, especially birds of prey	All fruit and vegetables
Animals killed incorrectly	Meat totally separately to Dairy
Meat and dairy	Animals killed correctly.

Component 3: Judaism

Rosh Hashanah

What

Rosh Hashanah and Yom Kippur are known as the Days of Awe and both known to be connected to judgement and atonement

God judges people on their deeds for the previous year and notes them down

Why

It is the celebration of the day when God created the world and marks the New Year

Not only does it mark the end of the year but looking at the next ahead

Rosh Hashanah is a happy and serious festival

How

Special fruits such as pomegranates are bought

Evening prayers will address God as a king

At home Kiddush is made and slices of apple dipped in honey are eaten

The challah eaten is a different shape than the one eaten at Shabbat

At the morning service the shofar is blown 100 times to represent the crying of the soul asking to be reunited with God

Jews will recite a special prayer at a running stream or river, known as casting away

Component 3: Judaism

Yom Kippur

What / Why

The holiest day of the year when many people will attend the synagogue, a day to atone for your sins

The end of the 10 days repentance, a day of forgiveness

It is a day of self-denial in 5 areas; food, wearing of perfumes, drink, sex and wearing of leather shoes for 25 hours

How

The day before is a time of preparation

Some Jews take chickens to the poor or give money to charity

Begins at home with a meal before a visit to Synagogue

The table is covered with Jewish books to remind them that it is celebrated with fasting and prayer

Although it is a solemn day, many Jews look forward to it as it gives them a chance to atone for wrongdoings

How

Five prayer services throughout Yom Kippur.

At the heart of each is a confessional prayer to God

The story of Jonah is told to remind Jews about forgiveness

Jews will also remember friends and family who have died as part of a mourning service

After nightfall a single blast of the shofar announces the fast is over

Then customary for children to get ready for the festival of Sukkot

Component 3: Judaism

Sukkot

What

Sukkot begins on the 5th day after Yom Kippur.

It is counted as a mitzvot for Jews.

It is a harvest festival to thank God.

Sukkot lasts for 7 days and no work is permitted on the first and second day

Why

It commemorates the 40 years Israelites were in the desert

All of the parts of us have the potential to sin but should join together to perform the mitzvot.

Sukkot celebrates the journey through the desert on their way to the Promised Land.

How

Jewish families build a Sukkah (a temporary shelter).

Jewish families may live or eat within the Sukkah during the 7 days they should spend as much time as possible in it.

Many families decorate their sukkah with their children's drawings, prayers and explanations of the festival land there is usually a table and chairs.

On each morning except Shabbat, people put the lulav in the right hand and say a blessing to God.

The Lulav and Etrog are waved in six directions front, right, back, left, up and down. This indicates that God's power

Component 3: Judaism

Pesach

This celebrates the Israelites liberation from slavery in Egypt led by Moses.

Prayers are often said for people who are not free.
Many of the Jews remove all grain products from the house during the festival. **Chametz**

Chametz

Some Jews believe that it is a source of pride.
Others say it represents the way sin spreads through a person
Others say it is because when the Jews left Egypt there wasn't time for bread to rise.

Pesach is welcomed into the house by lighting a candle.
Families will go to the Synagogue and then eat a meal together

The Seder meal is a central part of the festival and is eaten on the first two days.
The meal is served with 4 glasses of wine to celebrate; joy, happiness, freedom and one left by an open door to welcome prophet Elijah.

Sedar Meal

It begins with questions by the youngest family members
A lamb bone- symbol of sacrifice
A roasted egg – a symbol of new life
A green vegetable to dip in saltwater – a sign of spring and for tears
Bitter herbs – reflecting on the bitterness of slavery
A thick paste – to represent the mortar of Jewish slaves
Matzahh – to remember the moment when pharaoh finally freed them, they did not time to have fully baked bread.

Component 3: Judaism

Sources of Authority

Sources of Authority

The following pages contain key texts that you can use to:

Support your arguments

Prove a point you are making

Give you wider background on why something happens

Help give context to rituals and festivals.

How to Use

Annotate your texts in class, or following a discussion from class

Turn your source into a flash card with the key points

Practice describe style questions

Create short revision quizzes that cover quotes and meanings.

Component 3: Judaism

Sources of Authority

Genesis 1

God said, 'There shall be light,' and light came into existence. God saw that the light was good, and God divided between the light and the darkness. God named the light 'Day,' and the darkness He named 'Night.' It was evening and it was morning, one day.

Summary of the source

God created out of nothing

God created everything in the universe

God is all powerful as he could create from spoken command

Everything God made was good

Links to the course

Creation

The Nature of God

The value of human life

Key Terms and Phrases

"And God saw that it was good"

"God said let there be light"

Omnipotent

Omniscient

The Goodness of God

Possible Exam Questions

Describe the Nature of God as found in Genesis 2

Describe Jewish beliefs about God's omnipotence

Component 3: Judaism

Sources of Authority

Genesis 1

God said, 'Let us make man with our image and likeness. Let him dominate the fish of the sea, the birds of the sky, the livestock animals, and all the earth - and every land animal that walks the earth' God created man with His image. In the image of God, He created him, male and female He created them. God blessed them. God said to them, 'Be fertile and become many. Fill the land and conquer it. Dominate the fish of the sea, the birds of the sky, and every beast that walks the land.'

Summary of the source

God created all life

Life belongs to God

Humans are made in the Image of God

Humans were given responsibility over creation

God blessed humans

Links to the course

Creation

Stewardship

Sanctity of Life

Marriage

Key Terms and Phrases

Image of God

"Dominate the fish of the sea"

"Be fertile and become many"

Omnibenevolent

Possible Exam Questions

Describe what Genesis teaches about the responsibility to the planet

Describe what Genesis teaches about the role of human beings

Component 3: Judaism

Sources of Authority

The Shema

Hear, O Israel: the LORD our God, the LORD is one. Love the LORD your God with all your heart and with all your soul and with all your strength. These commandments that I give you today are to be on your hearts. Impress them on your children. Talk about them when you sit at home and when you walk along the road, when you lie down and when you get up. Tie them as symbols on your hands and bind them on your foreheads. Write them on the door-frames of your houses and on your gates.

Summary of the source

The daily prayer said morning and night

There is only One God

Teach the importance of God to those you meet

Where the Tefillin when praying

Ensure you have a Mezuzah

Links to the course

The Nature of God

Prayer and worship

Items in the home

Items worn for worship

Key Terms and Phrases

"The Lord is One"

"Tie them as symbols on your hands and bind them on your forehead"

Write them on the door frames of your house

Possible Exam Questions

Describe what the Shema teaches about God

Describe the importance of religious dress

Component 3: Judaism

Sources of Authority

Numbers 15

The Lord said to Moses, 'Speak to the Israelites and say to them: "Throughout the generations to come you are to make tassels on the corners of your garments, with a blue cord on each tassel. You will have these tassels to look at and so you will remember all the commands of the Lord, that you may obey them and not prostitute yourselves by chasing after the lusts of your own hearts and eyes. Then you will remember to obey all my commands and will be consecrated to your God. I am the LORD your God, who brought you out of Egypt to be your God. I am the Lord your God."'

Summary of the source

God gave Moses instructions about prayer

Jewish people are instructed to wear a prayer shawl with tassels on (613) to represent the commandments of God

The tassels remind Jewish people about God and how he delivered them from slavery

Links to the course

Items worn for worship

Prayer

Covenants

Key Terms and Phrases

Tallit (Prayer shawl)

"You will look at the tassels so you will remember the commands"

Possible Exam Questions

Describe Moses' instructions about prayer

Describe the purpose of the Tallit

Component 3: Judaism

Sources of Authority

Exodus 20

God spoke all these words, saying, I am God your Lord, who brought you out of Egypt, from the place of slavery.

Do not have any other gods before Me.

Do not represent such gods by any carved statue or picture of anything in the heaven above, on the earth below, or in the water below the land. Do not bow down to or worship them. I am God your Lord, a God who demands exclusive worship...

Do not take the name of God your Lord in vain. God will not allow the one who takes His name in vain to go unpunished.

Remember the Sabbath to keep it holy. You can work during the six weekdays and do all your tasks. But Saturday is the Sabbath to God your Lord. Do not do anything that constitutes work... God therefore blessed the Sabbath day and made it holy.

Honour your father and mother. You will then live long on the land that God your Lord is giving you.

Do not commit murder.

Do not commit adultery.

Do not steal.

Do not testify as a false witness against your neighbour.

Do not be envious of your neighbour's house.

Do not be envious of your neighbour's wife.

Component 3: Judaism

Sources of Authority

Summary of the source

God gave the 10 Commandments to the Hebrew people

God is One

4 of the commandments are about the love of God

6 are about the love of neighbour

God will punish those who go against His commandments

God rewards those who follow his commandments

Links to the course

Moses

Covenant

God as lawgiver and judge

God as One

Key Terms and Phrases

Law giver and judge

"I am God your Lord, a God who demands exclusive worship"

"I keep in mind the sin of the fathers for descendants"

"Keep My commandments, I show love for thousands"

Possible Exam Questions

Describe the belief of God as a law giver and judge

Describe the Jewish beliefs about God as One

Component 3: Judaism

Sources of Authority

Genesis

God said to Abram, 'Go away from your land, from your birthplace, and from your father's house, to the land that I will show you. I will make you into a great nation. I will bless you and make you great. You shall become a blessing. I will bless those who bless you, and he who curses you, I will curse. All the families of the earth will be blessed through you.'

Summary of the source

God made a conditional covenant with Abraham
God told Abraham to leave to go to another land and he will then give that Land to him
God blessed Abraham and those who followed him

Links to the course

Covenant
Abraham
Promised Land
Messiah

Key Terms and Phrases

Covenant
Land
Blessings

Possible Exam Questions

Describe the Abrahamic covenant
Describe God as Judge

Component 3: Judaism

Sources of Authority

Genesis 17

I will increase your numbers very, very much, and I will make you into nations - kings will be your descendants. I will sustain My covenant between Me and between you and your descendants after you throughout their generations, an eternal covenant; I will be a God to you and to your offspring after you. To you and your offspring I will give the land where you are now living as a foreigner. The whole land of Canaan shall be your eternal heritage.

Summary of the source

God made a conditional covenant with Abraham
God promised Abraham descendants
God made Abraham the 'Father of the Jewish people'
He promises land to Abraham's descendants

Links to the course

Covenant
Abraham
Promised Land
Messiah

Key Terms and Phrases

Descendants
"I will increase your numbers very, very much"
"I will sustain My covenant between Me and between you and your descendants"

Possible Exam Questions

Describe the teaching about descendants from the Abrahamic covenant
Describe the belief about the Promised Land

Component 3: Judaism

Sources of Authority

Genesis 17

You shall be circumcised through the flesh of your foreskin. This shall be the mark of the covenant between Me and you. 'Throughout all generations, every male shall be circumcised when he is eight days old. [This shall include] those born in your house, as well as slaves bought with cash from an outsider, who is not your descendant. All slaves, both houseborn and purchased with your money must be circumcised. This shall be My covenant in your flesh, an eternal covenant. The uncircumcised male whose foreskin has not been circumcised, shall have his soul cut off from his people; he has broken My covenant.

Summary of the source

God instructed the Jewish people to be circumcised as a permanent mark of the covenant

Circumcision should happen at 8 days old

Those who convert to Judaism must also be circumcised

Links to the course

Covenant

Abraham

Brit Milah

Rituals

Key Terms and Phrases

Circumcision

Brit Milah

"This shall be the mark of the covenant between Me and you."

Possible Exam Questions

Describe the link between Brit Milah and the Abrahamic covenant

Describe two parts of the Abrahamic covenant

Component 3: Judaism

Sources of Authority

Exodus 3

'Who am I that I should go to Pharaoh?' said Moses to God. 'And how can I possibly get the Israelites out of Egypt?' 'Because I will be with you,' replied God. 'Proof that I have sent you will come when you get the people out of Egypt. All of you will then become God's servants on this mountain.' Moses said to God, 'So I will go to the Israelites and say, 'Your fathers' God sent me to you.' They will immediately ask me what His name is. What shall I say to them?' 'I Will Be Who I Will Be,' replied God to Moses. God then explained, 'This is what you must say to the Israelites: 'I Will Be sent me to you.' God then said to Moses, 'You must [then] say to the Israelites, ' the God of your fathers, the God of Abraham, Isaac and Jacob, sent me to you.' This is My eternal name, and this is how I am to be recalled for all generations

Summary of the source

God asks Moses to free the Hebrew people

God asks Moses to trust him

Links to the course

Covenant

Moses

Key Terms and Phrases

Moses

Israelites

God of Abraham

Possible Exam Questions

Describe the Mosaic covenant

Describe how Moses showed faith in God

Component 3: Judaism

Sources of Authority

The Talmud

….because the possibility of danger to human life renders inoperative the laws of the Sabbath.

Our Rabbis taught: One must remove debris to save a life on the Sabbath, and the more eager one is, the more praiseworthy is one; and one need not obtain permission from the Beth din.

How so? If one saw a child falling into the sea, he spreads a net and brings it up — the faster the better, and he need not obtain permission from the Beth din though he thereby catches fish.

If he saw a child fall into a pit, he breaks loose one segment of the entrenchment and pulls it up — the faster the better; and he need not obtain permission of the Beth din, even though he is thereby making a step stairs.

If he saw a door closing upon an infant, he may break it, so as to get the child out — the faster the better; and he need not obtain permission from the Beth din, though he thereby consciously makes chips of wood.

One may extinguish and isolate the fire in the case of a conflagration — the sooner the better, and he need not obtain permission from the Beth din, even though he subdues the flames

Component 3: Judaism

Sources of Authority

Summary of the source

It is okay to break the rules of Shabbat in order to protect life

You do not need permission to save a life on Shabbat

Those who save a life on Shabbat are praiseworthy

Links to the course

Shabbat

Sanctity of Life

Image of God

Key Terms and Phrases

Pikuach Nefesh

Beth Din

Preservation of life

"The more praiseworthy is one"

Possible Exam Questions

Describe Jewish beliefs about the sanctity of Life

Describe Jewish beliefs about preservation of life during Shabbat

Component 3: Judaism

Sources of Authority

Psalm 139

For You created my veins, You covered me in my mother's womb. I shall thank You for in an awesome, wondrous way I was fashioned; Your works are wondrous, and my soul knows it very well. My essence was not hidden from You, when I was made in secret, I was formed in the lowest parts of the earth.

Summary of the source

God created all human life

God has a plan for each person

Human life is special

Human life belongs to God

Links to the course

The value of life

Preservation of Life

Pikuach Nefesh

Creation

Key Terms and Phrases

Sanctity of Life

Imago Dei

Pikuach Nefesh

Possible Exam Questions

Describe Jewish beliefs on the importance of life

Describe what Psalm 139 says about the importance of life

Component 3: Judaism

Sources of Authority

Jeremiah 1

When I had not yet formed you in the womb, I knew you, and when you had not yet emerged from the womb, I had appointed you; a prophet to the nations I made you

Summary of the source

God created all human life

God has a plan for each person

Human life is special

Human life belongs to God

Links to the course

The value of life

Preservation of Life

Pikuach Nefesh

Creation

Key Terms and Phrases

Sanctity of Life

Imago Dei

Pikuach Nefesh

Possible Exam Questions

How does Jeremiah 1 show the value of human life?

Describe the belief that human life belongs to God

Component 3: Judaism

Sources of Authority

Exodus 20

Remember the Sabbath to keep it holy. You can work during the six weekdays and do all your tasks. But Saturday is the Sabbath to God your Lord. Do not do anything that constitutes work. This includes you, your son, your daughter, your slave, your maid, your animal, and the foreigner in your gates.

Summary of the source

God instructed Jewish people to keep the Sabbath day Holy in the Ten Commandments

Jewish people are unable to do any work on the Sabbath Day and must not instruct others to work

Links to the course

Shabbat

Ten Commandments

God as a Lawgiver

Key Terms and Phrases

Sabbath Day

Holy

"Remember the Sabbath Day and keep it holy"

"Do not do anything that constitutes work"

Possible Exam Questions

Describe the Jewish beliefs about Shabbat

Describe the link between God as a Lawgiver and Shabbat

Component 3: Judaism

Sources of Authority

Exodus 20

Do not represent such gods by any carved statue or picture of anything in the heaven above, on the earth below, or in the water below the land. Do not bow down to such gods or worship them. I am God your Lord, a God who demands exclusive worship. Where My enemies are concerned, I keep in mind the sin of the fathers for their descendants, to the third and fourth generation.

Summary of the source

Judaism is a monotheistic religion

There is only one God

God states in the Ten Commandments that it is wrong to worship false idols

Idolatry is a sin

God will punish you if you go against His laws

Links to the course

God as One

God as Law giver

Ten Commandments

Key Terms and Phrases

Idolatry

Ten Commandments

"God who demands exclusive worship"

Possible Exam Questions

Describe the Jewish belief about idolatry

Describe how the commandments link to God as a Lawgiver

Component 3: Judaism

Sources of Authority

Genesis 2

A man shall therefore leave his father and mother and be united with his wife, and they shall become one flesh.

Summary of the source

Men and women are supposed to get married

The role of a married man and woman is to procreate

Links to the course

Marriage

Abortion

Life on Earth

Key Terms and Phrases

"Become one flesh"

Procreate

Marriage

Possible Exam Questions

Describe what Genesis 1 teaches about marriage

Describe the purpose of marriage

Component 3: Judaism

Sources of Authority

Leviticus 11: 1-23

Among mammals, you may eat any one that has true hooves that are cloven and that brings up its cud. You may eat any creature that lives in the water, whether in seas or rivers, as long as it has fins and scales.

Summary of the source

Jewish people are only permitted to eat what it states in Genesis

Jewish people can only eat mammals who have a cloven hoof and chew the cud

Fish can only be eaten if they have fins and scales

Links to the course

Kosher

Jewish practices

Law

Mitzvot

Key Terms and Phrases

Kosher

Trefah

Kashrut

Possible Exam Questions

Describe Jewish beliefs about Kosher food

Describe the animals that Leviticus states are Kosher

Component 3: Judaism

Sources of Authority

Exodus 12 - Passover

This day must be one that you will remember. You must keep it as a festival to God for all generations. It is a law for all time that you must celebrate it.

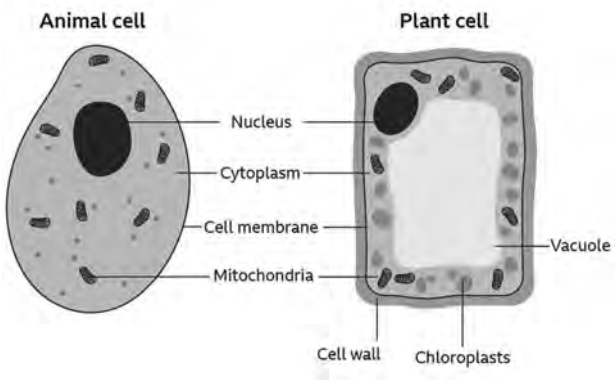
Summary of the source	Links to the course
God commanded that the Jewish people should celebrate the Passover It is part of the 613 mitzvot	Festivals Covenant with Moses

Key Terms and Phrases	Possible Exam Questions
Passover Pesach Festivals	Describe what God instructed about Passover Describe the link between Passover and Exodus

Year 9 Biology

1. Cells
2. Organisation of cells
3. Eukaryotic and prokaryotic cells
4. Animal specialised cells
5. Plant specialised cells
6. Nucleus
7. Stem cells and microscopes
8. Transport in and out of cells – diffusion
9. Levels of organisation
10. Organisation of cells in the digestive system 1
11. Enzymes in the digestive system
12. Organisation of cells in the breathing system
13. Organisation of cells in the circulatory system 1
14. Organisation of cells in the circulatory system 2
15. Cross section of leaf
16. Organisation of cells in plants
17. Coronary heart disease
18. Cell cycle: Mitosis
19. Cell cycle: Mitosis and cancer
20. Communicable disease: pathogens
21. Communicable disease: viruses
22. Communicable disease: bacteria, fungi and protists
23. Required Practicals 1: Microscopy & food tests
24. Required practical 2: Enzymes

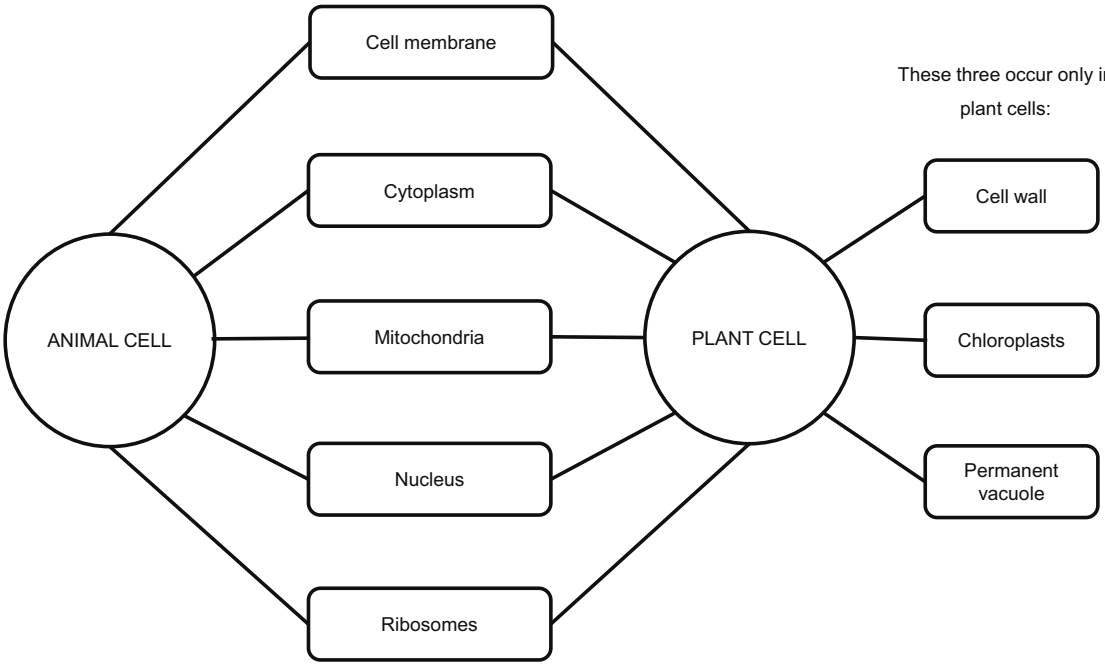
1. Cells



Both animal and plant cells contain a nucleus, cytoplasm, cell membrane, mitochondria and ribosomes. Plant cells also contain a cell wall, chloroplasts, and a permanent vacuole.

Cell organelle	Description
Cell membrane	Controls what enters and leaves the cell.
Cell wall	Made of cellulose, to strengthen the cell.
Chloroplast	The site of photosynthesis.
Cytoplasm	The site of chemical reactions.
Mitochondria	To release energy during respiration.
Nucleus	Contains **chromosomes** made of DNA molecules. Each chromosome carries a large number of genes.
Permanent vacuole	Filled with cell sap (a weak solution of sugars and salts).
Ribosomes	The site of protein synthesis (where proteins are made).

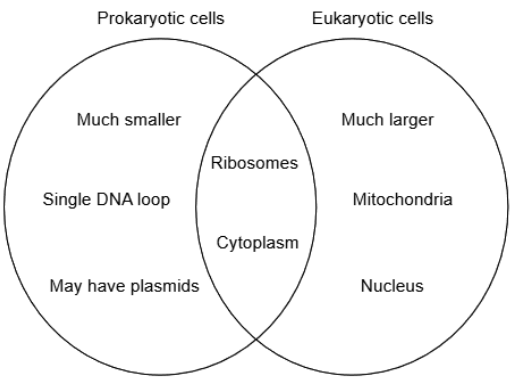
2. Organisation of Cells

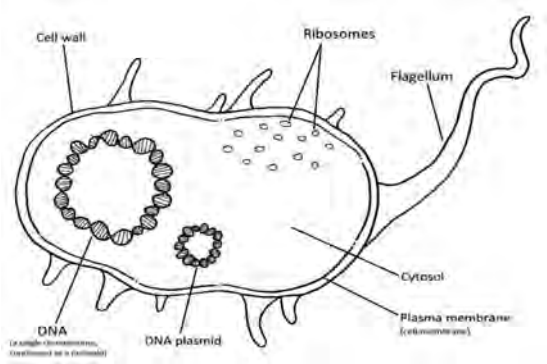


3. Eukaryotic and prokaryotic cells

Eukaryotic cells contain a nucleus.
Plant cells and animal cells are eukaryotic.

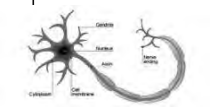
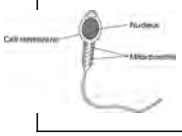
Prokaryotic cells (bacteria) are much smaller than eukaryotic cells.
They do not have a nucleus.
They do not have mitochondria but do have ribosomes.
They have a single DNA loop and may also have small rings of DNA called plasmids.



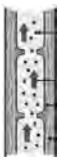


1000nm (nanometres) = 1μm
1000μm (micrometres) = 1mm
1000mm (millimetre) = 1m
10mm = 1cm (centimetre)

4. Animal Specialised Cells

Type of specialised cell	Function	Adaptations
Nerve cell 	Carry electrical impulses around the body	Lots of dendrites to make connections to other cells A very long axon that carries the electrical impulse from one place to another Contain lots of mitochondria to provide the energy needed to make special transmitter molecules, to carry impulses across gaps (synapses) between one nerve cell and the next
Muscle cells 	Contract and relax to allow movement	Contain special fibres that can slide over one another to allow the muscle to contract and relax Contain lots of mitochondria to provide energy for contraction Store glycogen which can be converted into glucose for respiration
Sperm cells 	Fertilise an egg cell	A tail for movement Middle section full of mitochondria to provide energy for tail to move Digestive enzymes in acrosome to digest a pathway into the egg A large nucleus containing half the genetic information needed to make an organism

5. Plant Specialised Cells

Specialised cell	Function	Adaptations
Root hair cell 	Absorb water and mineral ions	Large surface area available for water to move into cell by osmosis Large permanent vacuole that speeds up osmosis Lots of mitochondria that carry out respiration to provide the energy needed for active transport of mineral ions
Xylem cells 	Transport water and mineral ions from the roots to the highest leaves and shoots - always upwards.	When first formed xylem cells are alive but due to build-up of lignin the cells die and form long hollow tubes (vessels). The lignin makes the xylem vessels very strong and helps them withstand the pressure of water moving up the plant.
Phloem cells 	Transport sugars up and down the plant	End walls between cells break down to form sieve plates that allow water carrying dissolved sugars to move up and down the phloem. Neighbouring companion cells are packed with mitochondria to provide their energy needs.

6. Nucleus

Nucleus is found in animal and plant cells. → Chromosomes in the **nucleus** are made of DNA molecules. → **Chromosomes** are long strands of DNA that have been tightly wound together. → A **gene** is a section of DNA that codes for a protein. Proteins make up all parts of our cells

The nucleus contains **chromosomes** made of DNA molecules.
Each chromosome carries a large number of genes.

Gametes (sperm and egg cells) only have 1 set of chromosomes, so they have 23 chromosomes.

When human gametes come together in fertilisation, they form a zygote (fertilised egg cell) with 23 pairs of chromosomes (46 chromosomes).
Human body cells contain 23 pairs of chromosomes.

Biological structures in size order

Smallest
Gene
Chromosome
Nucleus
Cell
Tissue
Largest
Organ

7. Stem Cells and Microscopes

Use the EVERY model to complete calculations:
E = equation
V = values
E = enter results
R = result
Y = units

Magnification = size of image / size of real object

Magnification increases the size of the image.
Resolution increases the detail of the image.

Electron microscopes have higher magnification and higher resolution than **light microscopes.**

They have allowed scientists to study cells in much finer detail.

They have increased our understanding of sub-cellular structures such as mitochondria.

Type	Description
Adult stem cells	Adult cells which can form many types of cells, including blood cells.
Embryonic stem cells	Stem cells from embryos which divide and differentiate into specialised cells.
Differentiation	Specialisation of cells
Stem cells	Undifferentiated cells, capable of dividing to make lots of cells, and of differentiating to form specialised cells.
Meristem tissue	Tissue made up of stem cells in plants. It can differentiate into any type of plant cell, throughout the plant's life. Can be used to produce plant clones quickly and economically. Can be used to clone rare species. Can be used to clone plants with useful features, e.g. disease resistance.
Therapeutic cloning	Scientists can use embryo stem cells to make different types of human cells. The cells are not rejected by the patient's body, but some people have ethical or religious concerns.

8. Transport in and out of cells - diffusion

Diffusion: The overall movement of particles from high concentration to low concentration – they spread out.

Examples

Oxygen and carbon dioxide diffuse in and out of cells in **gas exchange.**

Urea moves out of cells into the blood plasma. It is a waste product. It goes to the kidney to be excreted.

Factors that affect the rate of diffusion

- The bigger the difference in concentrations, the faster diffusion is.
- The higher the temperature, the faster diffusion is.
- The bigger the surface area of the membrane, the faster diffusion is.

Diffusion and single celled organisms

Single celled organisms have a large surface area compared with their volume.

Diffusion is enough to get them all the molecules that they need.

Diffusion and larger organisms

Larger organisms have a small surface area compared to their volume.

They need exchange surfaces and transport systems to allow them to absorb enough oxygen and move it around the body.

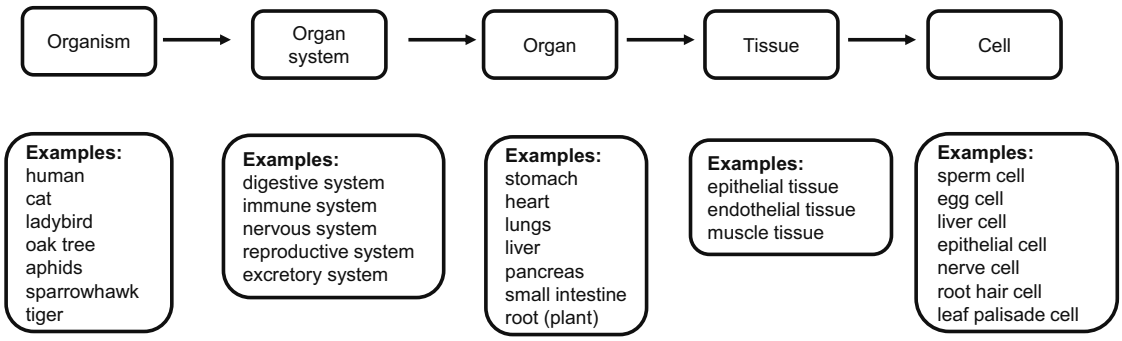
Exchange surfaces in plants have:

1. a large surface area.
2. thin membranes, to provide a short diffusion path.

Exchange surfaces in animals have:

1. a large surface area
2. thin membranes, to provide a short diffusion path.
3. a good blood supply
4. good ventilation (they breathe)

9. Levels of organisation



Basics of organisation

Cells are the building blocks of all organisms.

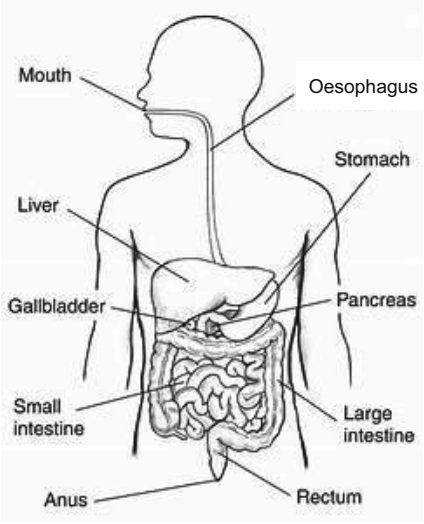
A tissue is a group of cells with a similar structure and function.

An organ is a group of tissues performing similar functions.

An organ system is a group of organs, which work together to perform a particular function.

10. Organisation of cells in the digestive system

The **human digestive system** is an example of an organ system in which several organs work together to digest and absorb food.

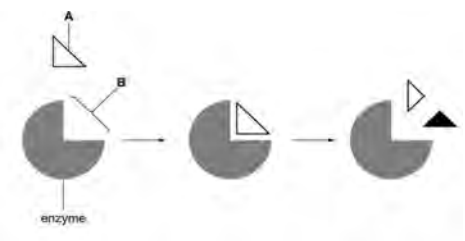


Organ	Function
Mouth	First stage of digestion, teeth break up food with mechanical digestion and salivary amylase breaks down food in chemical digestion.
Oesophagus	Transports food from the mouth to the stomach.
Stomach	Churns food and adds acid.
Small intestine	Adds digestive enzymes (amylase, lipase, and protease) and absorbs nutrients from the food.
Large intestine	Absorbs water, producing waste.
Rectum	Stores waste.
Anus	Waste passes out of the anus.
Liver	Produces bile. Bile neutralises stomach acid and emulsifies fats. Food does not pass through here.
Gall bladder	Stores bile which has been produced in the liver. Food does not pass through here.
Pancreas	Produces digestive enzymes: amylase, lipase, and protease. Food does not pass through here.

11. Enzymes in the digestive system

Digestive enzymes break down food into small soluble molecules that can be absorbed into the blood stream.

Digestive Enzyme	Produced by	Converts…	Into…
Amylase (carbohydrase)	Mouth, small intestine, pancreas	Starch (carbohydrates)	Sugar
Lipase	Small intestine, pancreas	Lipid (fat)	Glycerol + fatty acid
Protease	Stomach, small intestine, pancreas	Protein	Amino acids



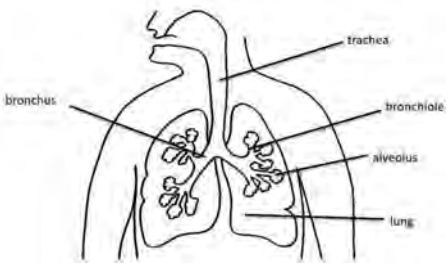
Enzymes are **specific.**
They have a specific shape (**the active site**) which works on a specific substrate – like a lock and key.

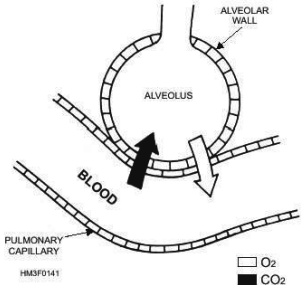
If the active site changes shape, it no longer works.
Changes in pH and temperature can **denature** – change the shape of the active site - so that it no longer works.

The products of digestion are used to build new carbohydrates, lipids and proteins.
Glucose can also be respired.

Bile is made in the liver and is stored in the gall bladder.
It is alkaline and neutralises the hydrochloric acid from the stomach.
It emulsifies fat to form small droplets, increasing the surface area. This makes fat digestion quicker.

12. The breathing system





Air enters the body through the **mouth** and **nose**.

⇩

Air enters the **trachea**.

⇩

The trachea divides into two **bronchi**. One **bronchus** enters each lung.

⇩

Each bronchus branches out into smaller tubes called **bronchioles**. Air travels through these bronchioles.

⇩

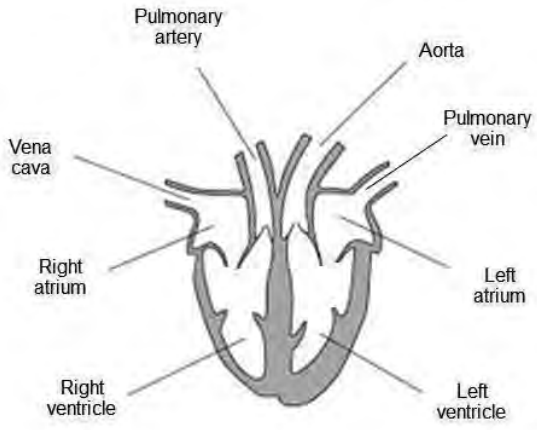
At the end of the bronchioles, the air enters one of the many millions of **alveoli** where gaseous exchange takes place

The lungs provide a good exchange surface for oxygen:

1. **Large surface area** provided by alveoli.
2. **Thin walls** of alveoli (one cell thick) and blood supply (capillary), providing a short diffusion distance.
3. **Good blood supply** to transport the oxygen away from the lungs.
4. **Well ventilated** to supply more oxygen.

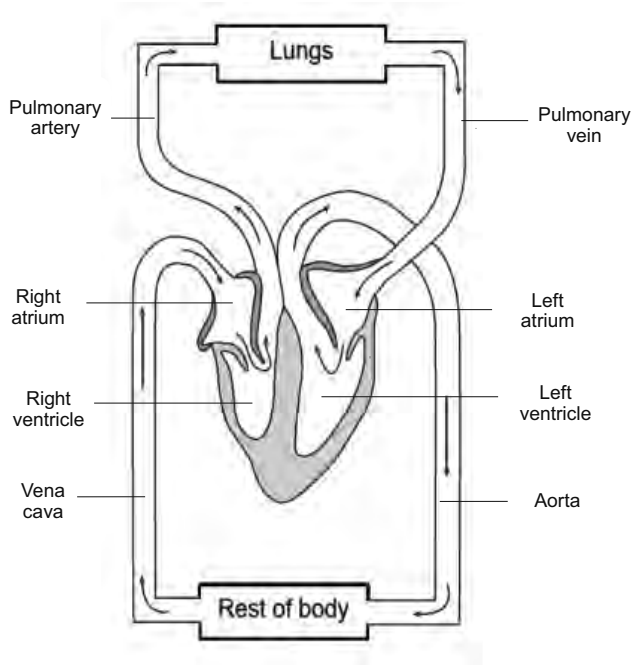
13. Organisation of cells in the circulatory system 1

The heart is an **organ**.
The function of the heart is to pump blood around the body.
Humans have a **double circulatory system**, which means that blood must pass through the heart **twice** to complete a full circuit of the body.



Organ	Function
Heart	Organ that pumps blood around the body in a double circulatory system.
Vena cava	Vein which brings blood from the body to the right atrium of the heart.
Right ventricle	Chamber which pumps blood to the lungs where gas exchange takes place.
Pulmonary artery	Artery takes blood from the right ventricle to the lungs.
Left ventricle	Chamber which pumps blood around the rest of the body
Pulmonary vein	Vein which brings blood from the lungs to the left atrium of the heart.
Aorta	The aorta takes blood from the left ventricle to the body.
Pacemaker	In the wall of the right atrium, controls heart rate.

14. Organisation of cells in the circulatory system 2

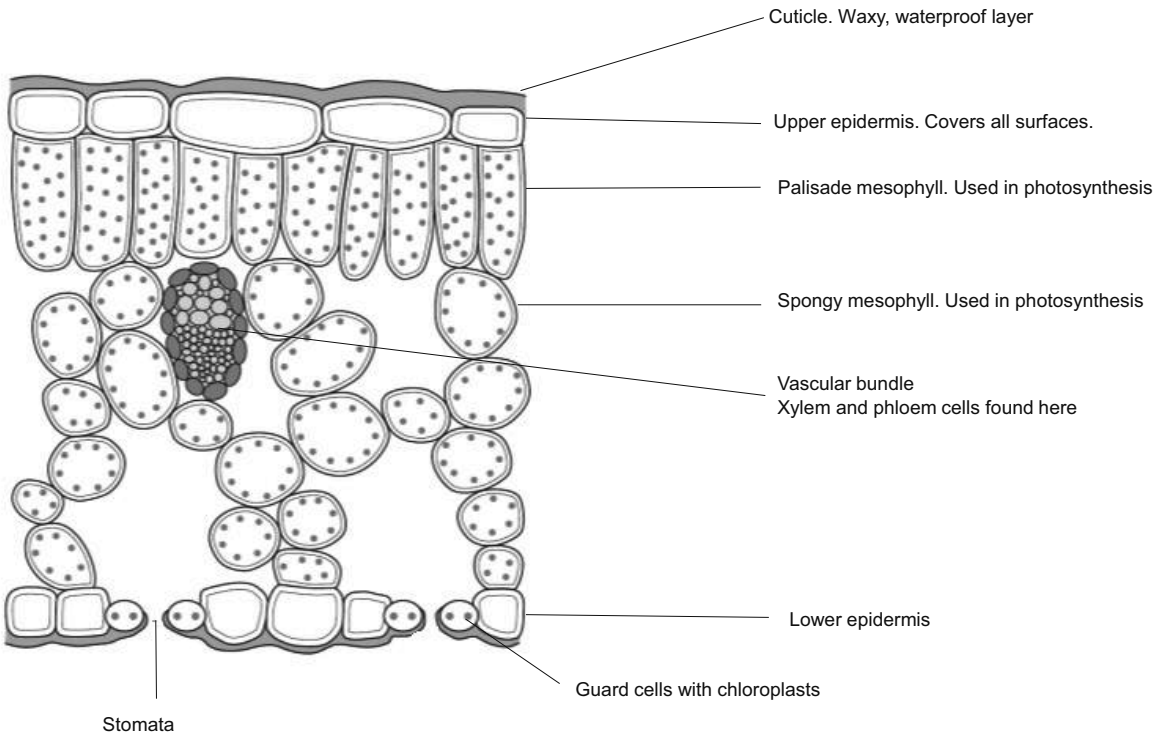


The blood is a tissue.

Blood component	Role
Plasma	Solution in which cells are suspended; carries dissolved food and hormones around the body
Red blood cells	Carry oxygen
White blood cells	Involved in immune response to fight pathogens
Platelets	Involved in blood clotting

Blood vessel	Role	Description
Artery	Carry blood away from heart	Walls contain lots of strong elastic tissue to withstand pressure
Capillary	Allow substances to diffuse into and out of the blood	Walls are one cell thick and include small holes to allow substances to move in and out easily
Vein	Carry blood to the heart	Have valves to keep blood flowing in one direction only

15. Cross section of a leaf



16. Organisation of cells in plants

Water is absorbed (by osmosis) by **root hair cells** that have a large surface area.
The root hair cells also absorb mineral ions (by active transport).

Xylem Cells

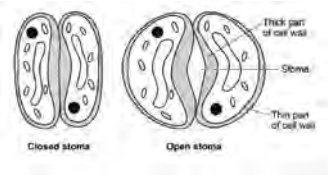
Transports **water and mineral ions** from the roots to the stems and leaves.
Made of hollow tubes, strengthened by lignin.

Transpiration is the transport of water and minerals up the xylem of a plant, and the evaporation of water through the stomata.
Transpiration is increased by
•Increased temperature
•Increased air movement
•Increased light intensity
•Decreased humidity

Phloem Cells

Translocation is the transport of sugars in the phloem, to all parts of the plant.
The leaves make sugars through photosynthesis.
The **phloem** transports dissolved sugars from the leaves to the rest of the plant for respiration or for storage of starch.
Phloem is made of tubes of elongated cells.
Cell sap (dissolved sugars) moves from one phloem cell to the next through pores in the end walls.

Stomata and Guard Cells



The **stomata** (small holes in the underside of the leaf) are needed for gas exchange in the leaf.
Water is also lost to the surroundings through the stomata.
To reduce water loss, **guard cells** can change the size of the stomata.

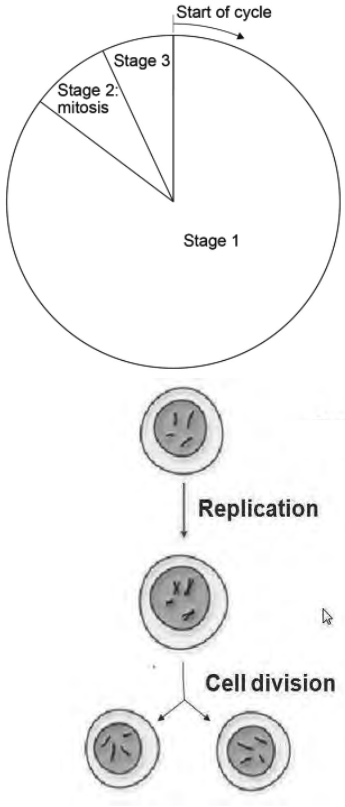
17. Coronary Heart Disease

Term	Definition
Disease	dis-ease (not at ease; something in our body or mind is not working correctly)
Coronary Heart Disease	a non-communicable disease (you can't catch it)
Coronary arteries	supply the heart muscle with oxygen and glucose
Coronary heart disease	The coronary arteries have layers of fatty material building up in them. They get narrower. Less blood can flow through the coronary arteries, so the heart muscle lacks oxygen.

Treatment	Description
Statins	Tablets used to reduce blood cholesterol. They slow down the rate of fatty material build up.
Stents	Used to keep the coronary arteries open.
Heart valve replacement	Valves keep blood flowing through the heart in the right direction. Sometimes the valves don't open fully or become leaky. This prevents blood flowing through the heart properly. The patient becomes out of breath and lacks energy. Faulty heart valves can be replaced with new biological valves (from a donor) or mechanical valves.
Heart failure	Can be treated with a new heart and lungs. The heart would come from a donor. Mechanical hearts can be used to keep the patient alive whilst waiting for a heart transplant.

18. Cell Cycle: Mitosis

Stage of the cell cycle	Events
1	The cell grows. The DNA replicates to form two copies of each chromosome. New mitochondria and ribosomes are made.
2	**Mitosis**: one set of chromosomes is pulled to each end of the cell. The nucleus divides.
3	The cytoplasm and cell membranes divide. There are now two identical cells.



Uses of cell division by mitosis

1. Growth
2. Repair of tissues
3. Asexual reproduction

19. Cell Cycle: Mitosis and Cancer

Stage of the cell cycle	Events
1	The cell grows. The DNA replicates to form two copies of each chromosome. New mitochondria and ribosomes are made.
2	Mitosis: one set of chromosomes is pulled to each end of the cell. The nucleus divides.
3	The cytoplasm and cell membranes divide. There are now two identical cells.

Uses of cell division by mitosis

1. Growth
2. Repair of tissues
3. Asexual reproduction

Cancer is the result of uncontrolled growth and division of cells. This is caused by a change in the genetic material of the cell.

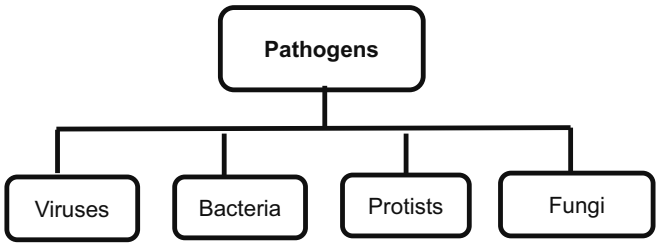
Benign tumours are growths of abnormal cells.
They are contained in one area, usually within a membrane. They do not invade other parts of the body.

Malignant tumour cells are cancers.
They invade neighbouring tissues and spread around the body in the blood, where they form secondary tumours.
Lifestyle factors and genetic factors can be risk factors for cancers.

20. Communicable diseases: pathogens

Communicable diseases are diseases caused by pathogens – they can spread from one organism to another.

Pathogens are organisms that cause infectious disease.
They can be viruses, bacteria, protists or fungi.
Pathogens may infect plants or animals.
Pathogens can spread by direct contact, water or by air.



Bacteria reproduce rapidly inside the body.
Bacteria produce poisons/toxins that damage tissues and make us feel ill.

Viruses reproduce rapidly inside the body.
Viruses live and reproduce inside cells, causing cell damage.

21. Communicable diseases: viruses

Pathogen	Disease	Transmission	Symptoms	Treatment or prevention
Virus	Measles	Sneezing and coughing produces droplets containing the virus; these droplets can be inhaled by others.	Fever and red skin rash. It can be fatal if there are complications.	Most young children are vaccinated against measles.
Virus	HIV/AIDs	Sexual contact or exchange of body fluids such as blood.	Flu-like illness, which then attacks the body's immune cells. Late stage HIV, known as AIDS, happens when the immune system is so damaged that it cannot deal with infections or cancers	treated with antiretroviral drugs.
Virus	Tobacco mosaic virus (TMV)	By direct contact	A distinctive mosaic pattern of discoloration on the leaves. The leaves can't photosynthesise as well, which affects the growth of the plant.	Remove infected plants; wash hands when handling plants to prevent transfer from one to another

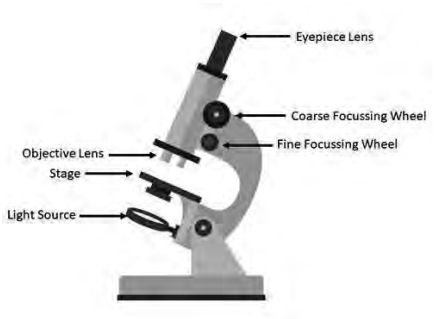
22. Communicable diseases: bacteria, fungi and protists

Pathogen	Disease	Transmission	Symptoms	Treatment or prevention
Bacterium	Salmonella (food poisoning)	Undercooked chicken, or contamination of surfaces from raw chicken	Fever, abdominal cramps, vomiting and diarrhoea, caused by the bacteria and the toxins from the bacteria.	Poultry (chicken, turkey and ducks) are vaccinated against salmonella to control the spread
Bacterium	Gonorrhoea	sexually transmitted disease	Thick yellow or green discharge from the vagina or penis; as well as pain when urinating.	Antibiotics, although there are many resistant strains. Barrier methods of contraception can reduce the spread.
Fungus	Rose black spot	by wind or water	Purple or black spots develop on leaves. The leaves turn yellow and drop off. The leaves don't photosynthesise well, which affects the growth of the plant.	Fungicides and removing and destroying the affected leaves.
Protist	Malaria	Spread by mosquito bites.	Recurrent (repeating) episodes of fever. It can be fatal.	Prevented by stopping mosquitos from breeding, and by avoiding being bitten e.g. with a mosquito net.

23. Required Practicals 1 – Microscopy and Food Tests

Using a Microscope

1. Light on
2. Platform (stage) high
3. Lowest magnification objective lens first
4. Coarse focus first, then fine focus



Rules for Biological Drawings

- Sharp pencil
- Smooth lines
- Ruler for label lines
- No arrowheads
- Add magnification (multiply eyepiece lens by objective lens)

Food tests

Food	Test	Positive result
Starch	add iodine solution	turns black
Sugars	add Benedict's solution → heat	makes (orange) precipitate
Protein	add Biuret solution	turns purple
Fats (lipids)	add ethanol → shake → add water → shake	cloudy white emulsion

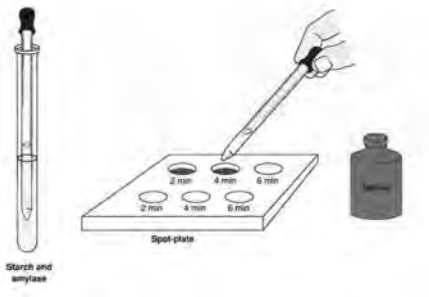
24. Required Practical 2 - Enzymes

Investigate the effect of pH on the reaction of amylase enzyme

IV: pH (change using at least 5 different buffer solutions)

DV: time taken to digest starch (measured as the time it takes for a sample of the mixture **not** to turn black when mixed with iodine solution)

CV: volume and concentration of amylase solution; volume and concentration of starch solution; temperature; time for samples



Method:

1. Place known volume of starch solution into a boiling tube.
2. Place known volume of amylase solution into the boiling tube.
3. Stir using a glass rod.
4. Take a sample of mixture and place onto a spot tile.
5. Add a drop of iodine solution to the spot tile; repeat every 30s; record the time taken for the mixture not to turn black.
6. Repeat steps 1 – 5 for at least 5 different pHs.

Y9 Chemistry

CONTENTS

25. Atoms, Elements, Compounds and Mixtures

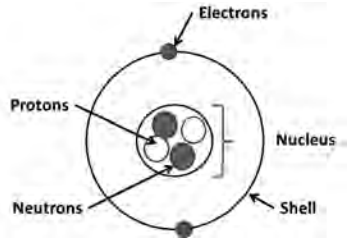
Keyword	Definition
Atom	smallest part of an element
Element	made up of only one type of atom
Compound	made from at least two elements, chemically combined
Mixture	made of two or more elements or compounds not chemically combined together

Radius of an atom = 0.1nm (1×10^{-10}m).

Radius of a nucleus is less than 1/10 000 of that of an atom.
This is 1×10^{-14}m.

Atoms are **neutral** (no electrical charge) because: -The number of protons and electrons are the same. -The charges cancel out
Atomic number = Proton number
Mass number = Number of protons and neutrons
Number of electrons = Number of protons

Structure of the atom (Nuclear model)



Subatomic particle	Relative charge	Relative mass
Proton	+1	1
Neutron	0	1
Electron	-1	1/1840

26. Structure of the Atom

7 Li 3

Top number

Bottom number

Proton = bottom number

Electron = bottom number

Neutron = top number – bottom number

Electronic Configuration

Electrons are arranged in shells.

1st shell – maximum of 2 electrons

2nd shell – maximum of 8 electrons

3rd shell – maximum of 8 electrons

Isotopes:

Atoms of the same element that have different numbers of neutrons but the same number of protons and electrons.

They have the same chemical properties but different physical properties.

39 Ar 18	38 Ar 18
18 protons 18 electrons 21 neutrons	18 protons 18 electrons 20 neutrons

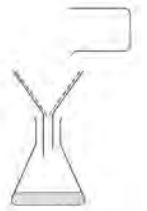
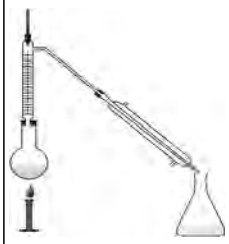
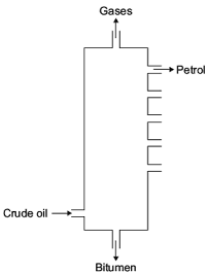
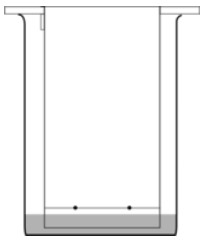
Calculating Relative Isotopic Abundance

Mass number	Abundance (%)
39	93.1
41	6.9

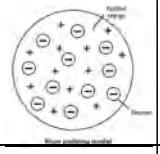
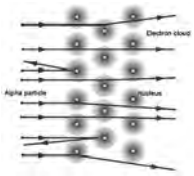
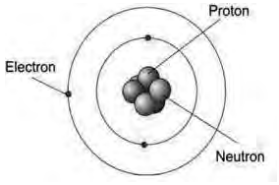
$$= \frac{(39 \times 93.1) + (41 \times 6.9)}{93.1 + 6.9}$$

$$= 39.1$$

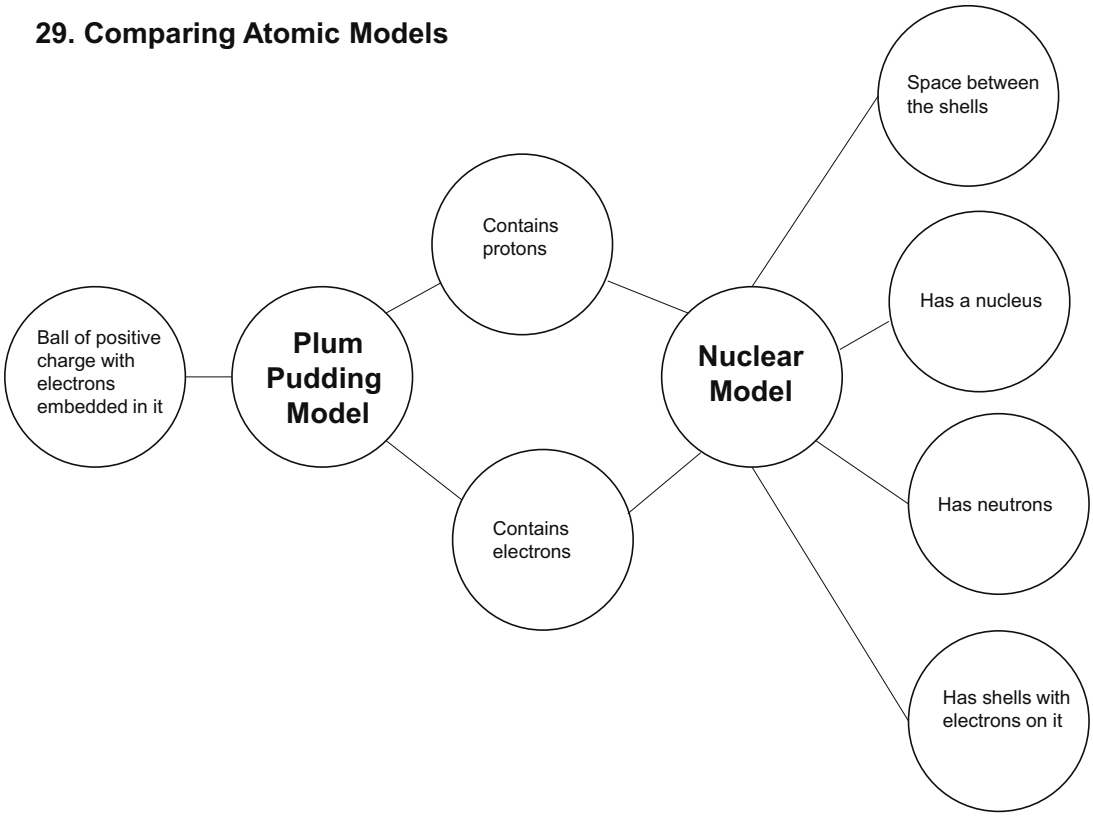
27. Separating Mixtures

Process	Filtration	Distillation	Fractional distillation	Chromatography
Diagram				
Physical property	Difference in solubility	Difference in boiling points	Difference in boiling points	Difference in solubility
Example	Sand and salt	Ink and water	Ink, water and oil	Different colours in dyes

28. History of the Atom

Atomic model	**Plum pudding model**		**Nuclear model**		
Diagram					
Discovery	Electron	Positive nucleus in the centre of the atom	Electrons occupy shells Electrons are at specific distances from the nucleus	Neutrons	• Atomic radius: 1×10^{-10} m • Radius of a nucleus is less than 1/10 000 of the radius of an atom. • Most of the mass of an atom is concentrated in the nucleus. • The electrons are arranged at different distances from the nucleus.
Description	The atom is a ball of positive charge with negative electrons embedded in it.	Positively charged alpha particles were fired at thin gold foil. Most alpha particles went straight through the foil. A few were scattered in different directions by the atoms in the foil. It showed that the mass of an atom was in the centre (the nucleus) and the nucleus was positively charged.		Proved the existence of isotopes	
Discovered by	Thompson	Rutherford	Bohr	Chadwick	

29. Comparing Atomic Models



30. Ionic and Covalent Bonding

Ionic Bonding (metal & non-metal)

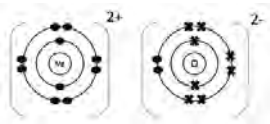
Structure: Giant ionic lattice

Electrons are lost or gained to achieve a full outer shell.

Ionic bond: Electrostatic attraction between oppositely charged ions.

Ions held in a fixed lattice.

Charge of ion: +2 (loses 2 electrons) and -2 (gains 2 electrons)



Describing the formation of an ionic compound

Example 1: NaF

Na atom loses 1 electron to form Na^{1+} ion.

F atom gains 1 electron to form F^{1-} ion

Example 2: Na_2O

Two Na atoms each lose 1 electron to form two Na^{1+} ions.

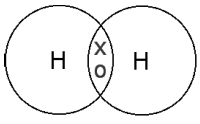
One O atom gains 2 electrons to form O^{2-} ion.

Covalent Bonding (2 x non-metals)

Covalent bond: Pairs of electrons are shared between the atoms.

Sharing one pair of electrons = single bond

Sharing two pairs of electrons = double bond



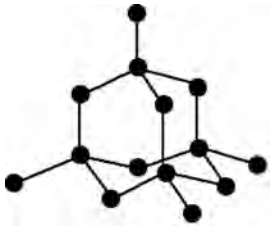
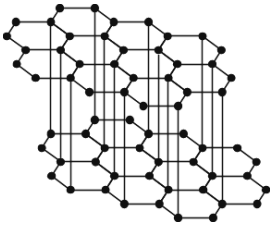
Simple Molecules

(2 x non-metals, covalent bonding)

Simple molecules (small molecules)

e.g. H_2, Cl_2, O_2, N_2, HCl, H_2O

31. Giant Covalent Bonding

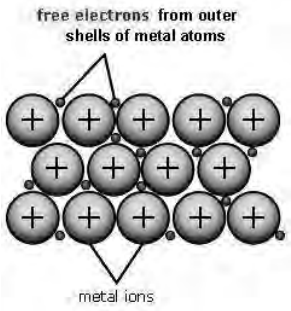
	Diamond	Graphite	Silicon dioxide
Bonding	Giant covalent	Giant covalent	Giant covalent
Made of	Carbon	Carbon	Silicon and oxygen
Structure	Each carbon atom forms four C-C covalent bonds.	Each carbon atom forms three covalent bonds with three other carbon atoms, forming layers of hexagonal rings . The 4th electron is delocalised	Each silicon atom forms four covalent bonds with oxygen atoms
Diagram			

32. Metallic Bonding and Alloys

Metallic Bonding

Metallic bond: Attraction between the positive metal ion and delocalised electrons.

Structure: Layers of metal positive ions surrounded by delocalised electrons



Alloy

Mixtures of metals with metals or a non-metal

e.g. stainless steel is a mixture of iron and carbon

Structure: Irregular layers

33. Quantitative Chemistry

Relative formula mass (RFM or M_r)

This is the mass in grams of 1 mole of the substance.

To calculate M_r (top number) you need to add up the atomic mass (Ar) of all of the atoms in the molecule.

Example1. NaCl = Na + Cl = 23 + 35.5 = 58.5

Example 2. MgF_2 = Mg + (2 x F) = 24 + (2 x 19) = 62

% Mass of an Element in a compound

$$\% \text{ mass of an element} = \frac{\text{Atomic mass of element x number of atoms}}{\text{Relative formula mass of compound}} \times 100$$

Remember: $\frac{\text{part}}{\text{whole}} \times 100$

Conservation of Mass

During a chemical reaction, no atoms are made, no atoms are destroyed.

Decrease in mass:

$CaCO_3$ (s) ⟶ CaO (s) + CO_2 (g)

Carbon dioxide is a gas which is a product

Carbon dioxide escapes into the air.

Increase in mass:

2Mg(s) + O_2 (g) ⟶ 2MgO (s)

Mg reacts with oxygen in the air

Oxygen has added to the magnesium

Concentration of a solution

dm^3 ⟷ cm^3 (X 1000 / ÷ 1000)

Concentration (g/dm^3) = mass (g) ÷ volume (dm^3)

34. Acids and Alkalis

Acid	Chemical formula
Sulfuric acid	H_2SO_4
Nitric acid	HNO_3
Hydrochloric acid	HCl

Alkali	Chemical formula
Sodium hydroxide	NaOH
Potassium hydroxide	KOH

Acid	Salt name ending
Hydrochloric	-chloride
Nitric acid	-nitrate
Sulfuric	-sulfate

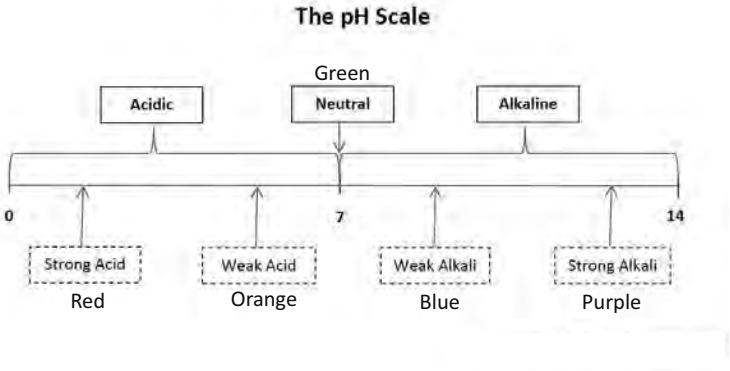
The pH Scale

It can be measured with a pH probe, or universal indicator.

Acid: pH 0-6

Neutral: pH 7

Alkali: pH 8-14



Neutralisation

Acids contain hydrogen ions (H^+)

Alkalis contain hydroxide ions (OH^-)

acid + alkali → water

Ionic equation: H^+ (aq) + OH^- (aq) → H_2O (l)

35. Reactions of Acids to Make a Salt (Neutralisation)

Reaction 1	**Reactions of Acids with Metals (Neutralisation)**
Rule	acid + metal → salt + hydrogen
Example	hydrochloric acid + magnesium → magnesium chloride + hydrogen

Reaction 2	**Reactions of Acids with Metal Oxide (Neutralisation)**
Rule	acid + metal oxide → salt + water
Example	sulfuric acid + magnesium oxide → magnesium sulfate + water

Reaction 3	**Reactions of Acids with Metal Hydroxide (Neutralisation)**
Rule	acid + metal hydroxide → salt + water
Example	nitric acid + magnesium hydroxide → magnesium nitrate + water

Reaction 4	**Reactions of Acids with Metal Carbonate (Neutralisation)**
Rule	acid + metal carbonate → salt + water + carbon dioxide
Example	nitric acid + magnesium carbonate → magnesium nitrate + water + carbon dioxide

36. Strong and Weak Acids

Strong acid

Completely ionised (breaks down) in aqueous solution.

$HCl \rightarrow H^+ + Cl^-$

***Examples**:* Hydrochloric acid (HCl), nitric acid (HNO_3) and sulfuric acid (H_2SO_4).

Lower pH numbers (pH 1-3)

The stronger the acid, the more it ionises in solution, and the more hydrogen ions there are in the solution.

Concentrated acid

More hydrogen ions (H^+) per volume

Weak acid

Partially ionised (breaks down) in aqueous solution.

$CH_3COOH \rightarrow CH_3COO^- + H^+$

Examples: Ethanoic acid, citric acid and carbonic acid.

Higher pH numbers (pH 4-6)

pH

If the hydrogen ion concentration in a solution increases by a factor of 10, the pH of the solution decreases by 1.

Volume of acid (cm^3)	**pH**
10	3
1000	5

37. Energy Changes

Exothermic Reaction. Energy is transferred from particles to the surroundings. Temperature increases.
Examples: Combustion, many oxidation reactions, neutralisation.
Every day uses: self-heating cans and hand warmers.

Endothermic reaction. Energy is transferred from the surroundings to the particles. Temperature decreases.
Example: Thermal decomposition and the reaction between citric acid and sodium hydrogencarbonate.
Every day uses: sports injury packs.

Activation energy: minimum amount of energy required for the reaction to start.

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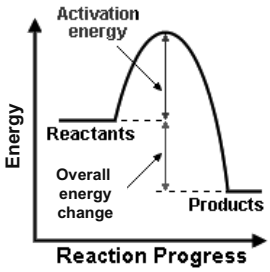
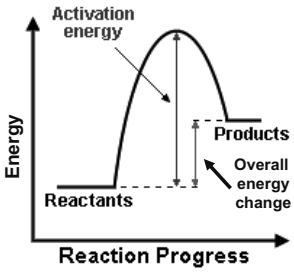


Exothermic reaction



Endothermic reaction

Exothermic energy profile:
Reactants are **higher** in energy than the products.
Energy is released to the surroundings.
.

Endothermic energy profile:
Reactants are **lower** in energy than the products.
Energy is absorbed by the surroundings.
.

38. Types of Chemical Reactions

Chemical Reactions

Thermal decomposition
The breakdown of a compound using heat

potassium carbonate → potassium oxide + carbon dioxide

Reactants: Potassium carbonate
Products: Potassium oxide and carbon dioxide

Test for carbon dioxide
Test: Bubble through limewater
Result: Limewater turns cloudy

Examples of fuels: propane and butane

Oxidation
A chemical reaction where oxygen is added.

iron + oxygen → iron oxide

Reactants: iron and oxygen
Products: iron oxide

Combustion (burning) – FO COW
A reaction where oxygen is burned with a fuel to make heat and light.
Combustion must have fuel, heat and oxygen.

FUEL + **O**XYGEN → **C**ARBON DIOXIDE + **W**ATER
methane + oxygen → carbon dioxide + water

Reactants: methane and oxygen
Products: carbon dioxide and water

Incomplete Combustion
Burning with not enough oxygen
Products: carbon monoxide, soot, carbon dioxide and water.

Complete Combustion
Burning with plenty of oxygen
Products: carbon dioxide and water.

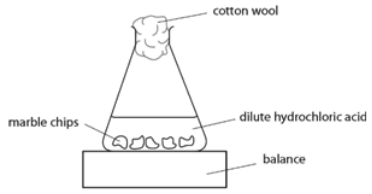
39. Conservation of mass

In a reaction, the atoms you start with are the same as those that you make.

mass of the reactants = mass of the products.

$H_2 + Cl_2 \rightarrow 2HCl$

Reactant side has 2 H and 2 Cl atoms.
The product side has 2 H and 2 Cl atoms.
If one side has a mass of 25g, the other side will have a mass of 25g

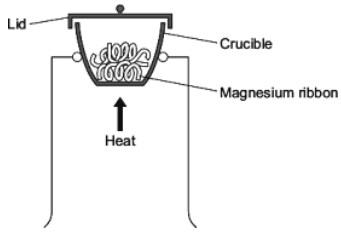


Loss in mass

calcium carbonate → calcium oxide + carbon dioxide

Explanation:

- Carbon dioxide is a gas
- It escapes into the atmosphere



Gain in mass

magnesium + oxygen → magnesium oxide

Explanation:

- Oxygen gas is added
- Oxygen comes from the air

40. Calculating Bond Enthalpy

Energy IN
Total energy needed to break the bonds in the reactants

—

Energy OUT
Total energy needed to form the bonds in the products

=

Energy CHANGE
Overall energy change

Exothermic reaction.

Negative value

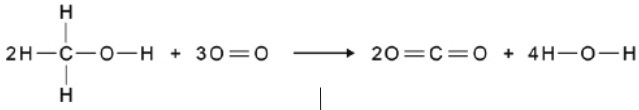
Total energy needed to break the bonds in the reactants ⟨ Total energy needed to form the bonds in the products

Endothermic reaction.

Positive value.

Total energy needed to break the bonds in the reactants ⟩ Total energy needed to form the bonds in the products

	C–H	C–O	O–H	O=O	C=O
Bond energy in kJ / mol	412	360	464	498	805



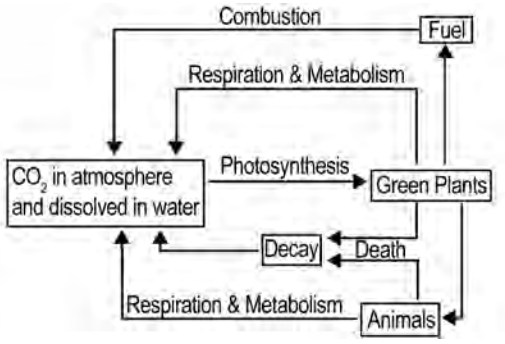
6 x (C-H) = 6 x 412 = 2472
2 x (C-O) = 2 x 360 = 720
2 x (O-H) = 2 x 464 = 928
3 x (O=O) = 3 x 498 = 1494
TOTAL = 5614

4 x (C=O) = 4 x 805 = 3220
8 x (O-H) = 8 x 464 = 3712
TOTAL = 6932

5614 – 6932= -1318

41. The Carbon Cycle

The carbon cycle shows how carbon moves through organisms and as carbon dioxide (CO_2) in the atmosphere.



Earth's atmosphere: 78 % nitrogen, 21 % oxygen, <1 % carbon dioxide, plus small amounts of other gases.

How carbon is recycled: By photosynthesis (COW GO) and respiration (GO COW).

Reasons why CO_2 levels have increased:

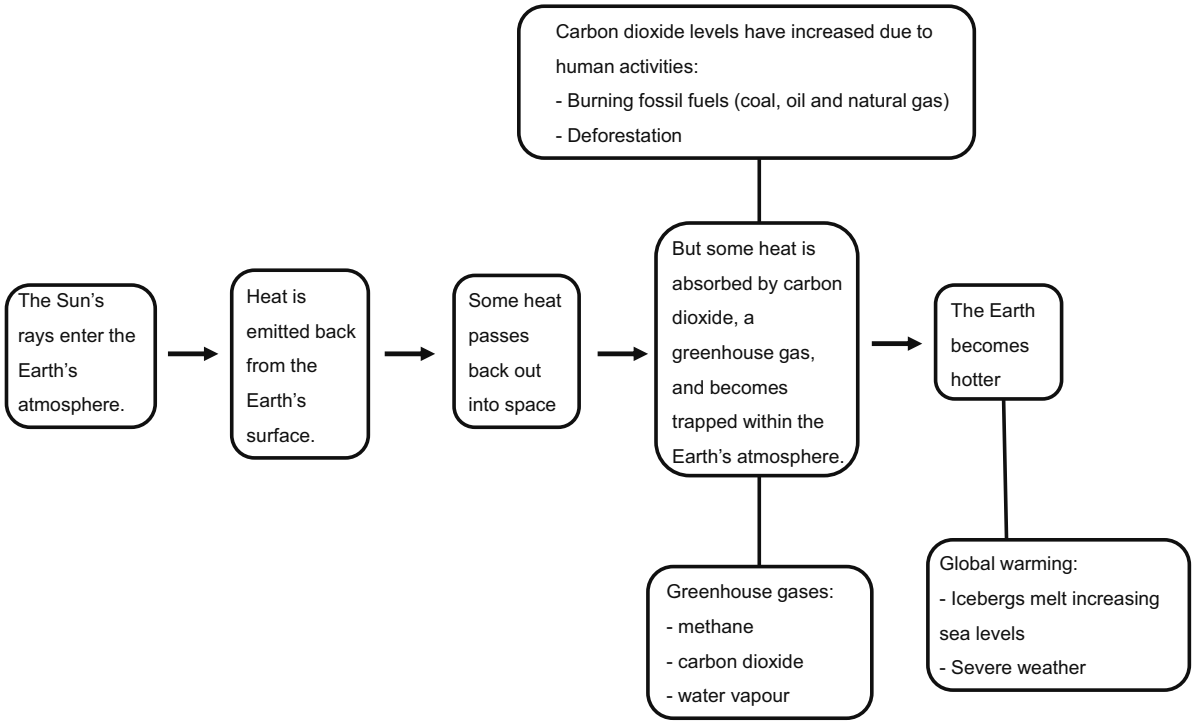
Human activities such burning fossil fuels (FO COW) and deforestation.

Greenhouse effect:

Greenhouse gases are carbon dioxide, methane, water vapour and ozone.

Scientists have evidence that global warming caused by human activity is causing changes in the climate.

42. The Greenhouse Effect



43. Required Practical 1: Making a salt

Making a soluble salt

1. Add excess copper oxide to sulfuric acid in a beaker
2. Stir using a stirring rod
3. Filter using a funnel and filter paper into a conical flask.
4. Evaporate the water from the copper sulfate solution in an evaporating dish using gentle heat until half the volume is left.
5. Leave on windowsill to form crystals.
6. Pat dry crystals.

Reasoning for the steps

Step 1: Excess metal oxide used so that all the acid reacts.
Step 2: Reaction stirred so all the chemicals react.
Step 3: Removal of excess copper oxide. Excess copper oxide used as it is easier to remove than excess acid
Step 4: Slow this step down by using a water bath

Observations:

Black solid (copper oxide) is left in the filter paper
Colour change

44. Required Practical 2 – Energy Changes

Reacting two solutions, e.g. acid and alkali

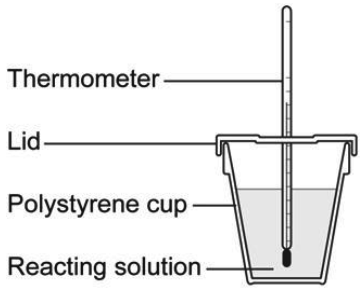
1.Place the polystyrene cup inside the glass beaker
2.Using a measuring cylinder, measure 25 cm^3 of acid
3. Add to polystyrene cup.
4.Record the temperature of the acid using a thermometer.
5.Add 5cm^3 of alkali to the polystyrene cup and record the temperature obtained.
6.Repeat with 5cm^3 of alkali until 40 cm3 of alkali has been added
IV: Volume of alkali
DV: Temperature of reaction mixture
CV: Type of acid and alkali, volume of acid

To improve the accuracy

Use polystyrene cup
Add a lid
Repeat the experiment and calculate the mean ignoring anomalous results
Valid results: Repeat 3 times, identify the anomalous results, calculate the mean

Reacting a solid with a solution, e.g. metal and solution

1.Place the polystyrene cup inside the glass beaker to make it more stable.
2.Using a measuring cylinder, measure 25 cm^3 of copper sulfate solution
3.Place the solution in a polystyrene cup.
4.Record the temperature of the solution using a thermometer.
5.Using a balance, weigh out 1g zinc powder
6.Add the zinc powder and record the temperature.
7.Repeat steps 1-6 with different masses of zinc powder
IV: Mass of metal
DV: Temperature of reaction mixture
CV: Concentration and volume of copper sulfate solution



Y9 Physics

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46. Kinetic energy and elastic potential energy
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48. Gravitational potential energy
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45. Energy stores and systems

Energy System

System:
An object or group of objects.
When a system changes there are changes in the way energy is stored within it.

Closed system:
Where neither matter nor energy enters or leaves.

Conservation of energy:
Energy is not created or destroyed but may be transferred between different energy stores.

The energy in a system can be transferred between different stores when work is done by:
- Heating
- Forces
- Current flowing

Energy Store	Example
Thermal	Cup of hot tea
Kinetic	Moving car
Gravitational Potential	Water in a reservoir at the top of a mountain
Elastic Potential	Stretched bungee cord
Chemical	Battery, food
Magnetic	Two opposing north poles on bar magnet
Electrostatic	Two electrons repelling each other
Nuclear	The energy available to be released by fission when splitting an atom

46. Kinetic Energy and Elastic Potential Energy

Kinetic Energy

Kinetic energy of an object depends on the:
- mass
- speed

Kinetic energy (J) = 0.5 x mass (kg) x velocity^2 (m/s)

$E_k = 0.5mv^2$

Unit conversions:
kJ to J: x 1000
g to kg: ÷ 1000

Elastic Potential Energy

A force acting on an object may cause the shape of an object to change.

Elastic objects can store elastic potential energy if they are stretched or squashed. For example, this happens when a catapult is used or a spring is stretched.

Objects can also store elastic potential energy when they are squashed.

Elastic potential energy (J) = 0.5 x spring constant (N/m) x extension^2 (m)

Unit conversions:
kJ to J: x 1000
cm to m: ÷ 100

47. Work Done

A car braking to slow down
The friction force from the brakes does work. Energy is transferred from the car's kinetic store to the thermal store of its brakes, the brakes then transfer heat to the surroundings.

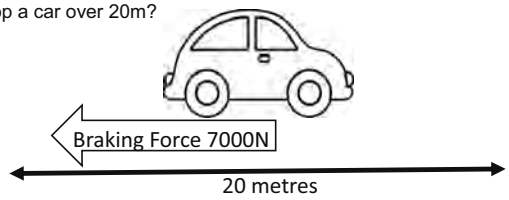
Energy transferred = work done

work done (J) = force (N) x distance (m)

W = Fs

Unit conversions:
kJ to J: x 1000
cm to m: ÷ 100
km to m: x 1000

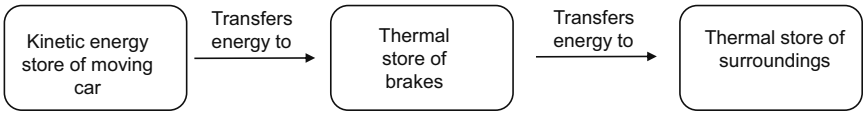
Example: How much work is done by the brakes if a 7000N braking force is used to stop a car over 20m?



Use the EVERY model to complete calculations:
E = equation
V = values
E = enter results
R = result
Y = units

E W = F x s
V F = 7000 N and s = 20 m
E W = 7000 x 20
R W = 140 000
Y J

W = 140000J or 140 kJ



48. Gravitational Potential Store (E_p)

Raising an object off the ground increases its gravitational potential energy store.

The amount of energy depends on the mass and height of the object and strength of the gravitational field it is in.

Gravitational potential energy store (J)	**=**	**mass (kg)**	**x**	**gravitational field strength (N/kg)** **x change in height (m)**

$E_p = mgh$

Unit conversions:
kJ to J: x 1000
cm to m: ÷ 100
km to m: x 1000
g to kg: ÷ 1000

Note: weight = mass x gravitational field strength

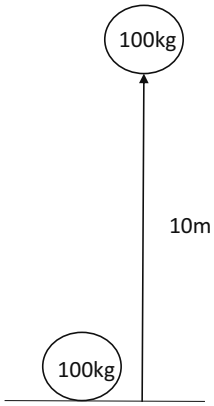
$W = m \times g$

Therefore, we have a second formula for E_p

E_p = Weight x change in height

$E_p = W \times \Delta h$

Example: What is the gravitational energy required to lift a 100 kg mass up by 100 m?
Gravitational field strength = 9.81N/kg



Use the EVERY model to complete calculations:
E = equation
V = values
E = enter results
R = result
Y = units

E	$E_p = m \times g \times h$
V	m = 100 kg; g = 9.81; h = 100 m
E	$E_p = 100 \times 9.81 \times 100$
R	$E_p = 98100$
Y	J

E_p = 98100 J

49. Specific Heat Capacity (c) and Power

The amount of energy needed to raise the temperature of 1 kg of a substance by 1 °C.

Change in thermal energy (J)	**=**	**mass (kg)**	**x**	**specific heat capacity (J/kg°C)**	**x**	**change in temperature (°C)**

$\Delta E = mc\Delta T$

Unit conversions:
kJ to J: x 1000
g to kg: ÷ 1000

Example: How much energy is released into the surroundings when a cup of tea holding 250g of fluid cools from 90°C to 20°C? c = 4200 J/kg°C

Use the EVERY model to complete calculations:
E = equation
V = values
E = enter results
R = result
Y = units

E	$\Delta E = m \times c \times \Delta\theta$
V	m = 250 g = 0.25 kg; c = 4200; $\Delta\theta$ = 90-20 = 70
E	$\Delta E = 0.25 \times 4200 \times 70$
R	73 500
Y	J

ΔE = 73500J or 73.5 kJ

Power

Power is the rate at which energy is transferred and is measured in watts.

1 watt = 1 joule of energy transferred per second.

Power (W) = energy transferred (J) ÷ time (s)

Power (W) = work done (J) ÷ time (s)

P = E ÷ t

Unit conversions:
kJ to J: x 1000
minutes to seconds: x 60
hours to seconds: x 3600
W to kW: ÷ 1000

Example. Calculate the power of a motor that uses 60,000 J of energy to lift an object in 20 seconds. Give your answer in kW.

E	$P = E \div t$
V	E = 60 000J; t = 20 s
E	P = 60 000 ÷ 20
R	3000
Y	W

P = 3000W or 3kW

A more powerful device can transfer more energy in a given time or will transfer the same amount of energy in a faster time.

50. Conservation of Energy

Dissipation of energy	Wasting energy. More energy needs to be put into appliance to account for dissipated energy. Useful dissipation of energy example: back of a fridge Example of dissipation of energy is bad: light bulbs, engines and TV's as heat
Conservation of energy	Energy can be transferred usefully, stored or dissipated, but it cannot be created or destroyed
Heat	When an object is heated, thermal energy is being transferred to it
Temperature	A measure of hot or cold something is

Reducing Wasted Energy (dissipated energy)	
Friction	Between two moving objects causes thermal energy to be dissipated. It can be reduced by lubrication.
Lubrication	• Friction between two moving objects causes energy to be dissipated as sound and to the thermal store.
Insulation	Reduces energy transfer by heating
Cavity wall insulation	Fills the air gap between the inner and outer wall reducing heat loss by convection.
Loft insulation	Reduces heat loss by convection.
Double glazing	• Creates an air gap between the two panes of glass to reduce energy loss by conduction. • Gases are good insulators
Draught excluders	Reduce energy loss by convection when placed around windows and doors.

51. Efficiency

Appliance	Useful Energy	Dissipated (wasted) Energy
Light bulb	Light	• Heating the bulb and surroundings
Hair Dryer	• Kinetic energy of the fan to push air • Heating of the air	• Sound of the motor. • Heating of the dryer and surroundings
Electric Motor	• Kinetic energy of objects driven by motor. • Gravitational potential energy of objects lifted by motor	• Heating of the motor and surroundings. • Sound of the motor turning

Efficiency

An efficient device wastes less energy than a less efficient device. It can be calculated as a decimal or multiplied by 100 to give a percentage.

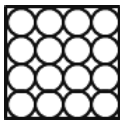
Efficiency = $\frac{\text{useful energy output}}{\text{total energy output}}$ **Efficiency = $\frac{\text{useful power output}}{\text{total power input}}$**

Example:. Calculate the wasted power and efficiency of a motor that has a rated power of 500W and transfers 300W usefully.

Wasted power = input power - output power = 500 – 300 = 200W

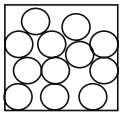
$$\text{Efficiency} = \frac{300}{500} = 0.6 \text{ 0r } 60\ \%$$

52. Methods of Heat Transfer Overview



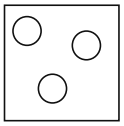
Solids

Have **strong forces** between particles or molecules, holding them close together in a **fixed**, **regular** arrangement. The particles can only vibrate around fixed positions.



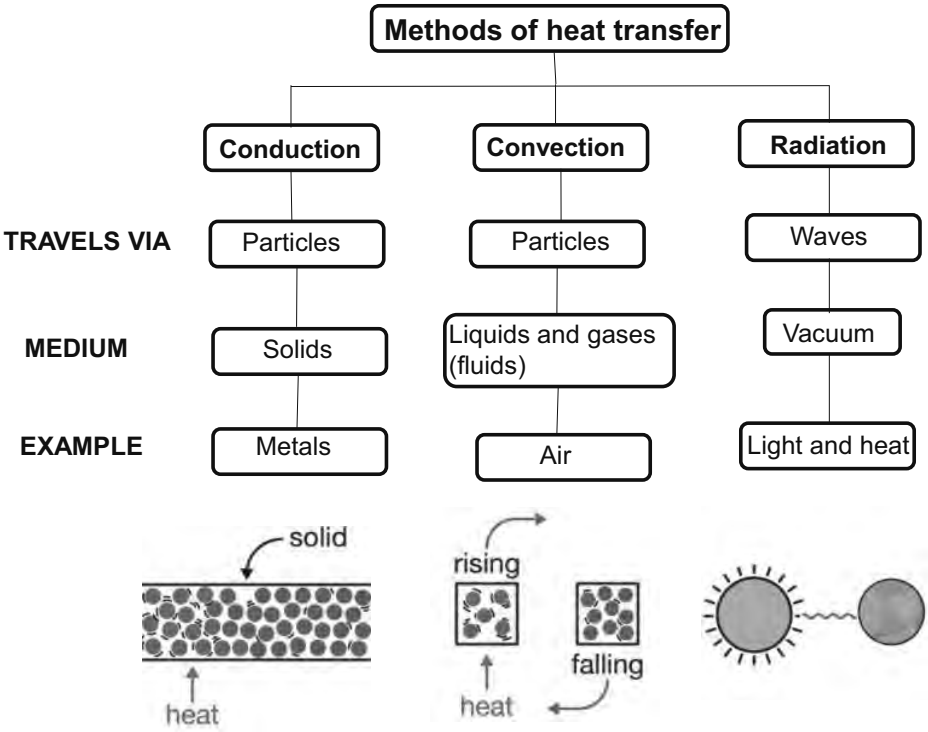
Liquids

Have **weaker forces** between particles so although the particles are close together they can **flow** over each other at low speeds in random directions.



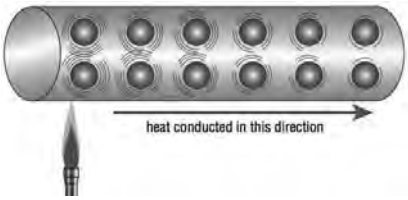
Gases

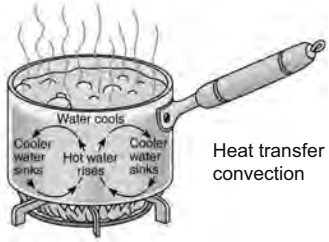
Have almost **no forces** between particles. Have **more energy** and are **free to move** in random directions and speeds.



53. Methods of Heat Transfer

Heat Transfer Method	Description
Conduction (Occurs in solids)	When heated particles vibrate more with an increase in their kinetic energy. They collide more with surrounding particles transferring the heat
Convection (Occurs in liquids and gases)	Particles are free to move (in a liquid and gas). Increase in their kinetic store. Particles move faster. The space between the particles increases, so the density decreases. The warmer less dense region rises and the cooler, denser regions sink.
Infrared Radiation (Occurs in all objects)	The hotter an object the more infrared radiation it emits in a given time. An object at constant temperature emits and absorbs infrared radiation at the same rate A perfect black body absorbs all the infrared radiation that falls upon it and then emits it back at the same rate as it absorbs it.





Heat transfer by convection

54. Non-Renewable Energy Resources

Renewable energy resources will never run out. It is an energy resource that can be replenished quickly.

Non-renewable resources will one day run out (fossil fuels). Fossil fuels are coal, oil and natural gas.

Energy Resource	Uses	Advantages	Disadvantages
Coal	Electricity generation, heating, steam trains in some countries	• Reliable energy resource • Low extraction costs • High energy per kg	All fossil fuels are running out. Burning fossil fuels releases carbon dioxide a greenhouse gas which causes global warming. SO_2 found in coal leads to acid rain when burned.
Oil	Electricity generation, heating, basis for petrol and diesel	• Reliable energy resource • Low extraction costs • High energy per kg	Burning fossil fuels releases carbon dioxide a greenhouse gas which causes global warming.
Gas	Electricity generation, heating, cooking	• Reliable energy resource • Gas fired power stations can be started quickly to meet changing energy demands	Burning fossil fuels releases carbon dioxide a greenhouse gas which causes global warming.
Nuclear	Electricity generation Fuel: Uranium or plutonium	• Reliable energy resource • It has the highest energy density per kg of any fuel. • Does not require combustion and therefore does not release carbon dioxide into the atmosphere	The waste products from nuclear plants is dangerous radioactive waste which needs to be stored safely for hundreds of years.

55. Renewable Energy Resources 1

Energy Resource	Uses	Advantages	Disadvantages
Solar Energy	• Heating domestic hot water. • Photovoltaic cells can create electricity to charge batteries. • Electricity generation in large scale solar power plants	• No atmospheric pollution due to burning of fossil fuels • In sunny countries it is more reliable (during the day) • Useful for remote places not supplied by the national grid. • No fuel costs and minimal running costs	• Cannot increase supply to match demand • High initial costs • Unreliable
Wind Power	Electricity generation	• No atmospheric pollution due to burning of fossil fuels • No fuel costs and minimal running costs No permanent damage to the landscape when removed. • Fast start-up	• Visual and noise pollution • Cannot increase supply to match demand • High initial costs • Cannot generate electricity if there is too little wind • Unreliable
Geothermal	• Electricity generation • Heating	• Reliable • No atmospheric pollution due to burning of fossil fuels	• Few suitable locations (only possible in volcanic areas) • High cost to build power station
Bio-fuels	• Electricity generation • Heating • Fuel for transport	• Carbon neutral (if plants are grown at the same rate as being burned). • Reliable as crops grow quickly	• High costs to refine the fuel • Space for growing food taken up • Forests cleared to make space – decay and burned vegetation release CO_2 and methane.

56. Renewable Energy Resources 2

Energy Resource	Uses	Advantages	Disadvantages
Hydro-Electric	Electricity generation	• Can respond immediately to increased demand, fast start-up. • Reliable (except if there is a drought) • No fuel costs and minimal running costs • Potential to be used as part of **pumped storage** scheme	• Requires land to be flooded to create a dammed reservoir • Loss of animal habitats • Relies on rainfall to keep reservoir full unless part of pumped storage system
Tidal barrage	Electricity generation	• No atmospheric pollution due to burning of fossil fuels • No fuel costs and minimal running costs	• Visual pollution • Difficulty providing access for boats / wildlife • Initial costs are high • Environmental impact during building phase due to multiple vehicles and large amounts of concrete being used
Wave power	Electricity generation	• No atmospheric pollution due to burning of fossil fuels • Smaller solution for limited populations	• Unreliable • Few suitable locations

57. Wave properties

Mechanical Waves travel through a medium (substance).
The particles oscillate (vibrate) and transfer energy.
The particles do not travel along in the wave.

Frequency (f) - the number of complete waves that pass a point every second.
1 wave per second has a frequency of 1Hz (hertz).

Time period (T) - the time for a complete cycle of a single wave.

Frequency (Hz) = 1 ÷ time period (s)

F = 1 ÷ T

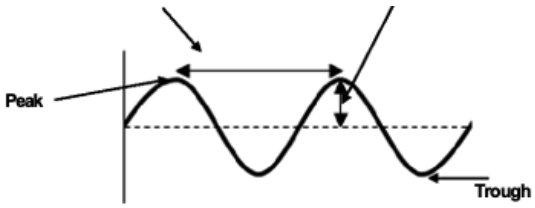
Example: What is the frequency for a wave with a time period of 0.2s

E f = 1 ÷ T
V T = 0.2 s
E f = 1 ÷ 0.2
R 5
Y Hz

f = 5Hz

Wavelength - the distance between adjacent waves (i.e. from peak to peak or trough to trough)

Amplitude - the maximum displacement from the horizontal mid-line.



Wave speed (m/s) = frequency (Hz) x wavelength (m)

V = f λ

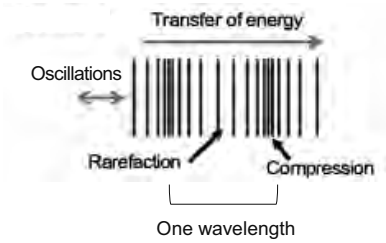
Example: How fast is a wave travelling which has a 3m wavelength and a frequency of 20Hz?

E V = f x λ
V f = 20 Hz; λ = 3 m
E V = 20 x 3
R V = 60
Y m/s

58. Transverse and Longitudinal waves

Longitudinal Waves

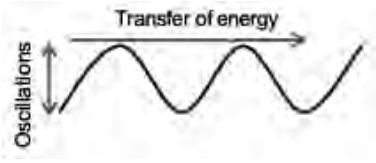
The **oscillations** (vibrations causing the wave are **parallel** to the direction of **energy transfer**.



Compression: particles bunch up
Rarefaction: particles spread out
Example: Sound waves

Transverse Waves

The **oscillations** (vibrations causing the wave) are **perpendicular** (90°) to the direction of **energy transfer**.



Example: Light waves, X-rays and water waves (ripples)
All electromagnetic waves

59. Sound Waves and Speed of Sound experiment

Sound waves are **mechanical longitudinal waves**.
They need a medium to travel through.

The speed of sound can be calculated using:

Speed (m/s) = distance (m) ÷ time (s)

Unit conversions:

km to m:	x 1000
cm to m:	÷ 100
minutes to seconds:	x 60
hours to seconds:	x 3600

Sound waves

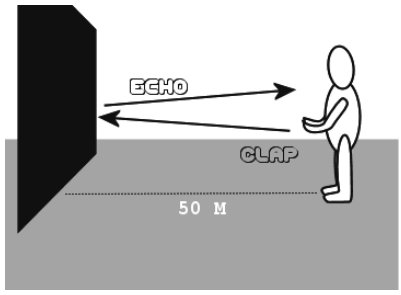
Bigger the amplitude – taller the wave – louder the sound

Higher the frequency – more waves per second – higher pitch

Speed of sound experiment

1. Measure the distance between the person and the wall using a metre ruler.
2. Double this distance.
3. Using a stop clock, measure the time taken from the clap being made to hearings it's echo.
4. Use the equation,

   speed = distance ÷ time.



60. Sound and Seismic waves

Human hearing can detect sound in the frequency range of 20Hz to 20,000Hz.

Ultrasound > 20kHz
Infrasound < 20Hz

Ultrasound is used to detect the depth of the sea bed, where inclusions or other defects are found in solid metal and to image soft tissue in humans.

When ultrasound is used to measure the depth of an object, or the distance below a surface to a defect, the signal travels from the transducer to the object and is bounced back to the transducer. The total distance travelled by the sound is twice the depth of the object.

Depth of object (m) = 0.5 x speed of ultrasound (m/s) x time (s)

Seismic Wave type	Description
Primary (P-waves)	• Causes the initial Earth tremor • Longitudinal waves which push or pull on material. • Bend as they travel through the earth's mantle • Refract at boundary between mantle and core • Travels through solids and liquids
Secondary (S-waves)	• Transverse waves that travel more slowly than P-waves • Shake material from side-to-side. • Bend as they travel through the Earth's mantle • Cannot travel through liquid outer core • Travels through solids only
Long (L-waves)	• Arrive last and and cause violent movements on the surface • Only happen in the Earth's crust.

61. Reflection, transmission and absorption of waves

Reflection

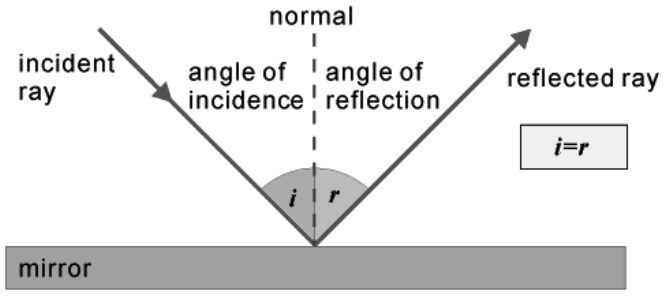
Angles are measured between the wave direction (ray) and a line at 90^{o} to the mirror (boundary)

Normal = an imaginary line drawn at 90^{o} to the surface

The angle of the wave approaching the boundary is called the angle of incidence (i)

The angle of the wave leaving the boundary is called the angle of reflection (r)

Angle of incidence (i) = Angle of reflection (r)



Absorption

Occurs when energy is transferred from the wave into the particles of a substance

Sound waves are absorbed by brick or concrete in houses

Light will be absorbed if the frequency of light matches the energy levels of the electrons

If an object appears red, only red light has been reflected. All the other frequencies of visible light have been absorbed

Transmission

Transmission occurs when a wave passes through a substance

The more transparent the material, the more light will pass through

For the process to count as transmission, the wave must pass through the material and emerge from the other side

When passing through a material, waves are usually partially absorbed

The transmitted wave may have a lower amplitude because of some absorption

For example, sound waves are quieter after they pass through a wall

62. Refraction of waves

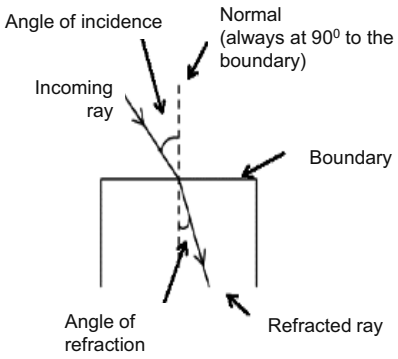
Refraction

Waves change speed when they cross a **boundary** between two materials of different density or a boundary of different depths.

If the wave enters a medium of higher **density** at an **angle** the ray bends towards the normal (see diagram).

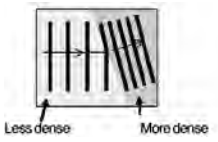
If it enters a medium **along the normal** then the wave does not change direction but the **wavelength** and **speed decrease**.
(waves closer together on diagram below but have not changed direction)

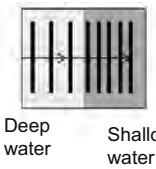
Refraction of Light ray



Wave Front Diagrams

The part of the wave front that enters the more dense medium first, slows down as the rest of the wave front continues at the same speed but has to travel further. The difference in distance and speed causes the wave to refract. A wave travelling from deep to shallow water also refracts.





Change in speed but no change in direction as wave entered **along the normal**

63. Space

Keyword	Description
Asteroid	A lump of rock (may or may not be orbiting anything)
Comet	A ball of ice, dust and gas orbiting a star in an elliptical orbit
Galaxy	A group of billions of stars. Earth is in the Milky Way galaxy
Meteor	A small piece of rocky matter entering Earth's atmosphere from space
Moon	A sphere of rock orbiting a planet
Planet	A sphere of rock or gas orbiting a star
Red Shift	Objects which are moving away from us are said to be red shifted because the wavelengths of light from these objects is shifted towards the red end of the spectrum. Hubble determined that the most distant galaxies are those most red shifted, meaning they are accelerating away from us. This supports the big bang theory.
Satellite	An object which orbits another. Natural (moon) or man-made (space station). They travel at a constant speed. Their orbit is determined by their speed.
Star	A sphere of (mainly) hydrogen carrying out nuclear fusion, producing heat and light
Universe	Everything that exists. Contains billions of galaxies

64. Star formation

Process of star formation: nuclear fusion

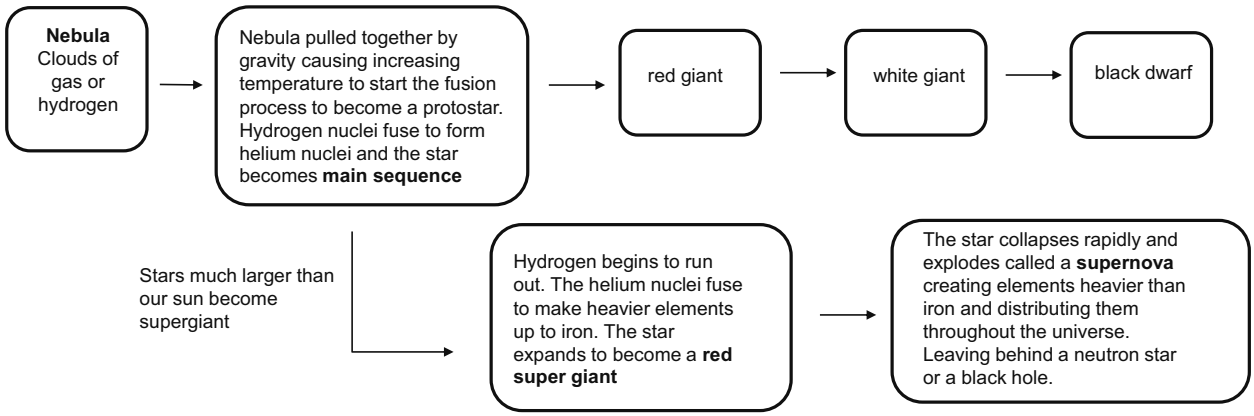
Main fuel source: Hydrogen

The Sun is a stable star. This is because the forces pulling inwards caused by gravity are in equilibrium with the forces pushing outwards caused by the energy released by nuclear fusion.

Range of wavelengths of a star depend on the temperature of the star.

A light year is the distance that light travels in a year

The life cycle of a star



65. Creation of the Universe

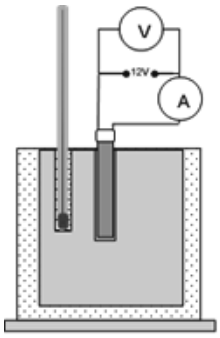
Much is still unknown about the universe and galaxies spin faster than they should based on the amount of mass in them. Scientist think that the missing mass is made up of something they have named **dark matter**.

The universe is not only expanding but accelerating in its expansion. Scientists think that **dark energy** is responsible for this acceleration but like **dark matter** they have no idea what **dark energy** is.

The universe could either end in a **big crunch** where the rapid expansion stops and a rapid contraction occurs or it could expand for ever in what is called the **big yawn**.

Mid 20th Century theories for the creation of the universe	**Key points**
Stay State Theory	Universe expands with a constant density, white holes leak matter into the universe to maintain the density as volume increases. Dropped after the discovery of cosmic microwave background radiation (CMBR)
Big Bang Theory	Universe expanded from an extremely small, hot, dense region creating space, time and matter

66. Required practical 1: Specific Heat Capacity



Method

1. Take a 1 kg block of copper.
2. Place an immersion heater in the larger hole in the block.
3. Connect the power supply to the joule meter (reset to read 0 Joules).
4. Connect the joule meter to the 12V immersion heater.
5. Place the thermometer into the other hole in the block.
6. Switch the power pack to 12 V. Turn it on.
7. After 1-minute record the temperature of the block and the reading from the joule meter.
8. Continue taking readings every minute until 10 minutes have passed.

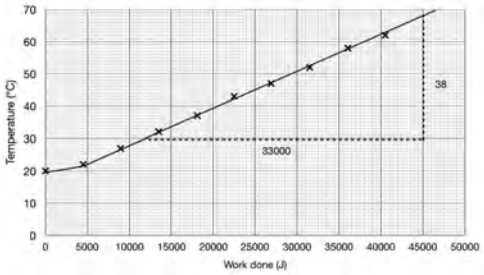
IV - Work done – (energy transferred to block measured by joulemeter)
DV - temperature
CV – Copper block of 1kg mass

Sources of Error

Heat is lost to the surroundings due to lack of insulation
The immersion heater is not fully immersed into the block
The graph may be curved at the start because it takes time for the heater and block to transfer the energy

Processing data

Plot graph work done against temperature
Specific heat capacity = 1 ÷ gradient

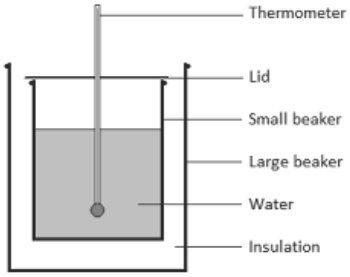


67. Required Practical 2: Thermal Insulation

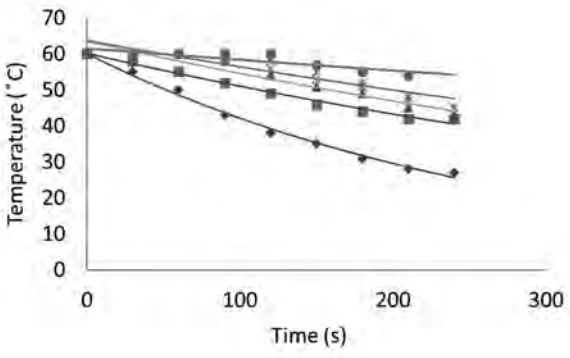
Method

1. Pour 200 cm^3 of hot water into a 250 ml beaker with a single layer of insulating material around it.
2. Use a piece of cardboard as a lid for the beaker.
3. Insert the thermometer through the hole in the cardboard lid
4. Record the temperature of the water and start the stopwatch.
5. Record the temperature of the water every 30 seconds for 5 minutes.
6. Repeat steps **1–5** increasing the number of layers of insulating material wrapped around the beaker until you reach 4 layers.
7. Repeat the experiment with no insulation around the beaker.
7. Plot a graph of temperature versus time.

IV – Time (s)
DV – Temperature change
CV – Volume of water, material of insulation, starting temperature.

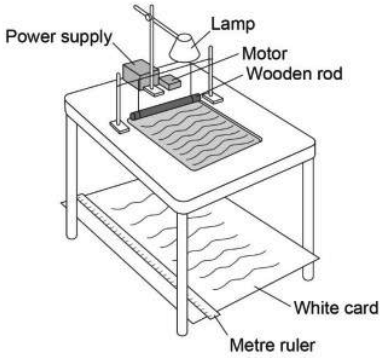


The more layers of insulation the longer it takes for the temperature to drop, indicating a better insulator.



68. Required practical 3: Speed of water waves

1. Set up the ripple tank as shown in the diagram.
2. Make sure that there is a large sheet of white card or paper on the floor under the tank.
3. Pour water to a depth of about 5 mm into the tank.
4. Adjust the height of the wooden rod so that it just touches the surface of the water.
5. Switch on the overhead lamp and the electric motor.
6. Adjust the speed of the motor to produce low frequency water waves.
7. Adjust the height of the lamp so that the pattern of the waves can be clearly seen on the white card.



How to find the frequency of a wave using a ripple tank: count the number of ripples that pass a point in 10 seconds. Divide the number of waves by 10.

How to measure the wavelength: measure the distance across 10 gaps between the shadow lines. Divide this distance by 10.

How to calculate the speed of the wave
Wave speed (m/s) = frequency (Hz) x wavelength (m)

How to improve the method of calculating the wavelength:
Take a photo of the shadows and the ruler.
Benefit is that the waves are not being disturbed.

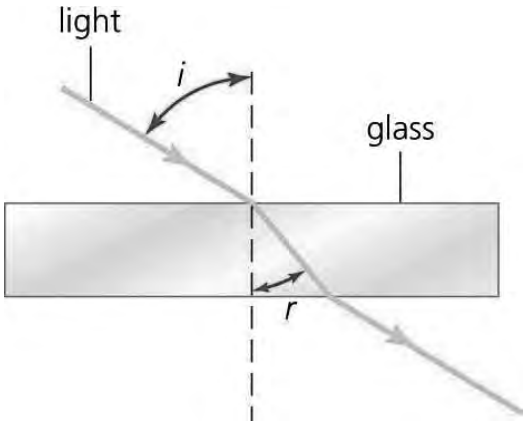
Reasons for using a:
Lamp: create shadows of the ripples
Metre ruler: measure the distance between 10 waves.
Signal generator**:** The vibration generator can have a built in signal generator so that you can directly set the frequency of paddle oscillation i.e. frequency of the ripple waves.

Deeper water means longer wavelength because velocity increases and frequency is constant

69. Required practical 4: Refraction of light

1. Place a glass block on a piece of paper
2. Draw around the glass block and then remove from the paper
3. Draw a line at 90° to one side of the block (the normal)
4. Use a protractor to measure and then draw a line at an angle of 20° to the normal
5. Replace the glass block
6. Using a ray box and slit point the ray of light down the drawn line
7. Mark the ray of light emerging from the block
8. Remove the block and draw in the refracted ray
9. Measure the angle of refraction with a protractor
10. Repeat the procedure for a range of values of the angle of incidence

Source of inaccuracy: The width of the light ray
Reason for inaccuracy: Makes it difficult to judge where the centre of the ray causes a large uncertainty



Normal (90° to the surface)

70. Maths in Science 1

Anomalous result	A number that does not fit the pattern
Mean	Adding up a list of numbers and dividing by how many numbers are in the list. Exclude the anomalous result.
Median	The middle value when a list of numbers is put in order from smallest to largest
Mode	The most common value in a list of numbers. If two values are tied then there are two modes. If more than two values are tied then there is no mode.
Range	The largest number take away the smallest value in a set of data or written as X-Y.
Uncertainty	range ÷ 2
Surface area of a cube	(area of 1 side) x 6 sides
Volume of a cube	Width x height x depth
Area of a circle	∏ x (radius)^2

Prefixes

1 kJ = 1 x 10^3 J = 1000 J

1 pm = 1 x 10^{-12} m

1 mm = 1 x 10^{-3} m= 0.001 m

kilo	10^{3}
centi	10^{-2}
milli	10^{-3}
micro	10^{-6}
nano	10^{-9}
pico	10^{-12}

5607.376

Standard form: 5.607 x 10^3

2 decimal places: 5607.38

3 significant figures: 5610

0.03581

Standard form: 3.581 x 10^{-2}

2 decimal places: 0.04

3 significant figures: 0.0358

71. Maths in Science 2

Calculating percentage: (part ÷ whole) x 100

e.g. Out of 90 insects, 40 of them were ladybirds. What is the % of ladybirds?

(40 ÷ 90) x 100 = 44 %

Calculating percentage change:

(difference ÷ starting value) x 100

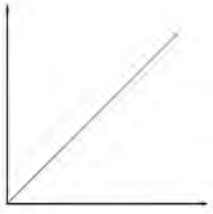
(0.59 ÷ 2.22) x 100 = 26.6 %

Conc of Sucrose (M)	Mass of potato at start (g)	Mass of potato at end (g)	Change in mass (g)
0	2.22	2.81	0.59

Graphs

Proportional (α)

When the line passes through the origin

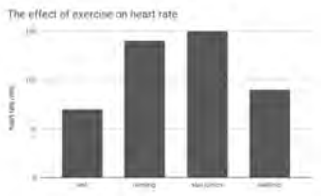


x axis = independent variable = left hand column of results table

y axis = dependent variable = right hand column of results table

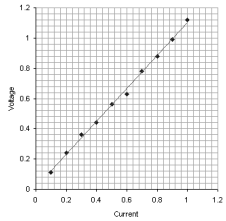
Categoric data: data put into groups e.g. colour of eyes

Draw a bar chart



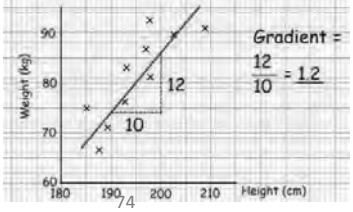
Continuous data: data that can take any value e.g. current

Draw a line graph



Gradient and Graphs

Gradient = $\frac{\text{Change in y}}{\text{Change in x}}$



kinetic energy = 0.5 × mass × (speed)^2	$E_k = \frac{1}{2} m v^2$
elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2} k e^2$
gravitational potential energy = mass × gravitational field strength × height	$E_p = m g h$
change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta\theta$
power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$
power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
efficiency = $\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$	
efficiency = $\frac{\text{useful power output}}{\text{total power input}}$	
charge flow = current × time	$Q = I t$
potential difference = current × resistance	$V = I R$
power = potential difference × current	$P = V I$
power = (current)^2 × resistance	$P = I^2 R$

energy transferred = power × time	$E = P t$
energy transferred = charge flow × potential difference	$E = Q V$
density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
thermal energy for a change of state = mass × specific latent heat	$E = m L$
For gases: pressure × volume = constant	$p V = constant$
weight = mass × gravitational field strength	$W = m g$
work done = force × distance (along the line of action of the force)	$W = F s$
force = spring constant × extension	$F = k e$
moment of a force = force × distance (normal to direction of force)	$M = F d$
pressure = $\frac{\text{force normal to a surface}}{\text{area of that surface}}$	$p = \frac{F}{A}$
pressure due to a column of liquid = height of column × density of liquid × gravitational field strength	$p = h \rho g$

HT

	distance travelled = speed × time	$s = v\,t$
	acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{\Delta v}{t}$
	(final velocity)² – (initial velocity)² = 2 × acceleration × distance	$v^2 - u^2 = 2\,a\,s$
	resultant force = mass × acceleration	$F = m\,a$
HT	**momentum = mass × velocity**	$p = m\,v$
HT	force = $\frac{\text{change in momentum}}{\text{time taken}}$	$F = \frac{m\,\Delta v}{\Delta t}$
	period = $\frac{1}{\text{frequency}}$	$T = \frac{1}{f}$
	wave speed = frequency × wavelength	$v = f\,\lambda$
	magnification = $\frac{\text{image height}}{\text{object height}}$	
HT	**force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length**	$F = B\,I\,l$
HT	$\frac{\text{potential difference across primary coil}}{\text{potential difference across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$	$\frac{V_p}{V_s} = \frac{n_p}{n_s}$
HT	**potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil**	$V_p\,I_p = V_s\,I_s$

1	2											3	4	5	6	7	0
							1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4		Key: relative atomic mass / atomic symbol / name / atomic (proton) number									11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	[285] Cn copernicium 112	[286] Uut ununtrium 113	[289] Fl flerovium 114	[289] Uup ununpentium 115	[293] Lv livermorium 116	[294] Uus ununseptium 117	[294] Uuo ununoctium 118

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.

YEAR 9
ART & DESIGN
KNOWLEDGE ORGANISER

FORMAL ELEMENTS

CONTENTS

THE FORMAL ELEMENTS

TONE

Tone describes the lightness or darkness of a surface.

A gradient is a series of tonal values from light to dark.

Tone can help to provide a form with value to give a sense of volume to a flat surface.

ADJECTIVES TO DESCRIBE TONE

Dark	Highlights
Light	Shadows
Mid tone	Shading
Grey	Blending
Blend	Graduated

SHAPE

Shape is an area enclosed by a line. It can be 2-dimensional and can be geometric or organic.

Geometric

Organic

ADJECTIVES TO DESCRIBE SHAPE

Circular	Irregular
Square	Stylized
Rectangular	Organic
Triangular	Geometric
Misshaped	Contour

FORM

Forms are 3-dimensional shapes. They occupy space (like sculptures) or give the illusion that they occupy space (drawing).

WORDS TO DESCRIBE FORM

Angular	Curvaceous
Twisted	Solid
Bulbous	Malformed
Tapered	Rounded
Contours	Negative space

THE FORMAL ELEMENTS

PATTERN

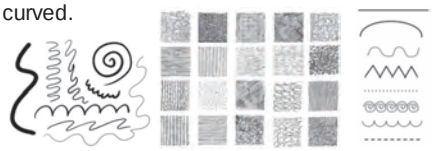
Pattern is a design that is created by repeating a formal element. It can be natural, like the stripes of a zebra, or man made, like a design on fabric. The image repeated is called a **motif**. These can be simple shapes or more complicated arrangements.

ADJECTIVES TO DESCRIBE PATTERN

Regular	Motif
Irregular	Repetition
Symmetrical	Radial
Tessellating	Tiered
Organic	Even

LINE

Line is a mark left by a moving point e.g. a pencil, or paint on a paintbrush. It can take many forms e.g. horizontal, diagonal, or curved.



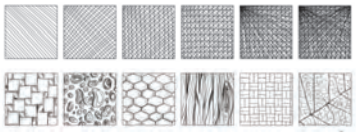
Marks can be repeated and used to create patterns in order to give tone and texture to your drawing.

ADJECTIVES TO DESCRIBE LINE

Broken	Graphical	Hesitant
Flowing	Angular	Scribbled
Moving	Geometric	Wavy
Woolly	Confident	Organic
Tight	Faint	Heavy

TEXTURE

Texture is the surface quality of an object. Texture can be real or implied. **Real texture** can be felt e.g. tree bark, whereas **implied texture** creates the look of texture on a flat surface e.g. a drawing or a painting.



WORDS TO DESCRIBE TEXTURE

Texture	Impasto	Hatching
Smooth	Fine	Rough
Tactile	Uneven	Shiny
Jagged	Frosted	Soft
Coarse	Silky	Stippled

THE FORMAL ELEMENTS

COLOUR

To see colour, you have to have light. When light shines on an object some colours bounce off the object and others are absorbed by it. Our eyes only see the colours that are bounced off or reflected.

Primary Colours

All colours can be obtained by mixing primary colours together. Primary colours cannot be created by mixing other colours.

Secondary Colours

A colour mixed from two primary colours

Tertiary Colours

A colour mixed from a primary colour and a secondary colour

Harmonious Colours are 3 colours next to each other on the colour wheel

Complimentary Colours are colours opposite each other on the colour wheel

The colour wheel can be split up into **warm** and **cool** colours, and each individual colour has it's own warm and cool variant

ADJECTIVES TO DESCRIBE COLOUR

Opaque	Luminous	Pale
Translucent	Bright	Pastel
Transparent	Saturated	Soft
Contrasting	Vibrant	Muted
Harmonious	Vivid	Deep
Complementary	Brilliance	Dull
Cool	Harsh	Hue
Warm	Neutral	Tint

DESIGN PRINCIPLES

CONTENTS

THE DESIGN PRINCIPLES

UNITY & VARIETY

Unity is how well the elements of a design work together. Each element should have a clear visual relationship with each other element to help communicate a clear, concise message.

Unity = Same colour
Variety = Different sizes

Unity = Same size
Variety = Different colours

BALANCE

Balance can be symmetrical (with items of equal weight on either side of the centre line) or asymmetrical (with items of different weights laid out in relation to a line that may or may not be centred)

Balance = Symmetrical

Balance = Asymmetrical

CONTRAST

Contrast is the difference between various elements within a design, that makes them stad out from each other.

Contrast in shape

Contrast in colour

Contrast in scale

Contrast in layout

THE DESIGN PRINCIPLES

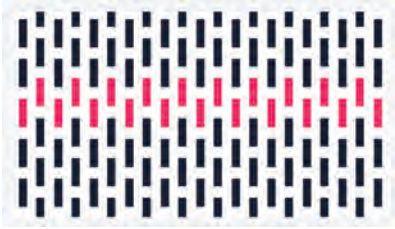
SCALE/PROPORTION

Proportion is the size of the elements in relation to one another. Larger elements tend to be seen as more important while smaller ones are seen as less so.

Size Ratio Divisions

REPETITION

Repetition reinforces an idea or perception. It can be achieved by repeating the same colours, shapes, images, objects, mark making techniques, and so forth.



Repetition changes perspective

EMPHASIS

Emphasis causes a certain part of a design to stand out compared to other elements. Conversely, it can also be used to minimise how much an element stands out.

Creating a focal point

WRITING ABOUT ART

CONTENTS

ART & DESIGN – WRITING ABOUT ART – KNOWLEDGE

KNOWLEDGE

What is the artist's name?
Where/when were they born? (this is important to put the work in context)
What do you know about the artist's background? (Life events/education/career)
When was the work created?
What is their style of work?
What does the artwork show?
Is the artwork part of a series?
Is there a theme? What is the theme about? (this could be researched or your own opinion)

EXAMPLE

Dutch Impressionist painter, Vincent Van Gogh was born on March 30th, 1893, in Zundert, a predominantly Catholic province of North Brabant in the Netherlands. Van Gogh created about 2,100 artworks, most of which date from the last two years of his life. They include landscapes, stilllifes, portraits and self-portraits, and are characterised by bold colours and dramatic, impulsive and expressive brushwork that contributed to the foundations of modern art. He was not commercially successful, and his suicide at 37 came after years of mental illness, depression and poverty.

The painting 'Starry Night' is one of the most recognized pieces of art in the world. Vincent van Gogh painted Starry Night in 1889 during his stay at the asylum of Saint-Paul-de-Mausole near Saint-Rémy-de-Provence. When in a state of depression Van Gogh incorporated darker colours and Starry Night is a wonderful example of this. Blue dominates the painting, blending hills into the sky. The small village lays at the base in the painting in browns, greys, and blues. Even though each building is clearly outlined in black, the yellow and white of the stars and the moon stand out against the sky, drawing the eyes to the sky.

ART & DESIGN – WRITING ABOUT ART – UNDERSTANDING

UNDERSTANDING

What is the main focus/where is your eye drawn to?
What formal elements have they used and how? Line, Colour, Shape, Form, Texture, Pattern, Tone...
How would you describe the composition?
If they have used people in their artwork, can you read any body or facial language?
How has the artist achieved the meaning, concept or message in the image?
What techniques has the artist used to create the meaning/concept or message?
What are your opinions of the work and why?
How does the piece of work make you feel?

EXAMPLE

The stars in the sky are the big attention grabber of the painting; the brightness of them, the swirling brushstrokes and the contrast between them and the blue-sky help make them stand out. It could be that Van Gogh simply wanted to breathe in the higher power into his art, as he grew up in a religious household, they could also represent hope. The village is painted with dark colours, but the brightly lit windows create a sense of comfort. The village is peaceful in comparison to the dramatic night sky and the silence of the night can almost be felt in Starry Night. Vince Van Gogh´s unique, thick brush strokes are very much obvious and it´s possible that his severe attacks further dramatized his brush work, this technique that adds even more depth as well as a rich texture to this work of art. The steeple dominates the village and symbolizes unity in the town. In terms of composition, the church steeple gives an impression of size and isolation. You cannot ignore the huge, curvy Cyprus tree positioned to the left in the foreground of the painting, Cyprus tress are typically associated with mourning. Personally, I believe that Van Gogh was showing that even with a dark night such as this it is still possible to see light in the windows of the houses. Furthermore, with shining stars filling the sky, there is always light to guide you. This is one of my favourite paintings by Van Gogh, I find the blues calming and the sky transfixes me.

ART & DESIGN – WRITING ABOUT ART – BEYOND & THE BIG QUESTION

BEYOND

What viewpoint has the artist used?
Are there any back stories as to how the work was made?
Does the artwork have depth or is it shallow?
What materials do you think they have used?
Can you think of any other materials they could have used?
What skills will you develop looking at this artist?
Could you approach the work using different techniques?
How could you experiment with the artists ideas further?

THE BIG QUESTION

How will you be influenced by this artists work when planning your own artwork?

EXAMPLE

Van Gogh painted The Starry Night during his stay at the Saint-Paul-de-Mausole asylum near Saint-Rémy-de-Provence in France, several months after suffering a breakdown. This painting is based on the view from his window, it appears that his room could have been high up or that the asylum was on a hill. Van Gogh was not allowed to paint in his room, so he created sketches of the view and used these alongside his memory. There is a great deal of depth to this painting, Van Gogh has achieved this by including the foreground, middle ground and the background. There is also depth and texture within the paint that Van Gogh has used, to achieve this he loaded his brush with oil paints to build up a thick, impasto texture. This impasto texture is a key feature in many of van Gogh's works. By creating work in response to Van Gogh I will develop my understanding of mark making, and colour, I will also develop my painting and drawing skills, and I think it will also provide me with the opportunity to be more expressive within my work. When planning my own work I will consider exaggerating certain elements like colour and perspective, if I paint light within my work I could use a strong colour contrast, like yellow and orange against blue. I could also use directional brushwork to create a sense of movement and turbulence in my painting and finally, I will consider repeating similar techniques and processes within my work, so that I can achieve a strong style.

ART & DESIGN – WRITING ABOUT ART – SENTENCE STARTERS

KNOWLEDGE

The artist… was born in…
Their parents were…
They studied at…
Events that may have influenced…
They are/were influenced by…
The painting is called…
It was completed in the year…
The work portrays…
This style of… is called…
Looking at this piece of work…
This painting is/isn't part of a series called…
When first looking at the painting I thought…
In the painting I can see the following: …
The subject of the painting is…
To me the artwork looks like…

UNDERSTANDING

My eye is initially drawn to….. Because…
In the piece the artist has created a… texture… by…
The colours used can be described as…
I can see the following shapes and forms…
There is limited use of… this suggests…
The artist uses space to create a feeling of…
The composition of the image suggests…
The composition style conveys…
The objects/people/scene looks… because the artist has…
The artist's use of… suggests…
I think he/she has done this to convey…
In my opinion…
It is in my view that…
This piece of artwork makes me feel…

BEYOND

I think the artist worked from… because…
The artist prepared for this work by…
I think the artist is trying to communicate…
There are/aren't any clear messages…
The reason I think this is because…
They have used…
It appears that…
They may have also used…
If they had used… It might have…
I could potentially use…
By looking at… I will develop my skills in…
It could also influence…
When creating my own work I will…

BIGGER PICTURE

This piece of art will influence how I…
Moving forward I think I will…
As a result of studying… I will…
This piece of art has made me consider…

These sentence starters can be used to help you form your artist research and analysis. You might not always be able to find the answer to all of the questions through research, some of the question require your thoughts and opinions. Always write in full sentences and evidence your thoughts and opinions.

ART & DESIGN – VOCABULARY

WORDS TO DESCRIBE ART

Realistic	Unrealistic
Abstract	Colourful
Abstraction	Linear
Expressive	Rounded
Impressionistic	Motion
Surreal	Messy
Still life	Organised
Portraiture	Geometric
Figurative	Structured
Non-Western	Fluid
Sculpture	Neat
Textile	Loud
Batik	Accurate
Appliqué	Disorganised
Glass	Graphic
Painting	Traditional
Mixed media	Modern
Ceramics	Contemporary

COMPOSITION

Balanced
Unbalanced
Skewed
Perspective
Plane
Proportion
Symmetry
Space
Scale
Foreground
Middle ground
Background
Decorative
Eye-line
Focus
Blurred
Form
Birds eye view

DRAWING

Line
Tone
Shading
Contour
Two-Dimensional
Three-Dimensional
Observational
Composition
Proportion
Perspective
Scale
Accuracy
Realistic
Outline
Mark-making
Sketch
Composition
Tracing
Impression

PAINTING

Wash
Watercolour
Acrylic
Oil
Brush strokes
Impasto
Drybrush

PRINTING

Monoprint
Etching
Intaglio
Lithograph
Woodcut
Block Printing
Lino Print
Linocut
Relief Print
Ink
Brayer

LIGHT

Natural
Artificial
Dark
Bright
Shadow
Low light
Dim

FEELING

Atmospheric
Expressive
Humorous
Disturbing
Refreshing
Nostalgic
Emotive
Depressing
Delicate
Sinister
Joyous

IDENTITY

CONTENTS

YEAR 9 - IDENTITY

BRIEF OVERVIEW OF TOPIC

In this project you will explore the theme identity.

You will begin by learning how to create portraits using various drawing techniques using pencil, pen, and colouring pencils.

You will focus on developing skills in representing tone, facial features and proportion.

You will also develop skills using paint, collage, photography and mixed media.

You will explore and analyse the work of a range of artists who use identity as inspiration for their art work, and then you will compose and create your own response showing an influence of their styles and techniques.

We will explore our own identities in order to produce our own individual pieces of work

ARTISTS WHO EXPLORE THE THEME IDENTITY

Fida Kahlo

Brno Del Zou

Dawoud Bey Class

Kehinde Wiley

Ed Fairburn

Erin Case

PLACES TO VISIT

Derby Museum & Art Gallery
The Quad
Castle Fine Art
Whitewall Galleries
Chatsworth House
Nottingham Contemporary
IKON Gallery
Wolverhampton Art Gallery
Tate Liverpool
Manchester Art Gallery

WEBSITES TO VISIT

www.npg.org.uk/
www.saatchigallery.com/
www.tate.org.uk
www.artsandculture.google.com
www.nationalgallery.org.uk
www.moma.org

YEAR 9 - INDENTITY

KEYWORDS	DEFINITIONS
Portrait	A **portrait** is a representation of a particular person. A self-**portrait** is a **portrait** of the artist by the artist.
Identity	Who you are, the way you think about yourself, the way you are viewed by the world and the characteristics that **define** you.
Personality	The combination of characteristics or qualities that form an individual's distinctive character.
Citizenship	The position or status of being a citizen of a particular country.
Ethnicity	The fact or state of belonging to a social group that has a common national or cultural tradition.
Nationality	The status of belonging to a particular nation. The **nationality** of a person is the place of birth; basically, it's an ethnic and racial concept.
Culture	The ideas, customs, and social behaviour of a particular people or society.

KEYWORDS	DEFINITIONS
Heritage	**Heritage** is a person's unique, inherited sense of family identity: the values, traditions, culture, and artifacts handed down by previous generations
Ancestor	a person, typically one more remote than a grandparent, from whom one is descended.
Individuality	The quality or character of a particular person or thing that distinguishes them from others of the same kind, especially when strongly marked.
Characteristic	A feature or quality belonging typically to a person, and serves to identify them, this could be a physical or non physical attribute.
Features	A distinctive attribute or aspect of something.
Expression	A look on someone's face that conveys a particular emotion
Proportion	Proportion refers to the dimensions of a composition and relationships between height, width and depth.

YEAR 9 – IDENTITY – KEHINDE WILEY

KEHINDE WILEY

Kehinde Wiley is a painter best known for his naturalistic portraits of African American men in heroic poses. Born in Los Angeles, CA, he earned his BFA from the San Francisco Art Institute and his MFA from the Yale University School of Art. Wiley was the first black artist to paint an official portrait of the president.

Kehinde Wiley's series 'A New Republic', raises questions about race, gender, and the politics of representation by portraying contemporary African American men and women using the conventions of traditional European portraiture.

Wiley's portraits of everyday men and women are based on specific paintings by Old Masters, replacing the European aristocrats depicted in those paintings with contemporary black subjects, drawing attention to the absence of African Americans from historical and cultural narratives. The subjects in Wiley's paintings often wear sneakers, hoodies, and baseball caps, gear associated with hip-hop culture, and are set against contrasting ornate decorative backgrounds that evoke earlier eras and a range of cultures. Through the process of "street casting," Wiley invites individuals, often strangers he encounters on the street, to sit for portraits. In this collaborative process, the model chooses a reproduction of a painting from a book and re-enacts the pose of the painting's figure. By inviting the subjects to select a work of art, Wiley gives them a measure of control over the way they're portrayed.






KEYWORDS

Identity	Floral	Expressive
Race	Pattern	Distinctive
Gender	Painting	Contemporary
Politics	Colourful	Evocative
Decorative	Vibrant	Reproduction
Contrasting	Ornate	

YEAR 9 – IDENTITY – ED FAIRBURN

ED FAIRBURN

Born November 15th 1989 in Southampton, England, Ed Fairburn graduated from Cardiff School of Art and Design in 2012. Ed Fairburn creates commissioned work, for both private and commercial clients.

In an age of smartphones, the art of reading a map is slowly being forgotten, but the Dorset-based artist reimagines maps, blueprints and star charts as canvases for his detailed portraits.

Ed Fairburn manipulates paper maps to construct other forms, usually portraiture. He calls this process topopointillism; a direct combination of topography and pointillism. Using traditional materials such as ink, paint and pencil, he makes gradual changes to the contours, roads and other patterns found in cartography. These changes allow him to tease out the human form, resulting in a comfortable coexistence of figure and landscape. He aims to preserve the functionality of each map by feeding the composition instead of fighting it – He often spend hours studying the terrain before he begins any physical processes.

Ed Fairburn is interested in the degree of subtlety behind each synchronisation, and the way in which a completed map behaves more like a portrait when viewed from further away – it's almost paradoxical that a portrait should lose detail when examined closely.

KEYWORDS	Ink	Human Form
Maps	Paint	Functionality
Blueprints	Pencil	Layered
Roads	Gradual	Patterns
Rivers	Contours	Line
Manipulate	Drawing	Tone

CONFLICT

CONTENTS

YEAR 9 - CONFLICT

BRIEF OVERVIEW OF TOPIC

In this project you will begin by exploring the theme conflict. We will look at various types of conflict, past and present, and look at how artists have responded.

You will conduct research and create a mind map, before beginning to study a variety of documentary photographers images. We will explore a current conflict and consider ways in which we can respond to it as artists, we will look at how we can convey messages within our work by applying various artists techniques.

You will work in a range of media to present your own ideas and responses that conveys a meaningful message.

You will learn a variety of drawing techniques, as well as collage, stencilling and painting techniques. You will also explore the art of contrast and juxtaposition of objects, imagery and materials.

ARTISTS WHO RESPOND TO CONFLICT

Guy Catling

Banksy

Pablo Picasso

Imranovi

Shepard Fairey

PLACES TO VISIT

National Memorial Arboretum

Derby War Memorial

War Memorial Museum

Derby War Memorial Garden

Imperial War Museum London (Virtual Tours)

WEBSITES TO VISIT

www.britishlegion.org.uk

www.theholocaustexplained.org/

www.un.org/en/

www.redcross.org.uk

www.artsandculture.google.com/project/street-art

YEAR 9 - CONFLICT

KEYWORDS	DEFINITIONS
Conflict	A conflict is a struggle between people which may be physical, or between conflicting ideas. Conflicts can either be within one person, or they can involve several people or groups. Conflicts arise because there are needs, values or ideas that are seen to be different, and there is no means to reconcile the dispute.
Violence	A behaviour involving physical force intended to hurt, damage, or kill someone or something.
Peace	A state or period in which there is no war or a war has ended.
Aggression	Feelings of anger or antipathy resulting in hostile or violent behaviour; readiness to attack or confront.
Reconciliation	The restoration of friendly relations.
Protests	a statement or action expressing disapproval of or objection to something.
Riot	a violent disturbance of the peace by a crowd

KEYWORDS	DEFINITIONS
Holy War	a war declared or waged in support of a religious cause.
Civil War	A war between citizens of the same country.
Just War	A war that is deemed to be morally or theologically justifiable.
United Nations	The **United Nations** is an international organization founded in 1945 after the Second World War by 51 countries committed to maintaining international peace and security, developing friendly relations among nations and promoting social progress, better living standards and human rights.
Leaders	People who lead or command groups, organizations, or countries.
Politics	The activities associated with the governance of a country or area, especially the debate between parties having power.

YEAR 9 – CONFLICT – GUY CATLING

GUY CATLING

Guy Catling is a graphic designer from the UK. He works with a variety of different mediums, including collage, photography, fashion and illustration. He has always had an interest in creating from a very young age and through many years of trial and error, he feels that he has established a style that is organic and from the heart. His clients vary from Urban Outfitters to Liberty of London.

Studying at University enabled him to gain a BA Hons in Graphic Design, which helped him to refine his skills and develop new interests in a variety of styles. This experience provided the foundations from which he built upon as a creative designer.

Guy Catlings workflow is heavily influenced by what he draws from his surroundings, which is how his style has evolved into what it is today. Whether he's immersed in architecture, the natural environment, pop culture, music or fashion, he is always observing, reflecting and growing as a designer. In particular, he finds nature and pattern a fascinating source of inspiration. Commenting on issues like war, terrorism and male dominance, Catling gives these photos a brighter, more cheerful take on their content and their history. With their floral appearance, these botches freshen up the images and their characters and add a lot of fun in them. The hippie notion of replacing guns with flowers is the main theme of these photos, in which the added details make even the shadiest character look like a lovely person.

KEYWORDS

War	Collage	Detail
Terrorism	Juxtaposition	Space
Male Dominance	Pattern	Selection
Monochrome	Floral	Composition
Photography	Irony	Landscape
	Contradiction	Historical

YEAR 9 – CONFLICT – SHEPARD FAIREY

SHEPARD FAIREY

Shepard Fairey is an American graphic artist and social activist who is part of the Street Art movement along with other artists including Banksy and Mr.Brainwash.

Fairey blurs the boundary between traditional and commercial art through type and image, communicating his brand of social critique via prints, murals, stickers, and posters in public spaces. “Art is not always meant to be decorative or soothing, in fact, it can create uncomfortable conversations and stimulate uncomfortable emotions,” he stated. Born on February 15, 1970 in Charleston, South Carolina, Fairey graduated from the Rhode Island School of Design in 1992 where he earned his Bachelor of Arts in illustration. In 1989 Fairey created the André the Giant Has a Posse sticker campaign, featuring a stylized image of the wrestler André the Giant. This project was the foundation for his seminal Obey series, which helped to push Fairey into the public spotlight. The artist is perhaps best known for his Hope (2008) campaign, which portrays a portrait of then-presidential candidate Barack Obama, in red, white, and blue. In 2017, the artist created a series of three posters— featuring portraits of culturally diverse women, again using a red, white, and blue colour scheme—in response to the xenophobic rhetoric of President-elect Donald Trump. Fairey currently lives and works in Los Angeles, CA. His works are included in the collections of the Smithsonian in Washington, D.C., the Los Angeles County Museum of Art, and the Victoria and Albert Museum in London.

KEYWORDS		
Street Art	Mixed Media	Political
Murals	Collage	Challenging
Stickers	Pattern	Equality
Posters	Spray Paints	Diversity
Prints	Controversial	Agenda

ART HISTORY

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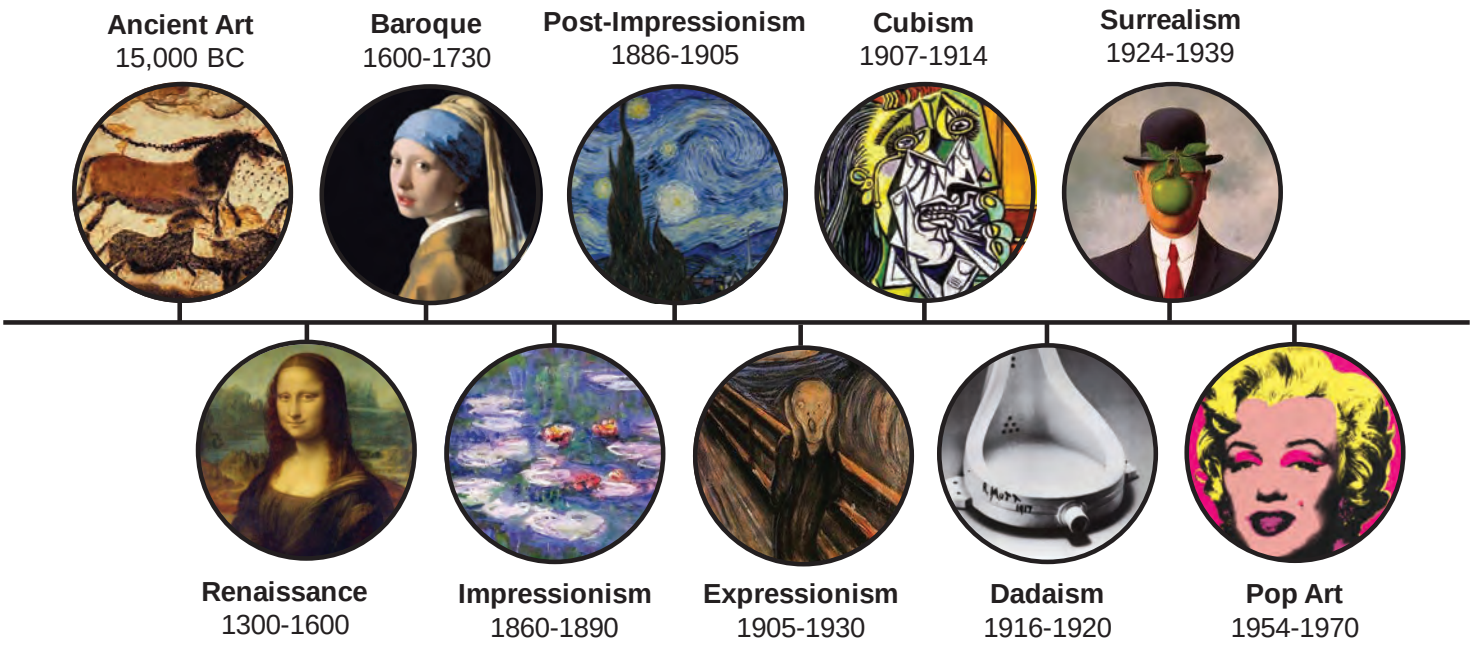
ART HISTORY – WESTERN ART TIMELINE



ART HISTORY – SURREALISM

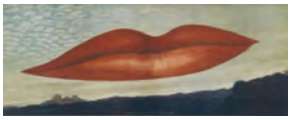
A twentieth-century literary, philosophical and artistic movement that explored the workings of the mind, championing the irrational, the poetic and the revolutionary.

FAMOUS SURREALIST ARTISTS

Salvador Dali
The Temptation of St Anthony1946

René Magritte
Son of Man
1964

Max Ernst
The Triumph of Surrealism
1937



Man Ray
A l'heure de l'observatoire: les amoureux1970

Yves Tanguy
My Life, White and Black 1944

Giorgio de Chirico
The Song of Love
1914

SURREALISM IN DETAIL

Unlike other creative movements, which can be characterized by themes of imagery, colour choices, or techniques, defining Surrealist art is slightly harder to do.

Surrealist artists seek to explore the unconscious mind as a way of creating art, resulting in dreamlike, sometimes bizarre imagery across endless mediums. The core of Surrealism is a focus on illustrating the mind's deepest thoughts automatically when they surface. This thought process for creating art known as "automatism." Many surrealist artists used automatic drawing or writing to unlock ideas and images from their unconscious minds, and others sought to depict dream worlds or hidden psychological tensions.

Over the years, Surrealism has resulted in a fascinating collection of artwork ranging from mythical landscapes, to obscure sculpture arrangements, to intriguing depictions of people and animals.

While 'surreal' is often used loosely to mean simply 'strange' or 'dreamlike', it is not to be confused with 'surrealist' which describes a substantial connection with the philosophy and manifestations of the surrealist movement.

ART HISTORY – SURREALISM

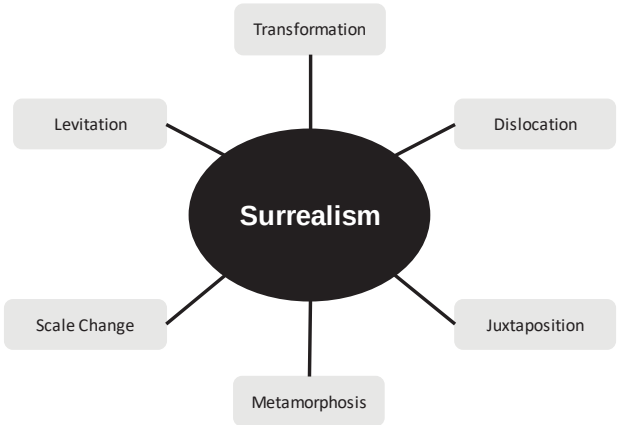
WHAT INSPIRED THE SURREALIST STYLE?

The poet Guilliame Apollinaire first devised the term "Surreal" in reference to the idea of an independent reality, existing "beneath" our conscious reality.

But the Surrealist movement initially surfaced in 1924 when French poet André Breton published his "Manifesto of Surrealism," influenced by the theories and writings on the unconscious mind by psychologist Sigmund Freud, the ground-breaking studies of Carl Jung, and the early 20th-century Dada movement.

While Surrealism started as a literary movement in the prose and poetry of Breton and others, visual artists such as Giorgio de Chirico, Pablo Picasso, Francis Picabia, and Marcel Duchamp embraced Surrealism and were recognized in Breton's 1925 publication, "La Révolution Surréaliste." Early Surrealists challenged the constraints of consciousness and rationality in order to liberate the unconscious mind—a "superior reality."

Throughout the 1920s, visual artists continued exploring Surrealist concepts in art, seeking complete creative freedom. The first-ever Surrealism exhibition, titled "La Peinture Surrealiste," took place in 1925 at the Galerie Pierre in Paris, firmly establishing the visual component of the movement.



ART HISTORY – SURREALISM

KEYWORDS	DEFINITIONS
Surrealism	a 20th-century avant-garde movement in art and literature which sought to release the creative potential of the unconscious mind
Juxtaposition	In visual arts, juxtaposition involves making the ordinary look extraordinary and represents one of the essential techniques in the Surrealism art movement. It is the placement of objects side by side that wouldn't ordinarily be together.
Conscious	The conscious mind involves all of the things that you are currently aware of and thinking about. It is somewhat akin to short-term memory and is limited in terms of capacity. Your awareness of yourself and the world around you are part of your consciousness.
Unconscious	The unconscious mind (or the unconscious) consists of the processes in the mind which occur automatically and are not available to introspection and include thought processes, memories, interests and motivations.

KEYWORDS	DEFINITIONS
Transformation	When someone or something changes in form or shape or appearance. Turning something familiar to unusual or strange.
Dislocation	Placing a familiar object into an unfamiliar setting. You would not expect to find a lobster sitting on a phone. Dislocation is often used with scale change.
Exquisite Corpse	a collaborative drawing approach first used by surrealist artists to create bizarre and intuitive drawings
Collaboration	A position or perspective from which something is seen.
Metamorphosis	When someone or something changes completely in form or state.
Levitation	An object appears to float or fly that could not in real life
Scale Change	Drastically altering an objects scale to intrigue or mystify us rather than to clarify the focal point.

ART HISTORY – SURREALISM – SALVADOR DALI

SALVADOR DALI 11 May 1904 – 23 January 23 1989

Salvador Dali was born in Figueres, Spain on May 11, 1904. Growing up he enjoyed drawing and he often got into trouble for daydreaming in school. Salvador began drawing and painting while he was still young. He painted outdoor scenes such as sailboats and houses. He also painted portraits. Even as a teenager he experimented with modern painting styles such as Impressionism. When he turned seventeen he moved to Madrid, Spain to study at the Academy of Fine Arts. Dali lived a wild life while at the academy. He hung out with a radical group of artists and got into trouble often. When he was close to graduation he was expelled for causing problems with the teachers. Not long after that, he was imprisoned for a short time for supposedly opposing the dictatorship of Spain.

Salvador continued to experiment and study different kinds of art. He explored classic art, Cubism, Dadaism, and other avant-garde painters. Eventually he became interested in Surrealism through artists such as Rene Magritte and Joan Miro. From this point he would concentrate much of his work on Surrealism and become one of the preeminent artists of the Surrealist movement. In 1931 Salvador Dali painted what would become his most famous painting and perhaps the most famous painting of the Surrealist movement. It is titled The Persistence of Memory. The scene is a normal looking desert landscape, but it is covered with melting watches.

ART HISTORY – SURREALISM – RENÉ MAGRITTE

RENÉ MAGRITTE 21 November 1898 – 15 August 1967

A Belgian surrealist painter, born in Lessines, Rene Magritte's witty and thought-provoking paintings sought to have viewers question their perceptions of reality, and become hypersensitive to the world around them. When Magritte was young his mother was suicidal, this led to Magritte's father locking her up in her room. One day, she escaped, and she was sadly found dead, having drowned herself. According to legend, 13 year old Magritte was there when they retrieved the body, and as she was pulled from the water, her dress covered her face. This later became a theme in many of Magritte's paintings in the 1920's, portraying people with cloth covering their faces. He went to study a the Royal Academy of Fine Arts in Brussels. He did not begin his actual painting career until after serving in the Belgian infantry. Magritte made a living producing advertisement posters, as well as creating forgeries of Picasso, Braque and Chirico paintings. His experience with forgeries also allowed him to create false bank notes during the German occupation of Belgium in World War II, helping him to survive the lean economic times. Through creating common images and placing them in extreme contexts, Magritte sough to have his viewers question the ability of art to truly represent an object. In his paintings, he often played with the perception of an image and the fact that the painting of the image could never actually be the object. His artistic interpretations influenced many modern artists, including Andy Warhol, Jan Verdoodt and Jasper Johns. His art, which was especially popular during the 1960's, has also influenced numerous songs, movies, and books.

ART HISTORY – SURREALISM – GIORGIO DE CHIRICO

GIORGIO DE CHIRICO 10 July 1888 – 20 November 1978

Giorgio de Chirico was born in Volos, Greece to Italian parents. His father was an engineer working on the construction of the Greek railway system and his mother was a noblewoman of Genoese origin. His parents encouraged his artistic development, and from a young age he took a strong interest in Greek mythology. Giorgio de Chirico was a pioneer in the revival of Classicism that flourished into a Europe-wide phenomenon in the 1920s. His own interest was likely encouraged by his childhood experiences of being raised in Greece by Italian parents. And, while living in Paris in the 1910s, his homesickness may have led to the mysterious, classically-inspired pictures of empty town squares for which he is best known. It was work in this style that encouraged him to form the short-lived Metaphysical Painting movement, along with the painter Carlo Carrà. His work in this mode attracted considerable notice, particularly in France, where the Surrealists championed him as a precursor. But de Chirico was instinctively more conservative than the Paris avant-garde, and in the 1920s his style began to embrace qualities of Renaissance and Baroque art, a move that soon drew criticism from his old supporters. For many years afterwards, the Surrealists' disapproval of his late work shaped the attitude of critics. The artist's reputation was also not helped by his later habits of creating new versions of his Metaphysical paintings and of backdating his work, as if those pictures had been created back in the 1910s. In recent years, however, his work of that period has attracted more interest, and it was certainly influential on a new generation of Italian painters in the 1980s.

ART HISTORY – POP ART

Pop art is an art movement that emerged in the 1950s and flourished in the 1960s in America and Britain, drawing inspiration from sources in popular and commercial culture. Different cultures and countries contributed to the movement during the 1960s and 70s

FAMOUS POP ART ARTISTS

Andy Warhol
Campbell's Soup I
1968

Roy Lichtenstein
Drowning Girl
1963

Claes Oldenburg
Giant BLT
1963

Peter Blake
The Beetles: Sgt Pepper
Album Cover 1967

Richard Hamilton
Interior
1964

David Hockney
A Bigger Splash
1967

POP ART IN DETAIL

Emerging in the mid 1950s in Britain and late 1950s in America, pop art reached its peak in the 1960s. It began as a revolt against the dominant approaches to art and culture and traditional views on what art should be. Young artists felt that what they were taught at art school and what they saw in museums did not have anything to do with their lives or the things they saw around them every day. Instead they turned to sources such as Hollywood movies, advertising, product packaging, pop music and comic books for their imagery. Modernist critics were horrified by the pop artists' use of such 'low' subject matter and by their apparently uncritical treatment of it. In fact pop both took art into new areas of subject matter and developed new ways of presenting it in art and can be seen as one of the first manifestations of postmodernism.

AMERICAN POP VS. BRITISH POP

Although they were inspired by similar subject matter, British pop is often seen as distinctive from American pop. Early Pop Art in Britain was fuelled by American popular culture viewed from a distance, while the American artists were inspired by what they saw and experienced living within that culture. In Britain, the movement was more academic in its approach. While employing irony and parody, it focused more on what American popular imagery represented, and its power in manipulating people's lifestyles. The 1950s art group The Independent Group, is regarded as the precursor to the British Pop art movement.

ART HISTORY – POP ART

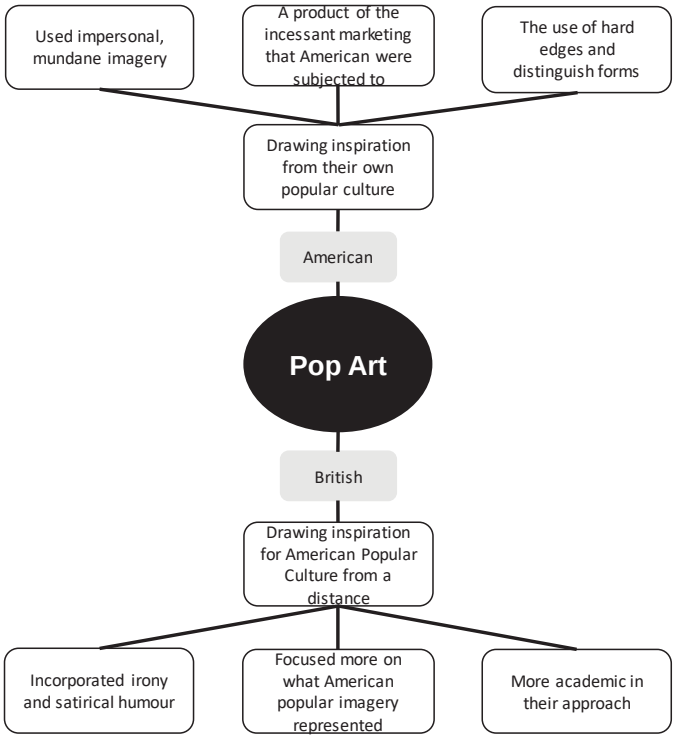
WHAT INSPIRED THE POP ART STYLE?

LONDON

In 1952, a gathering of artists in London called the Independent Group regularly met and discussed topics such as mass culture's place in fine art, the found object, and science and technology. Members included Eduardo Paolozzi, Richard Hamilton, architects Alison and Peter Smithson, and critics Lawrence Alloway and Reyner Banham. Britain in the early 1950s was still emerging from the austerity of the post-war years, and its citizens were unsure about American popular culture. While the group was wary of its commercial character, they were excited about the rich world pop culture seemed to promise for the future. The imagery they discussed at length included that found in Western movies, science fiction, comic books, billboards, automobile design, and rock and roll music.

NEW YORK

By the mid 1950s, the artists working in New York City faced a critical moment in modern art: follow the Abstract Expressionists or rebel against the strict formalism backed by many schools of modernism. By this time, Jasper Johns was already troubling conventions with abstract paintings that included references to: "things the mind already knows" - targets, flags, handprints, letters, and numbers. Meanwhile, Robert Rauschenberg's "combines" incorporated found objects and images, with more traditional materials like oil paint. These artists, along with others, later became grouped in the movement known as Neo-Dada. The now classic New York Pop art of Roy Lichtenstein, Claes Oldenburg, James Rosenquist, and Andy Warhol emerged in the 1960 in the footsteps of the Neo-Dadaists.



ART HISTORY – POP ART

KEYWORDS	DEFINITIONS
Pop Culture	Is culture which interests the general masses of people. It is influenced and spread by mass media. People experience or learn popular culture by hearing popular music on the radio, watching television, playing video games, or reading popular books and magazines.
Icons	A person or thing regarded as a representative symbol or as worthy of admiration.
Consumerism	Is the idea that increasing the consumption of goods and services purchased in the market is always a desirable goal and that a person's wellbeing and happiness depend fundamentally on obtaining consumer goods and material possessions.
Post – Modernism	Alate 20th-century style and concept in the arts, architecture, and criticism, which represents a departure from modernism and is characterized by the self-conscious use of earlier styles and conventions, a mixing of different artistic styles and media, and a general distrust of theories.

KEYWORDS	DEFINITIONS
Commonplace Objects	Items you use everyday, or forms a regular and basic part of your life, so it is not especially interesting or unusual.
Irony	A statement or situation where the meaning is contradicted by the appearance or presentation of the idea.
Satire	The use of humour, irony, exaggeration, or ridicule to expose and criticize people's stupidity or vices, particularly in the context of contemporary politics and other topical issues.
Mixed Media	A variety of materials used in a work of art.
Soft Sculpture	Soft sculpture is a type of sculpture made using cloth, foam rubber, plastic, paper, fibres and similar material that are supple and non rigid.
Mass Media	Refers to media technologies used to disseminate information to a wide audience. The messages are communicated through television, movies, advertising, radio, the internet, magazines, and newspapers

ART HISTORY – POP ART – ANDY WARHOL

ANDY WARHOL 6 August 1928 – 22 February 1987

Born Andrew Warhola, in the neighbourhood of Oakland in Pittsburgh, Pennsylvania, Warhol's parents were Slovakian immigrants. His father, Andrej Warhola, was a construction worker, while his mother, Julia Warhola, was an embroiderer. They were devout Byzantine Catholics who attended mass regularly and maintained much of their Slovakian culture and heritage.

When he graduated from college with his Bachelor of Fine Arts degree in 1949, Warhol moved to New York City to pursue a career as a commercial artist. It was also at this time that he dropped the "a" at the end of his last name to become Andy Warhol. He landed a job with Glamour magazine in September, and went on to become one of the most successful commercial artists of the 1950s. He won frequent awards for his uniquely whimsical style, using his own blotted line technique and rubber stamps to create his drawings.

In the late 1950s, Warhol began devoting more attention to painting, and in 1961, he debuted the concept of "pop art" — paintings that focused on mass-produced commercial goods. In 1962, he exhibited the now-iconic paintings of Campbell's soup cans. These small canvas works of everyday consumer products created a major stir in the art world, bringing both Warhol and pop art into the national spotlight for the first time.

ART HISTORY – POP ART – ROY LICHTENSTEIN

ROY LICHTENSTEIN 27 October 1923 – 29 September 1997

Roy Lichtenstein was born in New York in 1923. He became famous for his bright and bold paintings of comic strip cartoons as well as his paintings of everyday objects. He was one of a group of artists making art about 'popular' things such as TV, celebrities, fast food, pop music and cartoons.

Although best known as a painter, he made different types of art including sculpture, murals, prints and ceramics.

Lichtenstein chose colours carefully, to imitate the four colours of printers' inks. He also used Ben Day dots, a system invented to increase the range of colours available to newspaper printing.

Lichtenstein is famous for his use of cartoon strips from American comic books, which were very popular the 1950s. He admired the skill of the comic book artist, who could create complex stories of love and war in cartoon form.

He was sometimes accused of copying comics exactly, but he said that he made changes to the pictures – right down to the tiniest placement of individual dots. He was also criticized for using very basic painting techniques.

ART HISTORY – POP ART – CLAES OLDENBURG

CLAES OLDENBURG 28 January 1929 – Present

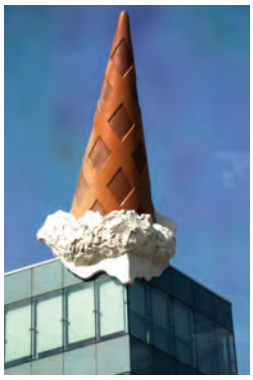
Claes Oldenburg is a Swedish-born American Pop-art sculptor, who is best known for his giant soft sculptures of everyday objects.

He studied literature and art history at Yale University from 1946 to 1950, then returned to Chicago where he took classes at The School of the Art Institute of Chicago.

He saw himself as a realist, not as an abstract artist. He felt art must relate to the realities of everyday life. Yet he took objects from the real world and placed them out of context, making them soft when they should be hard, large when they should be small.

Strongly influenced by the writings of Sigmund Freud, Oldenburg underwent an intense period of self-analysis between 1959 and 1961. He carefully recorded his discoveries in notebooks, often including illustrative sketches. This endeavour helped him to shape his approach to art.

Oldenburg's style changed and developed over the years. He worked in a variety of modes, including drawing, painting, film, soft sculpture, and large scale sculpture in steel. After 1959 he was influenced by the theatre. His involvement in "happenings" in the early 1960s resulted from his interest in both participatory art and Freudian free association.



ART HISTORY – POP ART – PETER BLAKE

PETER BLAKE 25 June 1932 – Present

British artist Sir Peter Thomas Blake is often called the "Godfather of British Pop art." Born in Dartford, Kent, he is best known for co-creating the sleeve design for the Beatles' album Sgt. Pepper's Lonely Hearts Club Band. Like many artists of his time, he came of age in a country recovering from the war, so much of his interests were drawn toward the bright and happy lifestyle that was being touted in America via a booming advertising industry utilizing ground-breaking new methods such as screen-printing to create optimistic and bold renditions of life in magazines, on posters, and on billboards.

His early training as a graphic designer coupled with a rich education in more historical modes of art allowed him to blend his obsessions with the new youthful popular culture and pop music scene in swinging London with foundational art references from the past into a form of urban realism that was fresh. This challenged the status quo's idea about what constituted art and broke down barriers between traditional fine art and the new cutting edge field of Pop.

As he progressed in his career, he continued to make work that gave respectful nods to the past cultural lexicon yet which remained equally engrossed in what lay on the horizon, reflecting man's ongoing experience of being prone to the external influences of past, present, and future.

Year 9 Drama and Dance Knowledge Organiser

Year 9 Drama – Unit 1: Exploring a Script : DNA

Keywords for the unit

Naturalism
A style of Drama from Victorian times onward, where the actor and the action has to be totally believable and realistic, convincing the audience what they are watching is real.

Stanislavski
Konstantin Stanislavski – a Russian actor, direct, theorist who developed the idea of naturalism and came up with a list of rehearsal techniques to create more realistic performances on stage

Proxemics
The performance space and how we use it. How the actors arrange themselves in relation to space. How close the actors stand to each other and what that tells the audience about their character relationships.

Semiotics
Symbolism on the stage as a way to communicate meaning. E.g Red light to show danger, a heartbeat to create tension, a top hat to show a wealthy person.

Empathy
is the ability to emotionally understand what other people feel, see things from their point of view, and imagine yourself in their place. Essentially, it is putting yourself in someone else's position and feeling what they must be feeling.

Moral Dilemma
a situation in which a person is torn between right and wrong. A **moral dilemma** involves a conflict with the very core of a person's principles and values. The choice the person makes may leave them feeling burdened, guilty, relieved, or questioning their values.

Keywords	VOICE
Tone	The emotion in your voice
Pitch	How high/low your voice is
Pace	How fast/ slow your voice is
Pause	When you stop moving/ speaking
Volume	How loud/ quiet your voice is
Projection	When you speak clearly and can be heard by an audience

Keywords	MOVEMENT
Gestures	How you move any part of your body to show a mood, feeling or idea
Facial expressions	Using your face to show emotions, mood, feelings and responses
Eye contact	When you establish eye contact with another actor or the audience
Posture	How you hold your body/your stance

Year 9 Drama – Unit 2 : Devising Drama: Exploring Practitioners – Bertolt Brecht

Key words for this unit

Bertolt Brecht
A German director and playwright who had strong political views and was anti –Nazi in the 1930's. He developed a new style of drama that was more political and used 'abstract' techniques

Multi-rolling
When an actor plays more than one part in a play.

Placards
A technique developed by Brecht when a character holds signs or banners explaining where or when the play is set, giving facts about a character or how they are feeling

Alienation
Distancing the audience emotionally from the scene and making them think about the moral of the scene instead.

Breaking the Fourth Wall
When an actor talks directly to the audience- acknowledges their presence in the theatre.

Social Change
To raise awareness about the **impact** of **social** issues such as injustice, war or prejudice through protest or confrontation in the hope that you can change things for the better.

Keywords	VOICE
Tone	The emotion in your voice
Pitch	How high/low your voice is
Pace	How fast/ slow your voice is
Pause	When you stop moving/ speaking
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Posture	How you hold your body/your stance

Year 9 Drama – Unit 3 : Individuality Exploring a theme through Drama

Key words for this unit

Conflict
Argument or tension resulting from different social or political opinions

Individuality
Not conforming to expected norms. Celebrating being or feeling different.

Solidarity
A group of likeminded people supporting each other in a time of conflict

Discrimination
Showing prejudice and treating people differently because of their race, colour, religion, sexuality, politics

Evaluation
Forming a clear set of opinions on a piece of work and being able to say why you have those opinions,.

Keywords	VOICE
Tone	The emotion in your voice
Pitch	How high/low your voice is
Pace	How fast/ slow your voice is
Pause	When you stop moving/ speaking
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Keywords	MOVEMENT
Gestures	How you move any part of your body to show a mood, feeling or idea
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Year 9 Dance – Dance Skills

Constructive Feedback

Positivity
State something that you enjoyed.

Improvement
Identify something that needs making better.

Target
State specifically what can be done to make the work better.

Technical Skills-
Required to perform a dance movement.

Keywords	
Accuracy	A being correct and precise.
Timing	The use of counts when moving to sound or music.
Dynamics	How a movement is performed.

Physical Skills-
Required to perform physical activity.

Keywords	
Strength	The power exerted by a muscle.
Stamina	Being able to maintain physical energy for a period of time.
Posture	The way the body is held.
Balance	A steady or held position through even distribution of weight.
Coordination	Efficient combination of body parts.
Extension	Lengthening a muscle or limb.
Flexibility	The range of movement at a joint.

Year 9 Dance – Dance Skills

Expressive Skills-
Required to connect with an audience.

Key Words	
Focus	The use of eyes to enhance performance.
Facial Expression	The use of face to communicate mood, theme and atmosphere.
Projection	The energy a dancer uses to connect with an audience.

Choreography Skills-
Required to create a dance.

Key Words	
Unison	2 or more dancers performing movement at exactly the same time
Canon	When the same movements overlap in time.
Formation	Shapes or patterns created in space by dancers
Pathway	Designs traced on the floor or in the air
Level	Distance from the ground – low, medium or high
Direction	The way a movement faces
Solo	One performer
Duet	Two Performers
Trio	Three Performers
Group	Three or more Performers.
Still Image	A held position or image.
Climax	The most significant moment of a dance.

Year 9 Dance – Unit 1: Swan Song

Key Information

Christopher Bruce
British choreographer and performer, well known for creating performances with a political message.

Swan Song
Created in 1987. 32 minutes long. 3 dancers (trio).

Variety of dance styles including ballet, contemporary, jazz, tap, gymnastics and ballroom.

The theme is open to interpretation, however there is clearly a victim and 2 interrogators.

It is suggested it is set in a prison, as the interrogators wear khaki green shirts and trousers and the victim wears blue jeans and a red t shirt, signifying blood. There is also use of a chair and canes.

Key themes include victimisation, manipulation, torture, anger and frustration.

The music used are a combination of every day sounds such as gun shots and use of silence.

Key Words	
Contact Work	Contact work is using resistance, weight, counterbalance and support to create movements with at least two or more dancers.
Prop	A prop is an object which is used within a performance.
Characterisation	Creation of a character through use of gesture, facial expression, posture, body language and emotion.
Canon	Performing a movement at different times, after another dancer has previously performed it. For example, like a Mexican wave.
Unison	Performing the same movement at exactly the same time as other dancers.
Call and Response	An individual dancer or group of dancers performing a movement, then another individual or group of dancers, responding with a movement in response to the original movement performed by the original individual or group.

Year 9 Dance – Unit 2: Thriller

Key Information

Thriller (1983)
The song 'Thriller' was written, directed and performed by Michael Jackson.

The video is approximately 15 minutes long, still one of the longest music videos ever to be created.

The video references numerous horror films and tells the story of the dead coming to life.

Michael Jackson wanted to create a film experience to go alongside his song and was one of the first artists to do this. He changed the music industry with this idea.

Michael Jackson created his own unique dance style which is widely recognised.

Key Words	
Motif	A movement which represents a theme or idea which is seen and repeated throughout a choreography.
Motif Development	Ways to develop a motif to create a larger sequence of choreography.
Travel	A movement which gets a dancer from one place to another.
Characterisation	Creation of a character through use of gesture, facial expression, posture, body language and emotion.
Canon	Performing a movement at different times, after another dancer has previously performed it. For example, like a Mexican wave.
Unison	Performing the same movement at exactly the same time as other dancers.
Call and Response	An individual dancer or group of dancers performing a movement, then another individual or group of dancers, responding with a movement in response to the original movement performed by the original individual or group.

Year 9 Dance – Unit 2: Thriller

Key Features of Michael Jackson's Dance Style-

Glides and Slides

Moon Walk

Popping

Isolation of the Body

Spin on the Spot

Toe Stand

Body Ripple

Freeze Frame

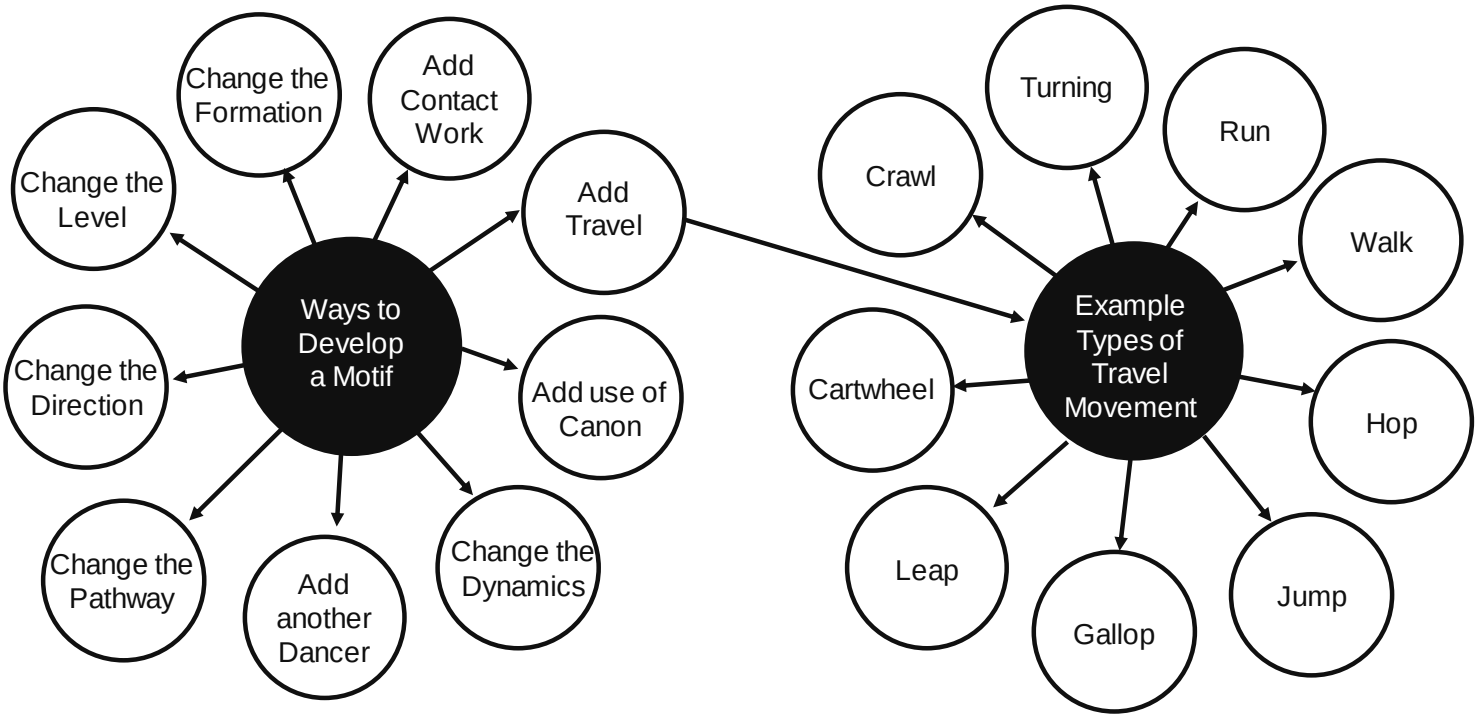
Early form of Hip Hop

Sharp, Strong Dynamics

Use of Prop

Key Motifs used in Thriller	
Claw Hands	Use of the hands in a claw position which often swing from side to side on a medium to high level.
Isolation of Head and Shoulders	Individually moving individual parts of the body such as turning the head to the side, lifting and dropping the shoulders and moving the chin from side to side. This can be done on all levels.
Footwork	Crossing the feet by stepping one foot in front of the other and tapping the opposite foot out to the side. This is usually performed on a low level.
Crouches	Bending down towards the floor to create a ball position. This is performed on a medium to low level.
Bending of the Knees	Straightening and bending the knees when stood in a position to create a bouncing dynamic. This is done on a medium to high level.

Year 9 Dance – Unit 2: Thriller



Year 9 Dance – Unit 3: Emancipation of Expressionism

Key Information-

Choreography
Emancipation of Expressionism (EOE)

Choreographer
Kenrick H2O Sandy

Created
2013

Dance Style
Hip-Hop, Krumping, Popping, Locking, Animation, Breaking & Waacking Techniques. Taking influence from other styles such as contemporary.

Themes
Sharing an emotional journey of finding individuality and expression. Appreciating Hip-Hop as an art form.

Dancers
17: 8 female & 9 male.

Length
11 minutes.

Costume
Blue jeans, pastel blue t shirt, accessories such as jewellery to represent individuality, hair tied back to show facial expressions.

Structure of EOE	
1. Genesis	Represents the start of life and the idea of being in the womb and finding the initial energy and movements.
2. Growth & Struggle	Represents the struggle for recognition which we can have as individuals. Shows a competition for individuality & expression. Takes the use of a rugby scrum showing support for an individual who is unsure of who they are.
3. Connect and Flow Between People	Sharing of energy and flow between two dancers. Representing the connections, which we have between individuals. Sometimes the energy is shown as an individual, but sometimes it is shared as a group.
4. Empowerment	The energy is captured and showcased as a group. Represents the idea of empowerment and the dancers coming together as a whole.

Year 9 Dance – Unit 3: Emancipation of Expressionism

B Point Choreography

A key method used in creating movement for Emancipation of Expressionism.

The idea of the body (hence the name B) being broken down into individual parts and numbered.

The dancers then use the hands to hit specific numbers (areas) on the body, to create a sequence of movement, in a quick and fast rhythm.

Uses isolation and sharp, strong and fast dynamics.

Effective and simple choreography for a group of people.

Uses canon to add further choreographic development.

Key Motifs used in EOE	
Ninja Walk	Running on the spot in 1 count. Arms slicing backwards & forwards in a 90-degree angle, in a running motion, in counts of 2. Sharp, fast dynamics. Medium to high level.
Ninja Glide	Stepping and sliding from one side to the other using the slicing arms from the Ninja Walk. Performed in various counts. Sharp, sustained, strong dynamics. Medium to high level.
Ninja Static	Upper body moving with the slicing arms from Ninja Walk, lower body static. Performed usually in 2 or more counts. Sustained, strong, fluent dynamics. Medium to high level.
Chariots of Fire	Crossing arm action low to the left, open to the right, cross high to the left and high to the right. Performed in 4 counts. Sharp, strong, fast dynamics. Medium to high level.

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Year 9 Technology Knowledge organiser

Year 9 Technology – Metal Fabrication Project (1)

Material Categories

Ferrous Metals

Metals that contain iron, are usually magnetic and rust

Non-Ferrous metals

Metals without iron, are usually non magnetic and don't rust

Alloys

Metals made up from mixing 2 or more metals together to combine properties

Thermoplastics

Plastics that can be reheated and shaped many times

Thermosetting Plastics

Plastics that can only be heated and shaped once

The Brazing Process

Heating metals parts up using a blow torch until hot enough for brazing rod to be melted over the join, connecting them together

Keywords	
Hardness	Ability to resist surface scratches
Ductility	Ability to be stretched out into a wire
Plasticity	Ability to be shaped or moulded
Malleability	Ability to be shaped without breaking
Toughness	Ability to withstand impact
Brittleness	Ability to be easily damaged

Year 9 Technology – Metal Fabrication Project (2)

Keywords	
Brazing	Method of joining metal parts together using heat
Injection Moulding	Heating up plastic and forcing into a mould to make parts
Pickling	Method used to clean the surface of metal
Electroplating	Process of coating a metal with a layer of another metal using electricity
Galvanising	To cover a metal with zinc
Hardening	Heating metals to make them get harder
Tempering	Heating and cooling metals to make them less brittle
Annealing	Heating and cooling metal to make it tougher
Normalising	Heating and cooling metal to make it more ductile
Fabricating	To construct something from prepared parts
Powder Coating	To heat a part then cover in a fine layer of plastic particles to produce a coating
Press Forming	To use moulds to press a sheet of material into a required shape

Year 9 Technology – Metal Fabrication Project (3)

Metal work tools

Tin snips
Used to cut sheet metal

Safety Goggles
Must be work when brazing to protect your eyes

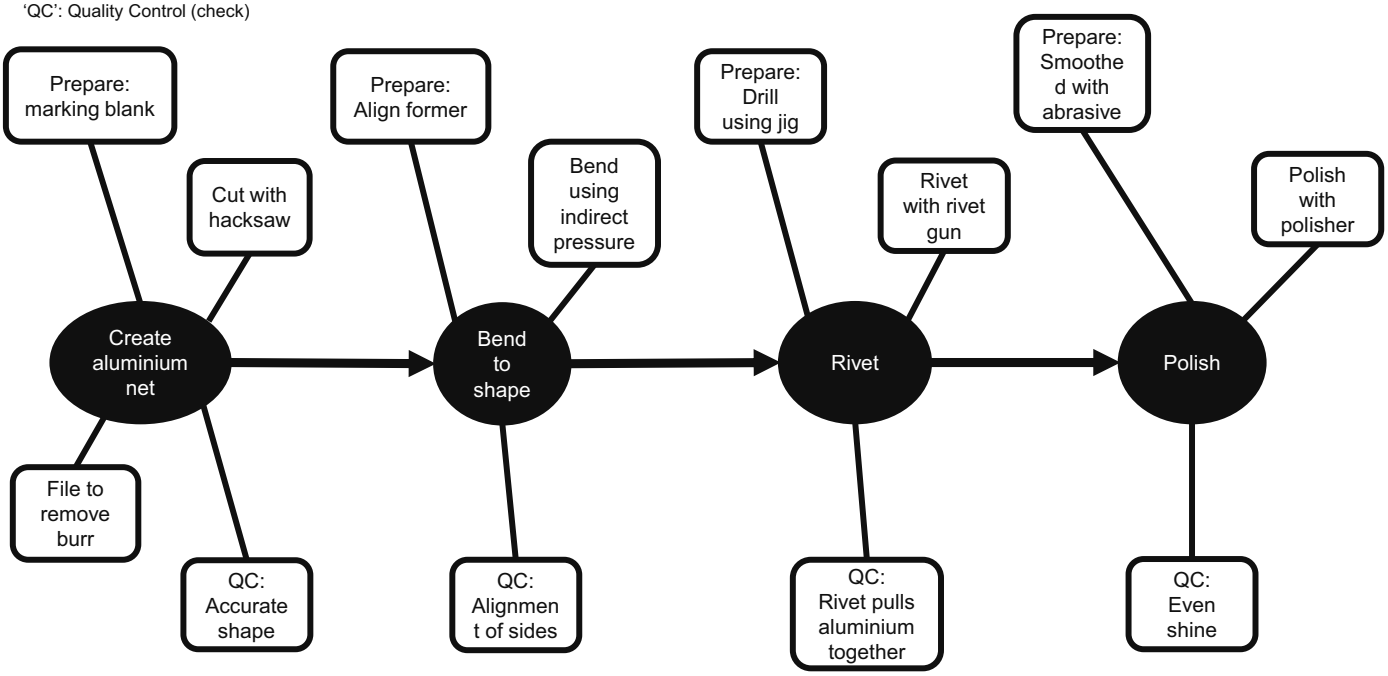
Hand files
Used to abrade the edges of the sheet metal until smooth

Powder coating
Used to coat metal objects with a thin plastic coating to prevent them from rusting

Year 9 Technology – Metal Fabrication Project (4)

Fabricating the aluminium box

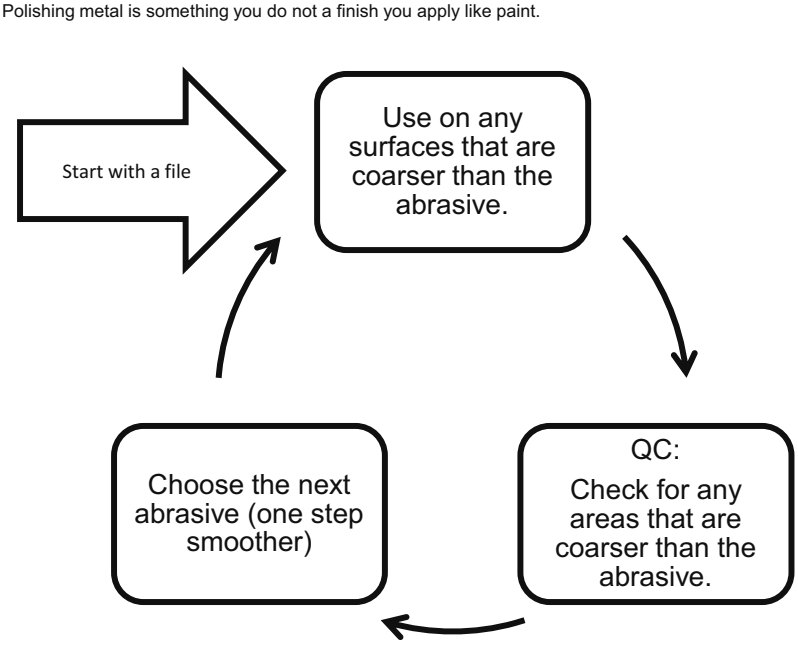
This shows the stages of producing your sample box.
'QC': Quality Control (check)

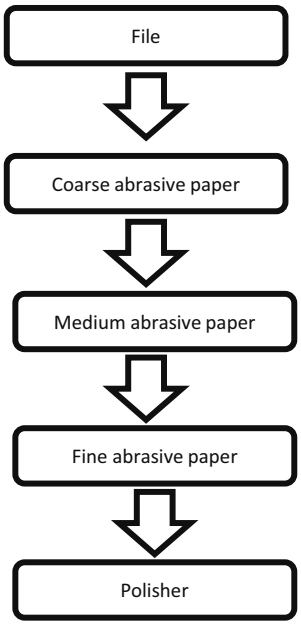


Year 9 Technology – Metal Fabrication Project (5)

Achieving a polished finish

Polishing is a process of gradually removing scratches until none remain and the surface shines.
Polishing metal is something you do not a finish you apply like paint.

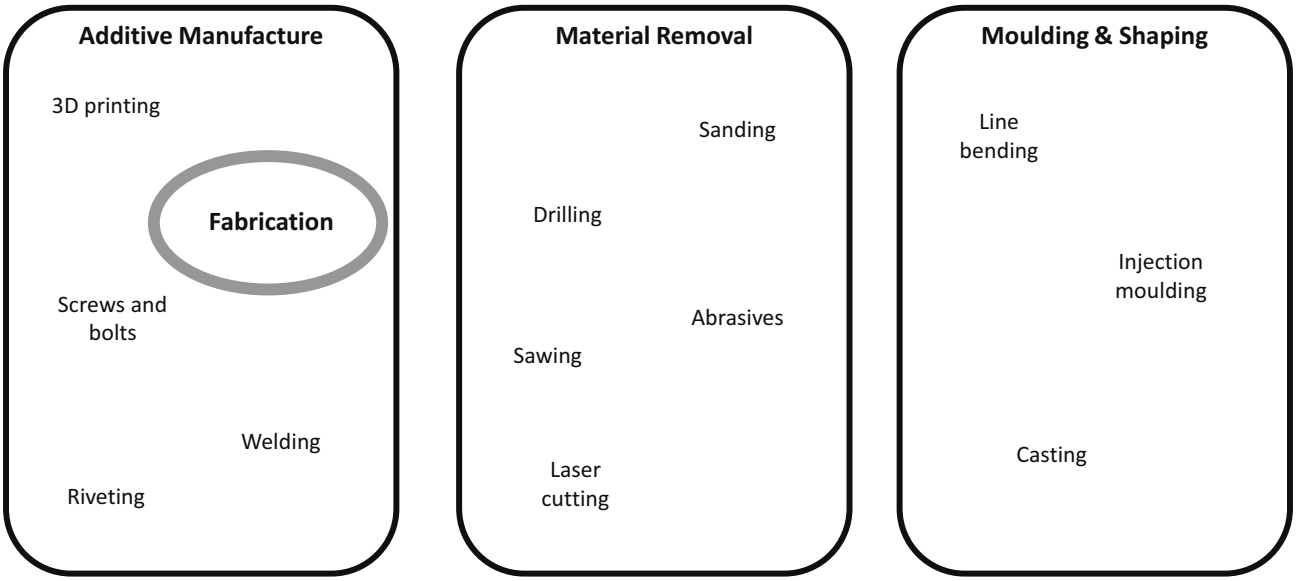




Year 9 Technology – Metal Fabrication Project (6)

Ways of Manufacturing

Manufacturing processes fall into 3 main categories



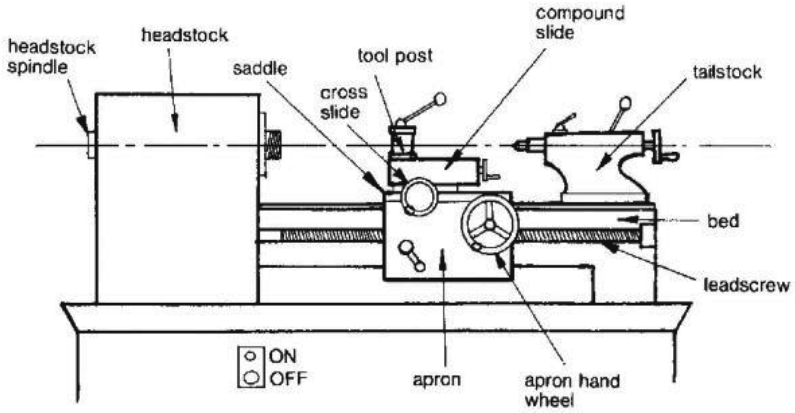
Year 9 Technology – Metal Fabrication Project (7)

Methods of Fixing

Some are temporary (removable) and others are permeant
Some fix at a single point, some on a seam (line).

	Temporary	**Permanent**
Point	Screw Bolt Dowel	Spot weld Rivet Dowel glued
Seam	[None]	Welding Brazing Soldering
Area	[None]	Bonding (glue)

Year 9 Technology – Engineering Project - Phone Stand (1)



The Turning Process

To use a centre lathe to spin materials around so you can cut into them to create specific shapes

Keywords	
Facing off	To use the centre lathe to make the end of the work piece totally smooth
Turning down	To use the centre lathe to reduce the diameter of the workpiece to a desired measurement
External screw thread	A groove that is cut around the external face of a cylindrical part to allow a nut to be screwed onto it
Internal screw thread	A groove that is cut around the internal face of a hole to allow a bolt to be screwed into it

Year 9 Technology – Engineering Project – Phone Stand (2)

The Milling Process

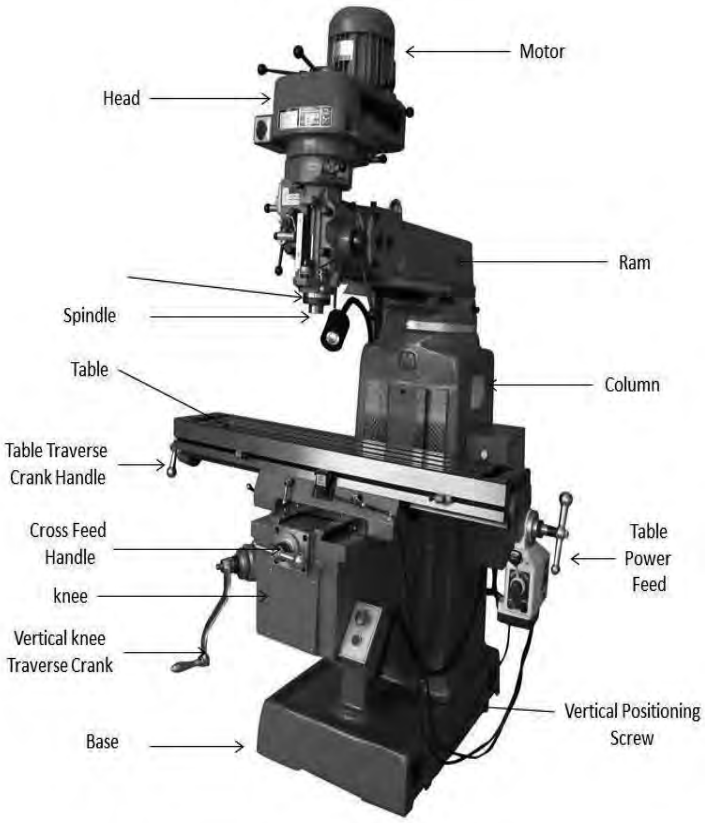
To cut or shape metal using a rotating tool in a milling machine

Horizontal Milling Machine

In horizontal mills, the cutters are mounted on a horizontal spindle across the table. Many horizontal mills also feature a built-in rotary table that allows milling at various angles

Vertical Milling Machine

In vertical mills, the spindle axis is vertically oriented. Milling cutters are held in the spindle and rotate on its axis. The spindle can be extended, or the table raised or lowered to produce the same effect, allowing for plunge cuts and drilling. Vertical milling machine have a stationary spindle, and the table is moved both perpendicular and parallel to the spindle axis to cut.



Year 9 Technology – Engineering Project – Phone Stand (3)

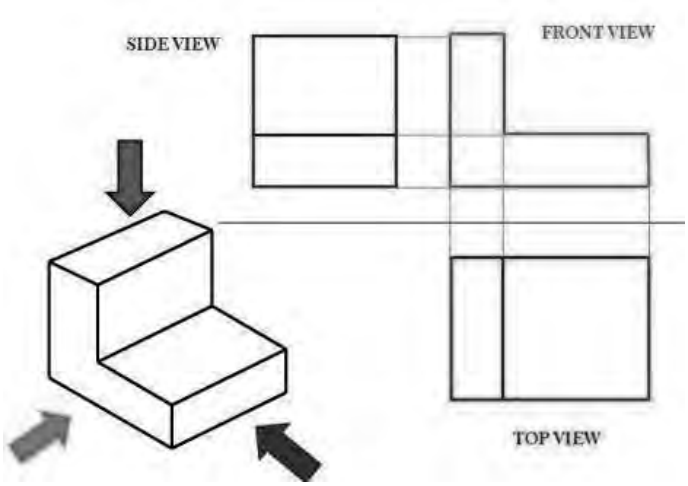
Orthographic Projection

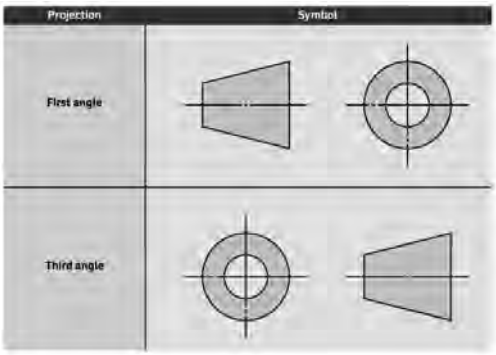
A technical drawing that shows apart from the top, side and end and contains information about the dimensions and how parts should be made. Dimensions are always in mm.

Orthographic projections are working drawings in either a first or third angle projection and show each side of a design without perspective, a 2D drawing of a 3D object.

Construction lines show where areas join and are used to draw a side and plan (top) view, ensuring that the drawing is accurate from all angles.

First and third angle projections use these symbols on a diagram to indicate which projection they are.





Outlines	
Construction lines	
Hidden details	
Dimension arrow	3 cm
Centre line	

Year 9 Technology – Engineering Project – Phone Stand (4)

CNC Machining

CNC stands for – Computer Numerical Control and the machine that you will use is called a CNC Lathe

A CNC lathe is used to make cylindrical components and can also do threads and chamfers

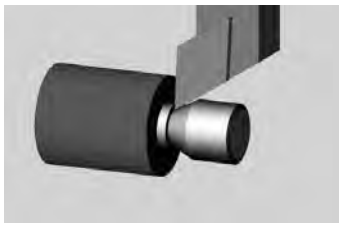
It works by using a program that contains information called G-Codes. These are a set of instructions that the computer can read

Year 9 Technology – Engineering Project – Phone Stand (5)

G-Codes and Simulation

G Codes is a language in which people tell CNC machines how to make something. The "how" is defined by G Code instructions provided to a machine controller that tells the motors where to move, how fast to move and what paths to follow.

Simulation is used to check the programming before the CNC starts to manufacture the component. This is used to ensure that there is no errors within the programming.

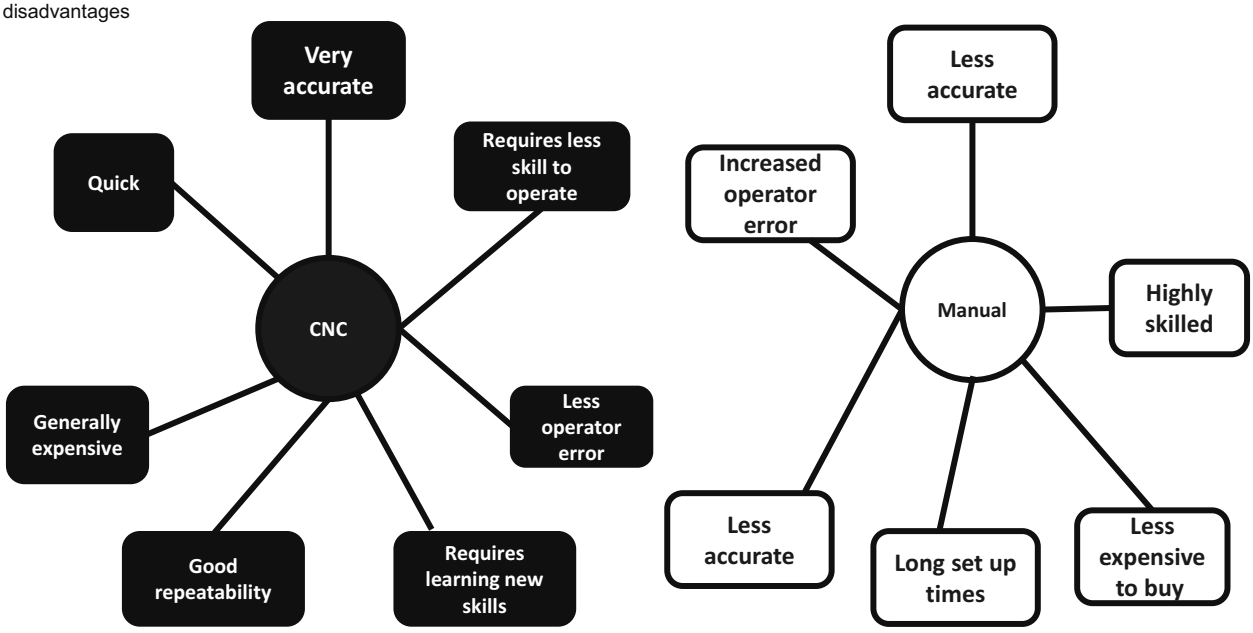


Year 9 Technology –Engineering Project – Phone Stand (6)

Comparing CNC machining to Manual machining

Traditionally manual machines were always used to make certain products, now we very often use CNC or automatic machines

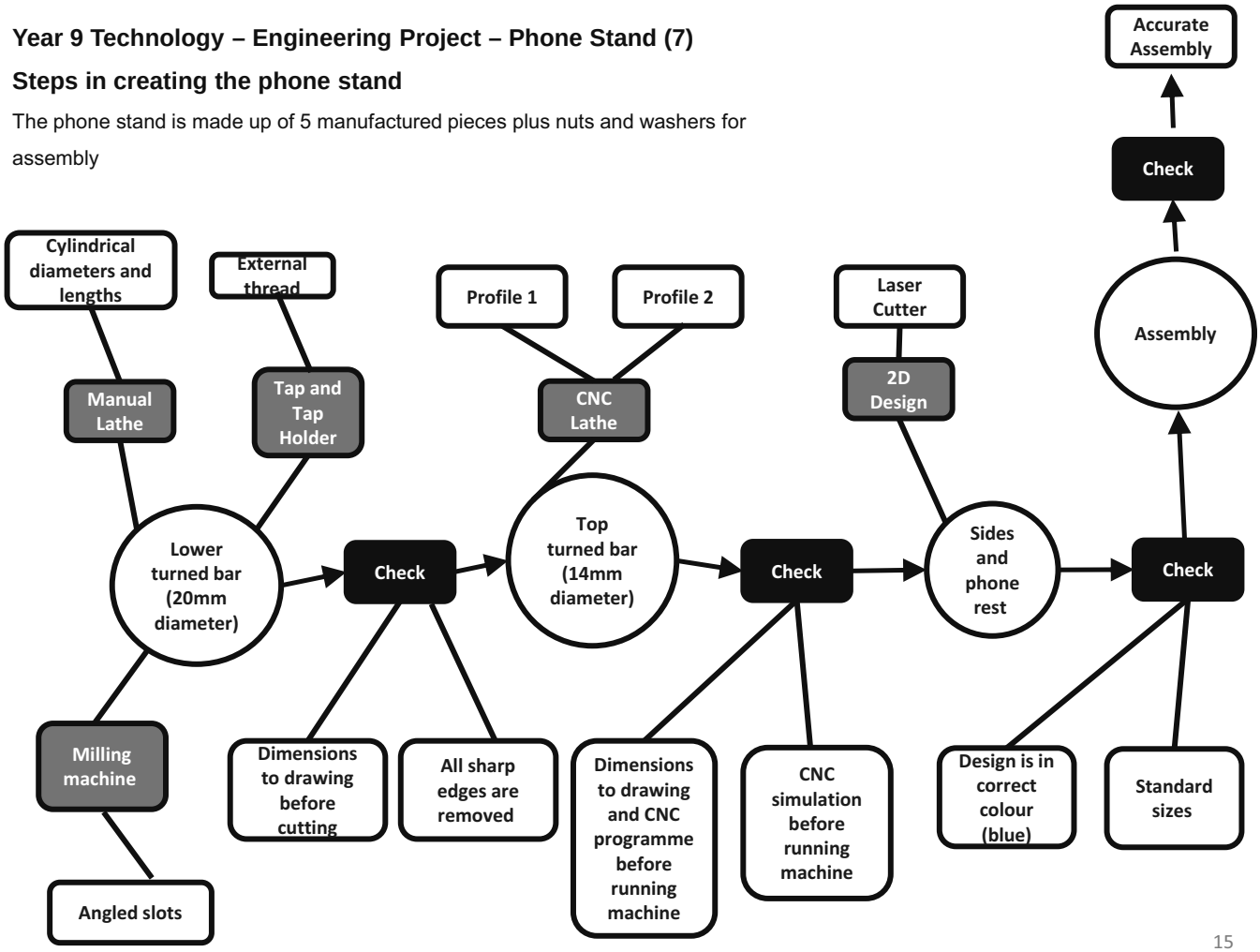
Here are some comparisons between CNC and Manual machining. Some are advantages and some are disadvantages



Year 9 Technology – Engineering Project – Phone Stand (7)

Steps in creating the phone stand

The phone stand is made up of 5 manufactured pieces plus nuts and washers for assembly



Year 9 Technology – Engineering Project – Phone Stand – Key Words (8)

Keywords	
Milling	To cut or shape metal using a cutting tool/ cutter
Centre Lathe	A machine that allows you to spin a piece of material round whilst cutting into it to make a required part
Working Drawing	A drawing that contains information needed to manufacture a specific part, such as measurements
Stage Drawing	A set of drawings that show the stages of production of a part
Measurement	The distance or angle of a part.
Digital Caliper	Hand held device used to measure parts
Die and Die Holder	Hand held tool that allows you to cut an external screw thread into a piece of material.
Metal Removal	Processes that remove metal such as turning, milling, drilling.
Chamfer	An angled slope cut round the corner or a part
Precision	The quality of being exact and accurate
Tolerance	The amount that the measurement can deviate before it becomes unacceptable

The 4C's for Food Safety

CLEAN

Personal Hygiene
Wash hands
Cover cuts with a blue plaster
Nails clean and short
Tie hair back
No jewellery
Wear a clean apron
Do not handle food if you have an upset stomach
Do not cough or sneeze near food

Kitchen Hygiene
Clean and sanitise surfaces
Equipment must be cleaned thoroughly
Cupboards, fridges and freezers must to cleaned regularly
Always use a clean spoon each time you taste food
Lids on
Ensure pest infestations are delt with immediately

CROSS CONTAMINATION

Equipment used on raw foods MUST be cleaned thoroughly before being used on other food.

Clean and sanitise surface between uses.

Wash fruit and vegetables to remove dirt or soil.

Wash hands after touching raw meat and fish.

Use colour coded chopping boards:
Green - Salad and veg
Red - Raw Meat
Yellow - Cooked Meat
Blue - Fish
White - Dairy and bakery

The 4C's for Food Safety

CHILL

Temperature of the **fridge** should be between **below 5 °C.**

Never put hot food in the fridge, as it will raise the temperature of the fridge.

Do not overload the fridge, air needs to circulate
Throw away food that is past its use by date.

Always store **raw** meat and fish on the **bottom** shelf
Cooked meat should be on the **top** shelf.

Keep food covered or wrapped to prevent cross- contamination.

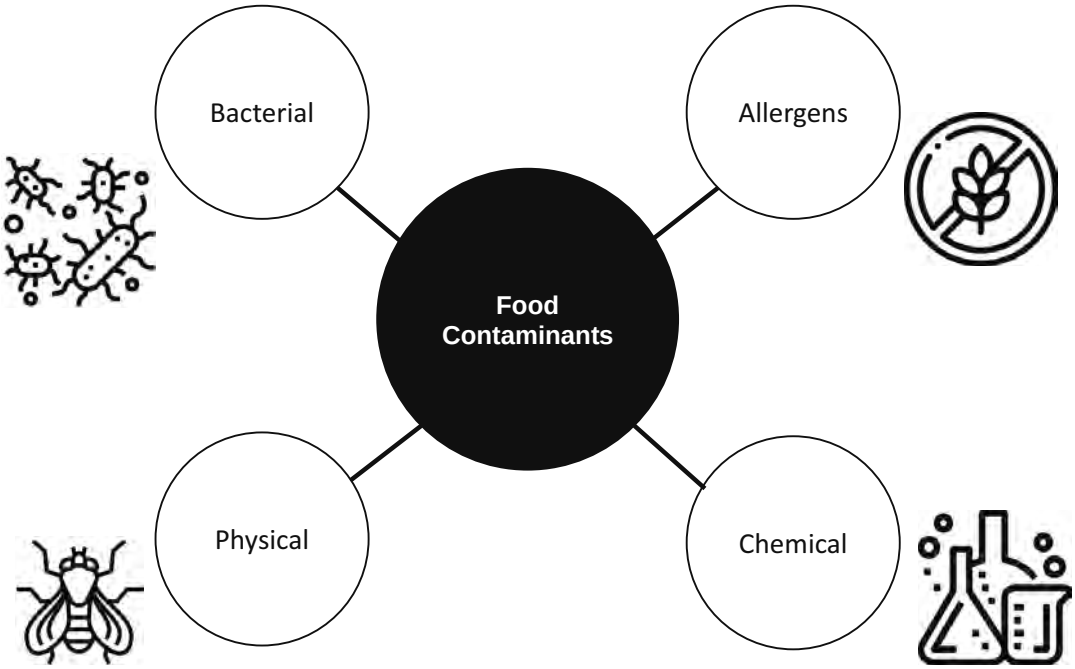
Temperature of a freezer should be **-18 °C.**

COOK

Use a temperature probe to ensure food is cooked.

To kill bacteria food must reach at least 75°C.

Food related causes of ill health



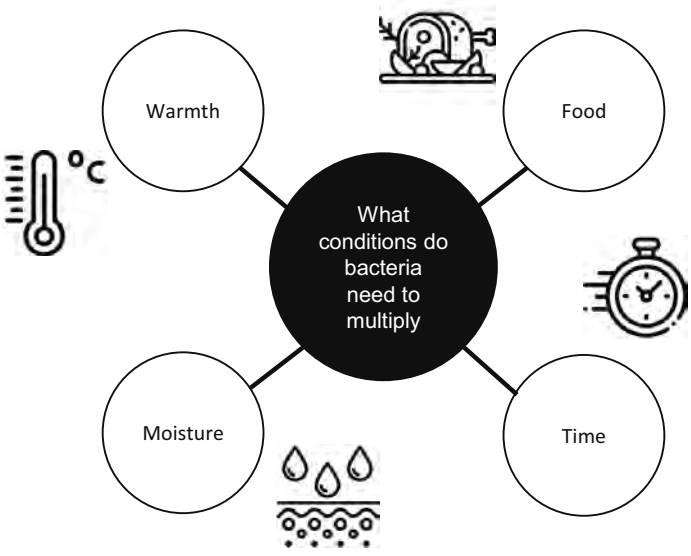
Food related causes of ill health

Bacteria

Some bacteria have to be **INSIDE** your body to make you ill. These are consumed in the food.

Once inside you, the bacteria attack your body causing illness, some such as Salmonella cling to the gut wall preventing absorption of water and nutrients- this type take hours even days to colonise the gut so symptoms may not show for a few days.

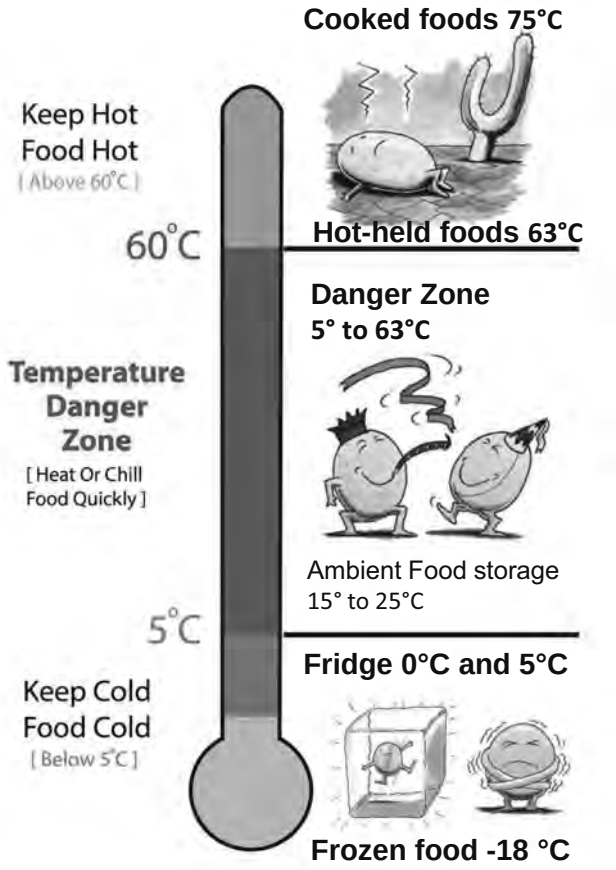
Some produce a **TOXIN** (poison) on the food which makes you ill when you eat it. Toxins act on the body rapidly so this type make you ill within minutes to hours of eating them.



Sources of food poisoning bacteria

- People/sewage
- Raw food
- Insects
- Rodents
- Soil/dust
- Refuse/waste
- Animals/birds
- Contaminated packaging

Pathogenic Bacteria



Food poisoning symptoms

Visible:	**Non-visible:**
Diarrhoea	stomach pains
pale in colour	muscle contractions
vomiting	headaches
signs of dehydration	feeling sick/nausea
confusion	flu like symptoms
chills/shivering	(dizziness/light-headed)
bloating/swelling	loss of appetite
Sweating	fatigue
fatigue	joint/muscle pains
	Chills
	weakness

Common types of food poisoning

Type of food poisoning	Foods it is found in
Campylobacter	Poultry, raw meat, unpasteurised milk products, water
Salmonella	Raw meat, unwashed vegetables, eggs undercooked chicken
E. coli	beef, chicken, lamb, unpasteurised milk cheese, spinach, salads, raw veg
Clostridium perfringens	Undercooked meats, large volumes of food, casseroles, gravies

Type of food poisoning	Foods it is found in
Listeria	Raw foods, fridge temperatures, unpasteurised milk, cheese, smoked salmon, pate, raw sprouts
Bacillus cereus	Rice, leftover food, foods at room temperature, sauces and soups
Staphylococcus aureus	Foods made by hand and no additional cooking. Salads, ham, tuna, chicken, cream pastries, sandwiches, dairy products, meat, eggs

Hospitality and catering providers
Keywords

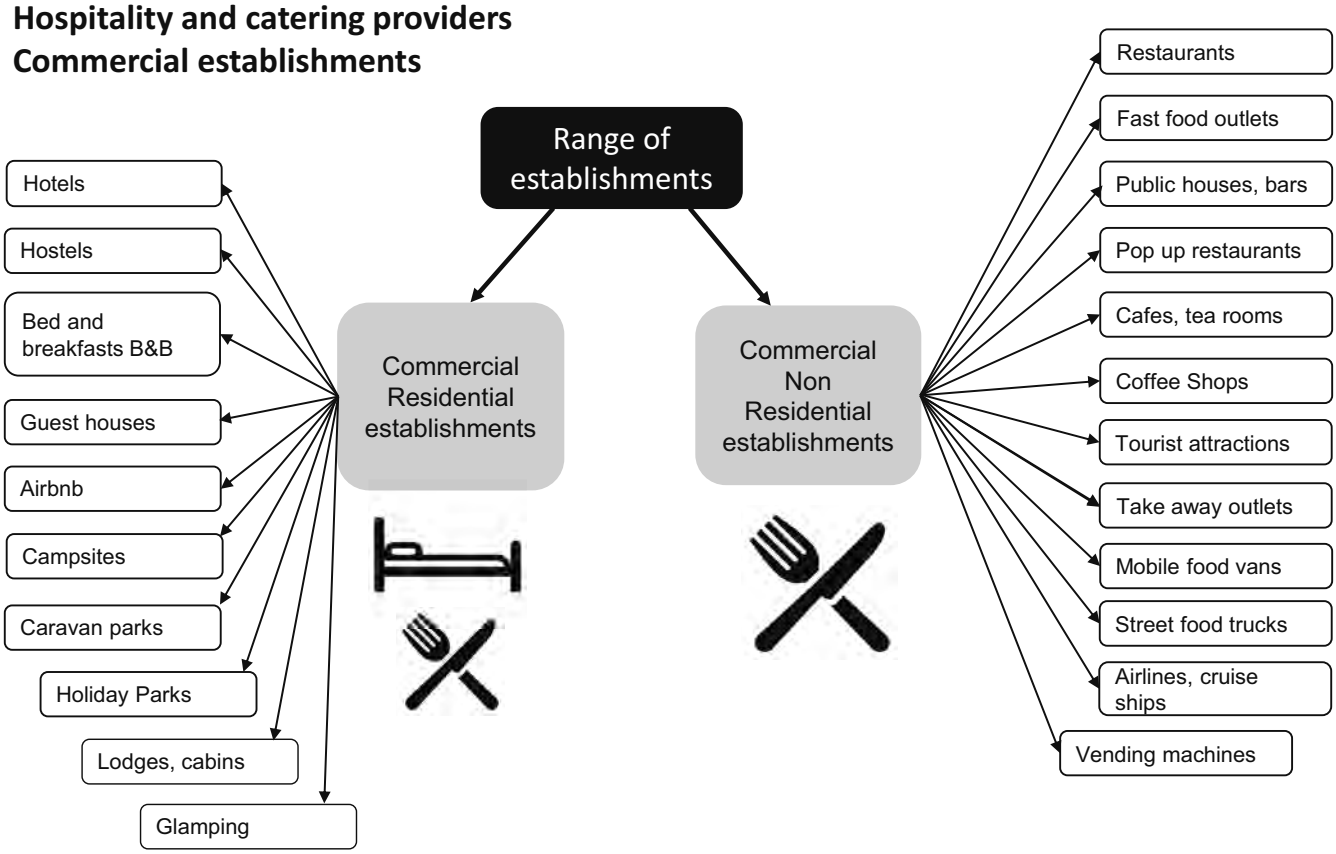
Commercial: business that operates to earn money

Non-commercial: non-profit organisations or government run provisions

Residential: where accommodation is offered

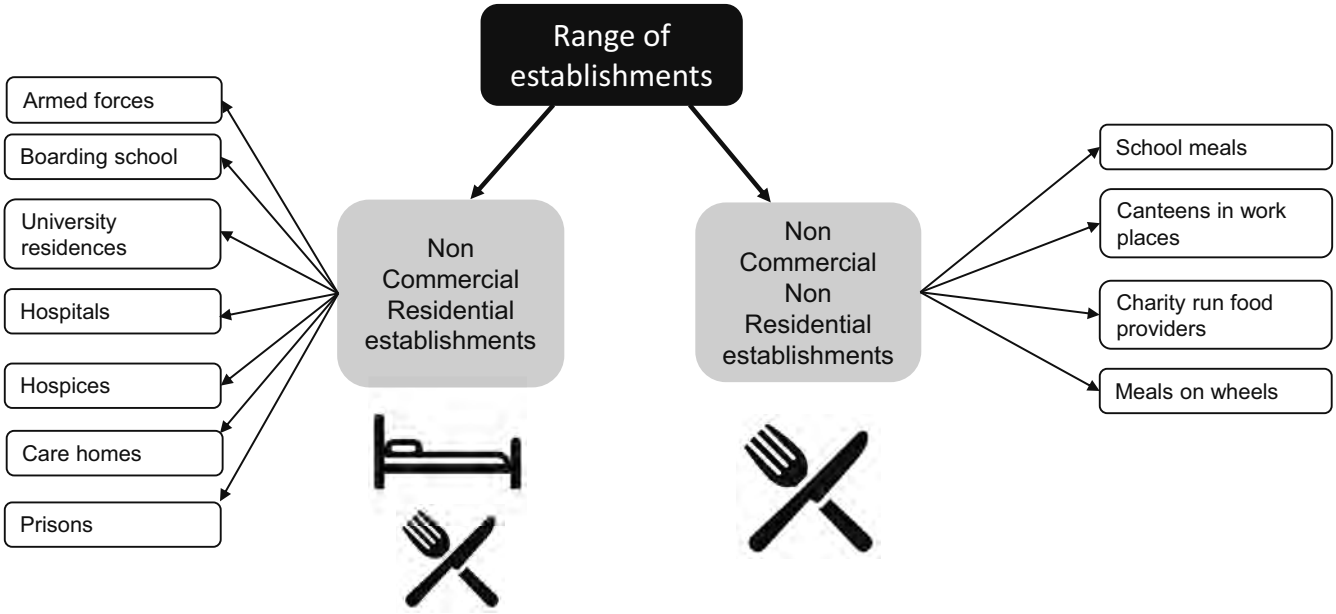
Non-residential: where only food and drink is offered

Hospitality and catering providers
Commercial establishments



Hospitality and catering providers

Non Commercial establishments



Catering Options

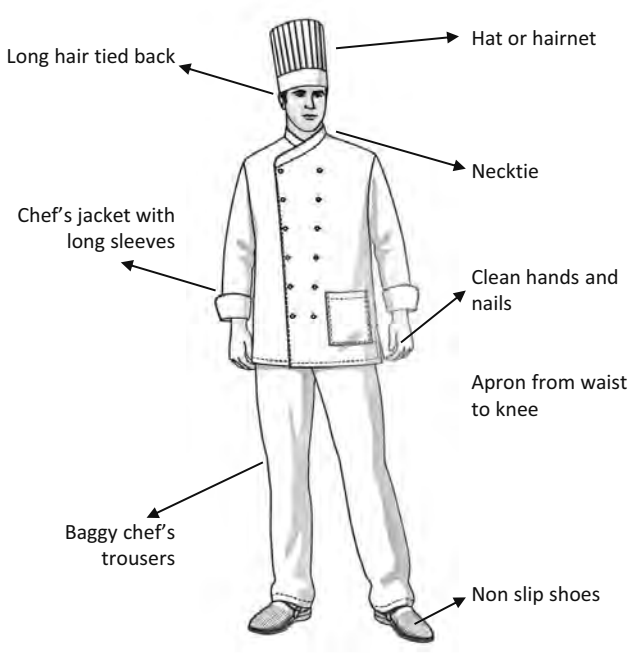
Provision	Advantages	Disadvantages
Restaurants and bistros	Waiter service. Can ask questions about the menu. Comfortable seating at a table	Often more expensive than other options Waiting time can be longer than other options
Pop-up restaurants	Often set up in convenient locations. Prices can be cheaper. Gives customers a chance to try new foods	The menu may be limited Only in location for a limited time
Cafe	Faster service than a restaurant. Lower prices than a restaurant. Wide menu choices – something for everyone	Can be crowded. Seating may not be very comfortable, for example fixed seats
Street food	Usually fast service. Cheap prices. Food is wrapped and ready to go. Can ask questions about ingredients etc.	Hygiene may not be as good as indoor venues, for example lack of pest control and temperature control. There may be no seating available. Usually need cash to pay
Mobile vans	Serve fresh, hot food. Very convenient if in your location	Only available at set days/times. Limited menu choice. Engine fumes can be a problem if engine left running
Fast food Fast service	Fast cooking, as food is often prepared/cooked beforehand. Cheaper prices. Easy to eat.	Often unhealthy choices. Not all packaging can be recycled so may be damaging for the environment.

Catering Options (continued)

Provision	Advantages	Disadvantages
Takeaways and drive-throughs	Fast and convenient. Cheaper prices. No need to get out of the car at drive-throughs, so convenient for families with children and disabled customers.	Menu choice is limited Often unhealthy choices
Tearooms and coffee shops	Service is usually fast. Food is often freshly prepared. Good for snacks and lighter meals. Branded coffee shops offer a familiar setting and menu.	Limited menu choice. Can be crowded. Seating may not be comfortable, for example raised stools. Can be expensive.
Delicatessens and salad bars	Offer a wide range of salads and sandwiches. Often sell hot food such as soups and jacket potatoes.	Waiting times can be long at peak times as food is often made to order Seating may be limited or in a small space
Pubs and bars	Food often available all day. Generous portion sizes. Wide menu choices. Prices often cheaper than restaurants. Comfortable atmosphere	Seating may not be comfortable, for example raised stools. Waiting time can be longer than some other options, for example fast food and cafes
Visitor attractions (for example theme parks)	Catering sited in convenient locations. Fast service. Choice of catering options to suit different guests. May offer meal deals or unlimited drinks	The food is often expensive. Can be long queues Small portions. Some visitor attractions don't allow you to take your own food in, so they have a captive market

Kitchen dress code

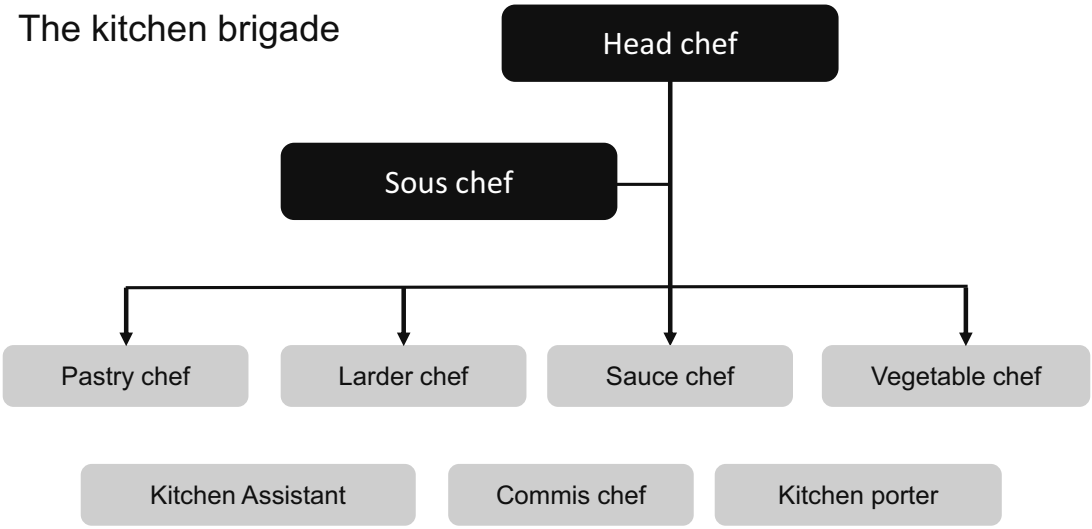
Where an item of clothing is for personal protection while doing the job then the employer must provide it free of charge.



A chef should wear:

- **a jacket with long sleeves**, usually double-breasted, made from cotton to stay cool while still protecting the chef from heat, burns and scalds
- **trousers**, which should be loose fitting for comfort and made from cotton to keep cool; loose fitting trousers can be removed easily if hot liquids are spilled on them
- **apron** – this is worn around the waist, over the trousers, as added protection
- **hat** – called a toque, which is worn to prevent hair from falling into food
- **neckties** – these used to be worn to prevent sweat from dripping into food; they are not worn as often now due to improved ventilation in kitchens
- **safety shoes** – should have steel toe caps in case a knife or hot food is dropped on the feet
- **kitchen cloth** – tucked in the apron, kept dry for handing hot pans and equipment.

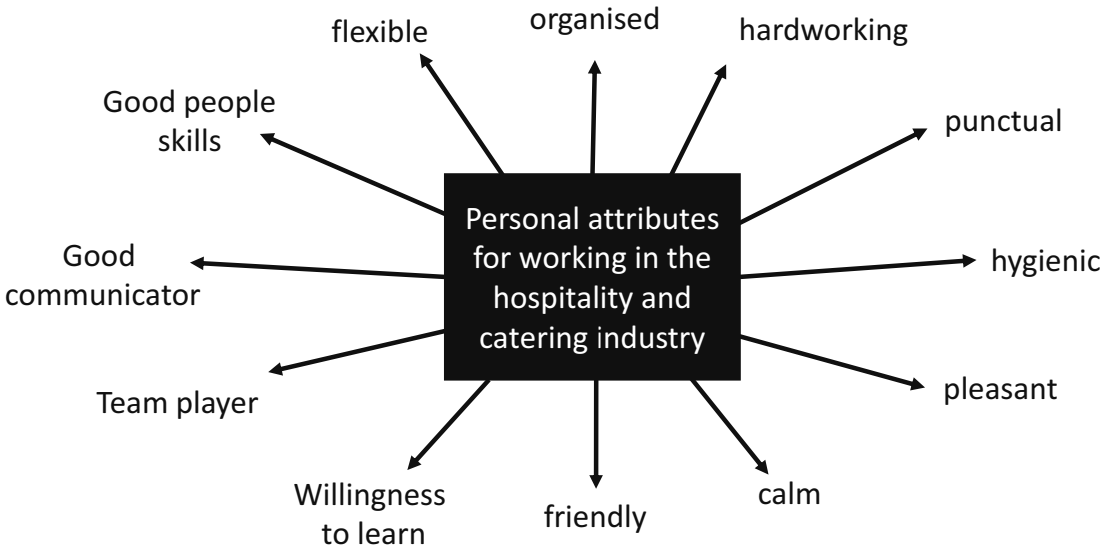
Job roles in the Catering industry



Working in the hospitality and catering industry

Personal attributes

A personal attribute is a quality or personality trait that someone has in their character. Different job roles require different sets of skills and personal attributes.



Working in the hospitality and catering industry

Job roles – Kitchen Staff

Executive (Head) Chef

Creating menus cooking and preparing food
Ordering and dealing with suppliers
Monitoring the quality of food going out of the kitchen and giving the finisher dishes their final touches
Managing staff: hiring, training, and sorting rota and pay
Managing and implementing legal legislation
Liaising with the general manager and meeting with other managers .
Dealing with problems or complaints.

Sous Chef

The next chef in command who will take over from the executive chef when they are away from the kitchen
Managing food preparation and directing tasks
Supervising staff and kitchen stations
Implementing legal legislation
Ensuring that food standards are maintained, as well as the high quality of the food
Assisting the executive chef with managing staff, creating a menu, and completing any admin

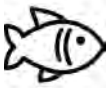
Working in the hospitality and catering industry

Job roles – Kitchen Staff

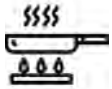
Chef de Partie

A chef de partie oversees a particular area within the kitchen
In larger kitchens a chef de partie may oversee other chefs within their station

Butcher chef (Boucher)
in charge of preparing meats before they are used in other stations.



Fish chef (Poissonnier)
Specialist chef in preparing fish dishes and sauces.



Fry chef (Friturier)
In charge of fried dishes.

Grill chef (Grillardin)
Specialist of foods that require grilling.

Pantry chef (Garde manger)
Responsible for preparing cold dishes (also known as a swing chef).

Roundsman (De tournant)
A relief chef. This person will fill in on stations.

Pastry chef (Pâtissier chef)
in charge of the pastry station where baked goods, desserts, and pastries are made

Working in the hospitality and catering industry

Job roles – Kitchen Staff

Apprentice / Commis Chef

Learning about food preparation techniques and assisting station chefs

Assisting with cleaning, deliveries and stock taking

Kitchen Plongeur

Aiping down walls, tiles, fridges, and freezers.

Maintaining and cleaning stations washing floors, taking out the rubbish

Cleaning all large equipment

Cleaning all the pots, dishes, and utensils

Kitchen Assistant

Washing and cleaning equipment and utensils.

managing waste disposal

Organising and managing equipment ready for the working day

Cleaning and maintaining hygiene and safety within the kitchen

Helping all station chefs (wash, peel, chop ingredients)

Kitchen Porter

Keeping the fridge/freezer and storeroom organised.

collecting equipment and utensils and washing them

Checking that all equipment is washed and placed away correctly

Unloading and taking deliveries

Emptying bins, sweeping and washing the floor

Working in the hospitality and catering industry

What training and qualifications do you need to work in the hospitality and catering industry?

Once you leave school there are lots of courses available at different further education colleges and universities to provide additional training and qualifications. Below are four examples of organisations which provide advice, courses and other training opportunities:

School

Level 2 Hospitality & Catering

College

Level 3 Advanced and professional cookery

Level 3 Hospitality & Catering

Level 2 Culinary Skills

Apprenticeship

University

Degree in Hospitality Management

Degree in Professional Cookery

Degree in Food and Culinary Arts

Chartered Institute of Environmental Health

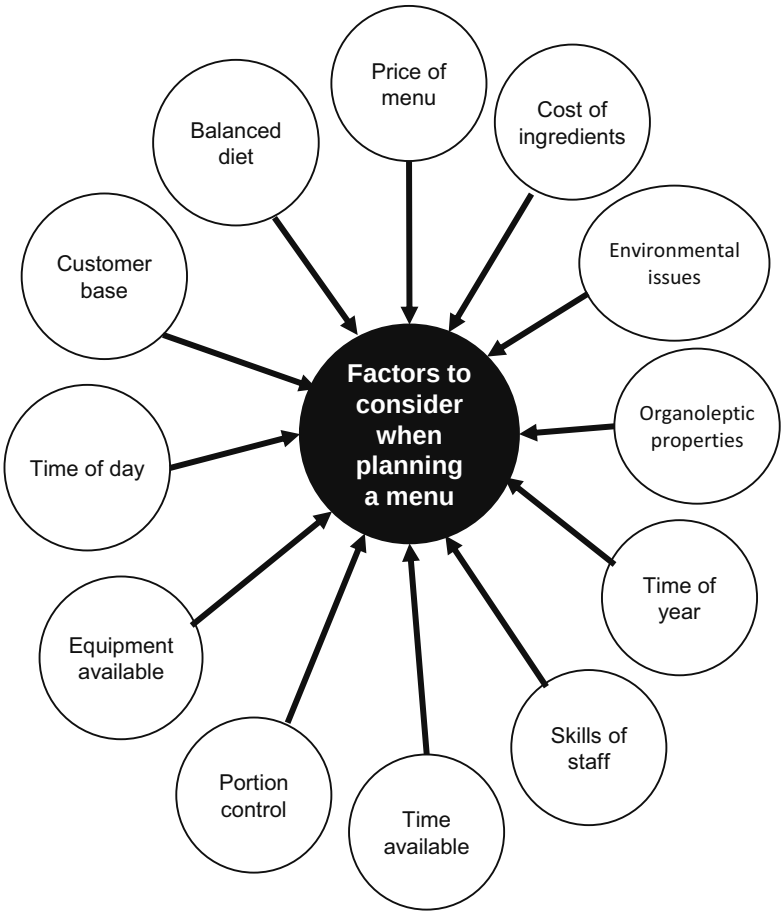
A training and awarding organisation for qualifications in food safety and hygiene

- Level 1/2 Certificate in Food Safety

Factors affecting menu planning

You need to be aware of the following factors when planning menus:

- **cost** (ingredients as well as business costs)
- **portion control** (value for money without waste)
- **balanced diets**/current national advice
- **time of day** (breakfast, lunch, and dinner menus as well as small plates and snacks)
- **clients/customers** (a menu with prices that will suit the people who visit your establishment).



Factors affecting menu planning

Customer

Who is the customer?

What age are they?

What nutritional requirements to they have?

Special dietary requirements

Budget

Time of day that the customer is eating ie. breakfast, lunch or dinner

Type of provision

Planning a menu depends on the size and type of provision. For example a small coffee shop would not require large industrial equipment. The customers visiting a coffee shop would also not want to wait very long for their food. They would also expect to be able to buy light lunch time dishes, not fancy fine dining dishes that take a long time to produce.

Cost

Cost of ingredients

A profit needs to be made

Customers budget

Type of provision

Competitive prices

Portion control

Factors affecting menu planning

Skills of the chef

The skills of the chef must be suited to the type of provision and the menu offered.

A Michelin starred restaurant will require a chef who has complex skills in preparation, cooking and presentation of dishes.

A café will require a chef who has a range of medium and complex skills to produce a suitable menu.

A large restaurant will normally have a full kitchen brigade while a smaller establishment may only have a single chef with one or two assistants.

Time available

The type of provision will influence the amount of time a customer may be willing to wait for their dish to be prepared.

Can the chef prepare, cook, and present more than one dish at the same time?

Can some items be made in advance?

Average waiting time for a meal
5-6 mins fast food outlet
23 mins Restaurant
40 mins Fine dining

Equipment available

You need to know and understand the type of equipment needed to produce a menu. The choice of dishes will be influenced by the equipment available to the chef.

This includes kitchen equipment such as:

- hobs, ovens, and microwaves
- fridge, freezer and/or blast chiller
- specialist equipment, for example a sous vide or pizza oven
- hand-held equipment, for example electric whisks or hand-blenders
- other electric equipment, for example food processors.

Factors affecting menu planning

Time of year

The time of year can affect menu choices.

- Light and cold dishes such as salads are better suited to the summer months.
- Hearty dishes such as stews are more suited to the winter.
- Special dishes linked to holidays such as Christmas and Valentine's Day may also be included.
- The availability of seasonal produce can also affect menu choices as certain commodities, for example strawberries, are less expensive when in season.

Environmental issues

The chef will need to think about environmental issues when planning a menu.

- Can the chef reduce the amount of ingredients bought as well as reducing food waste?
- Can the chef reuse ingredients to create new dishes for example stale bread made into bread-and-butter pudding?
- Can the kitchen recycle waste wherever possible?

Running the kitchen sustainably will save money.

Organoleptic properties

Organoleptic properties are the sensory features of a dish (appearance, aroma, flavour, and texture).

The chef will need to think about how the dish will look and taste.
Is there a range of colours?
Do the flavours go well together?
Are there a variety of textures?

The organoleptic properties will need to suit the customer and the type of provision.

The difference between intolerances and allergies

- Food intolerances are more common than food allergies. The symptoms of food intolerance tend to come on more slowly, often many hours after eating the problem food. Typical symptoms include bloating and stomach cramps.

- A food allergy is a rapid and potentially serious response to a food by your immune system. It can trigger classic allergy symptoms such as a rash, wheezing and itching.

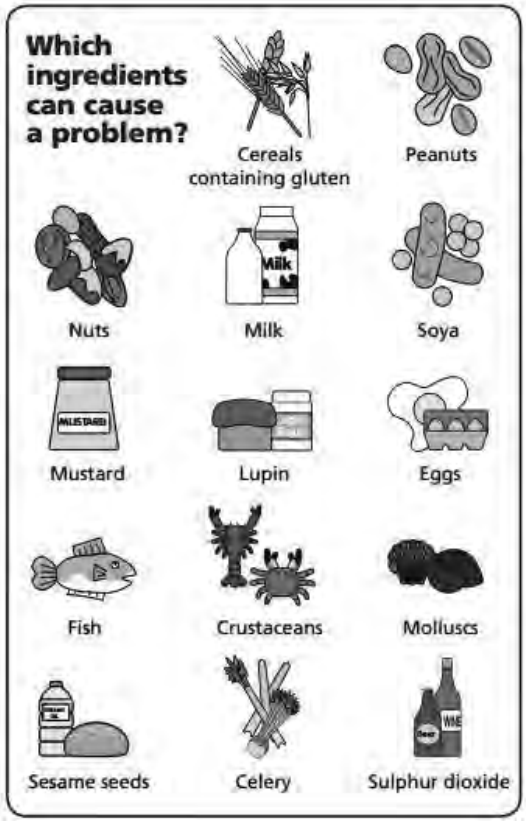
- Genuine food allergy is rare. About 2% of the population and 8% of children under the age of three are affected. (www.nhs.uk)

Reasons for food intolerance

- Some people react to certain foods and eating them may cause uncomfortable symptoms or, in rare cases, a severe illness.

- Food intolerance is more common in children than in adults. Children often grow out of the intolerance before they go to school.

Allergies



Symptoms of food allergies

A food allergy usually occurs between a few minutes and a few hours after eating a particular food.

The symptoms of food allergies vary:

- coughing
- dry, itchy throat and tongue
- nausea and feeling bloated
- wheezing and shortness of breath
- swelling of the lips and throat
- runny or blocked nose
- sore, red and itchy eyes

Anaphylaxis

Anaphylaxis is most commonly caused by food allergies, but can also be caused by other things, such as insect bites and drug allergies.

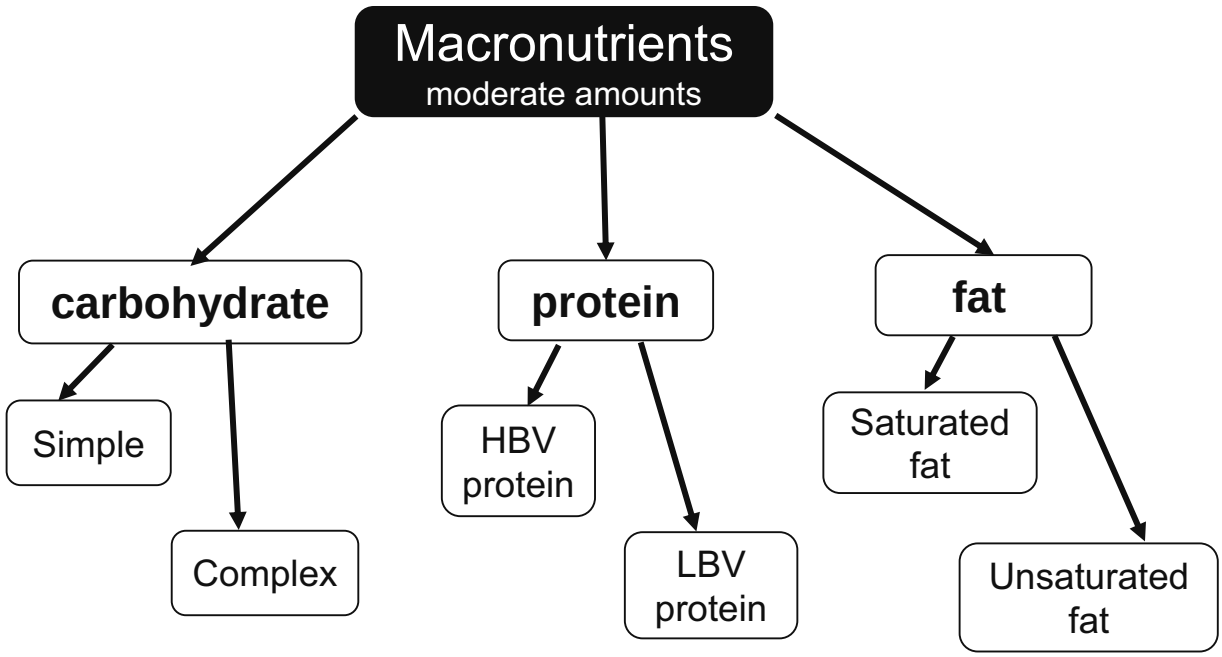
Peanuts, milk, eggs and fish are the most common foods to cause anaphylaxis in the UK.

- Feeling lightheaded or faint.
- Fast, shallow breathing, wheezing
- A fast heartbeat
- Clammy skin
- Confusion and anxiety
- Collapsing or losing consciousness

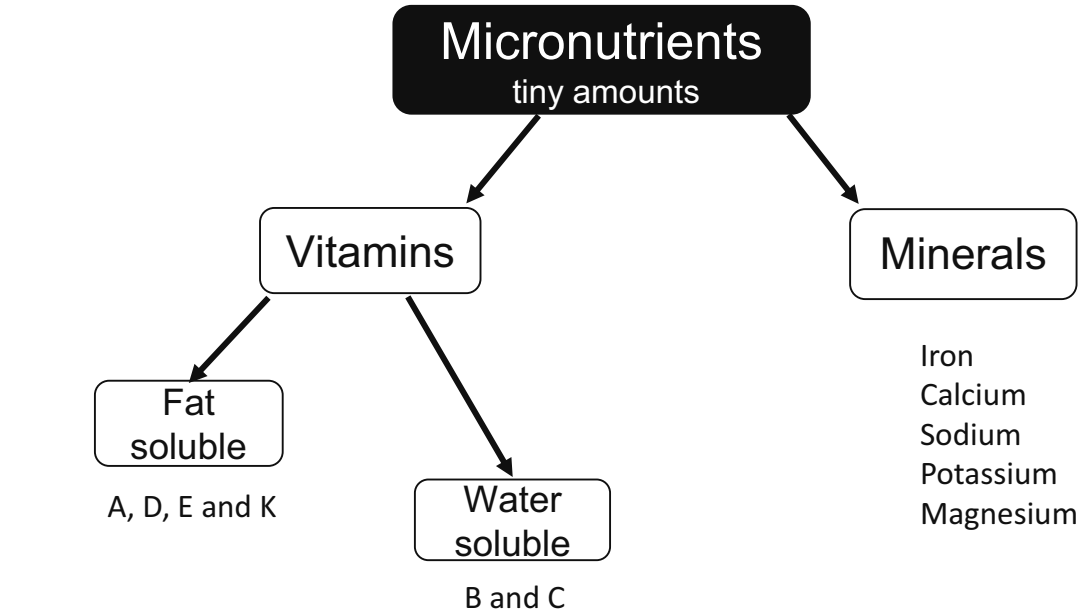
Allergens in hospitality and catering

- All menu items must be marked with any of the 14 major allergens they contain
- Wait staff should have a good knowledge of which allergens are present
- When using pre-prepared ingredients, kitchen staff should check the labels carefully to identify any allergens, e.g. Peanut flour used to thicken the sauce in a takeaway curry or milk present in a minor ingredient in a pre-packed or catered food

Understanding the importance of nutrition



Understanding the importance of nutrition



Fibre (NSP)

Water

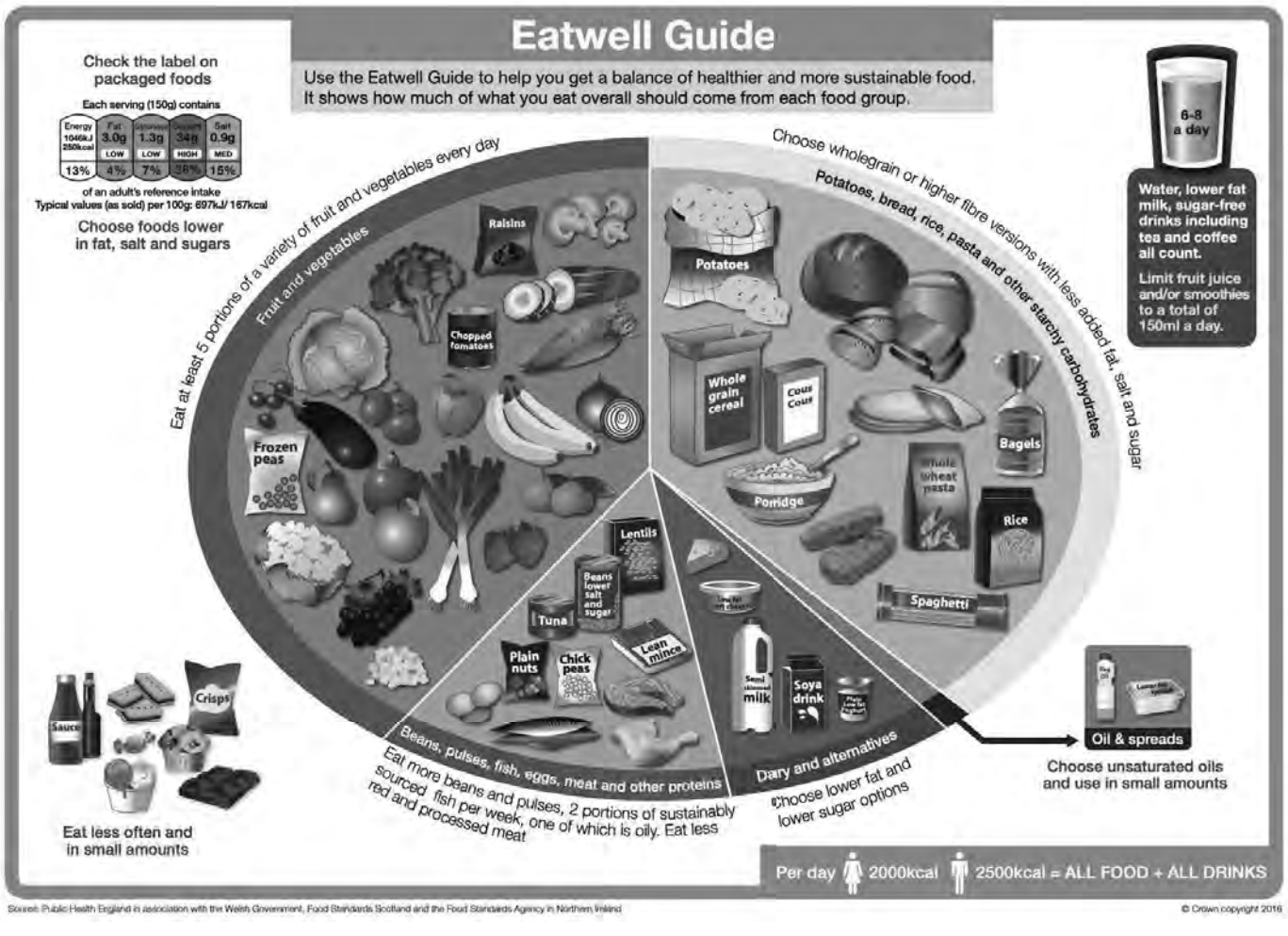
A Healthy Balanced Diet

A healthy balance diet provides all the nutrients needed for healthy body functions and normal physical activity.

To help achieve a balanced diet the Government have put together some dietary guidelines. The Eatwell Guide and 8 Tips for Healthy Eating.

8 Tips for Healthy Eating

1. Base meals on starchy foods
2. Eat 5 portions of fruit & vegetables a day
3. Eat 2 portions of fish a week
4. Small amounts of saturated fat and sugar
5. Eat less salt
6. Drink plenty of water
7. Do not skip breakfast
8. Get active



Carbohydrates

Carbohydrate provides an important source of **energy** for the body.

Carbohydrate provide energy to move and be active as well as energy for body processes such as breathing, heart beating.

Vitamin B (thiamine and riboflavin) is needed to help release the energy to the body.

All carbohydrates are converted to **glucose** when digested and this is converted to energy.

If the energy is not used up then it is stored as body fat.

Simple Carbohydrates (sugars) Sugar gives a fast release of energy that means your blood sugar levels go up. Some foods contain natural sugars such as milk, fruit & honey.		**Complex Carbohydrates (starch)** Starchy foods provide a slow release of energy and help our blood sugar levels stay the same so we don't feel tired.
glucose – Fruit, vegetables, honey, sugar beet/cane, corn	**sucrose** – Sugar beet/cane	**starch** – Potatoes, wheat, oats, pulses, corn, rice, pasta, bread, cous cous, cereals, beans, lentils, kidney beans, porridge, muesli, non-starchy vegetables
galactose – found in the milk of mammals	**maltose** – Soya beans, barley, wheat	
fructose – found in fruit Fruit, vegetables	**lactose** – Milk and milk products	**Dietary Fibre (NSP)** – found in wholegrain cereals, Fruit, vegetables, seeds and nuts

Excess carbohydrates :
Obesity, Tooth decay, Type 2 diabetes

Carbohydrates deficiency:
Lack of energy, weight loss, severe weakness

Protein

Protein is a macronutrient formed from chains of amino acids which are the building blocks of protein. There are 20 amino acids that come from animals and plants.

What is protein needed for?

Growth of skin, hair, cells, organs, bones and connective tissue. Growth especially in children and pregnancy.

Repair body tissues after illness, injury or surgery.

A **secondary source of energy** for the body.

Maintaining the body (bones and muscles)

Higher biological value (HBV) protein Contain **all** essential amino acids	**Lower biological value (LBV) protein** Contain **some** essential amino acids
From animal sources	From plant sources
Meat, fish, eggs, milk, cheese *Exception – soya beans*	Cereals, nuts, beans, seeds

Protein Complementation – two or more LBV proteins can be eaten together to provide all the essential amino acids, e.g. beans on toast or mixed bean and lentil curry. This is protein complementation, and is important for vegetarians and vegans.

Excess protein in the diet is used as energy. If it is not required for energy then it will be stored as fat.

Protein deficiencies are rare but in developing countries but can lead to stunted growth in children.

Some groups of people have a higher need for protein:
- babies and children – for growth;
- adolescents – for growth spurts;
- pregnant women – for the growing baby;
- People healing from surgery
- An athlete for growth and repair of muscle and tissue

Fat

Our bodies need fats for many essential functions, however in the modern world many people consume over the recommended daily amounts of fat which can cause problems with obesity, heart disease and stroke.

What is fat needed for?

Protect vital organs

Stores fat-soluble vitamins (A, D, E and K)

To maintain body temperate

Ensure a healthy immune system

Maintain healthy skin and hair

Provide energy (fat is very high in energy)

Fat is a source of fatty acids, these are essential mechanisms for cell membranes in the nervous system and the brain

Saturated fat	Unsaturated fat
Solid at room temperature	Liquid at room temperature
More harmful to health, as they raise LDL cholesterol	Considered to be the 'healthier' fats. They can help maintain healthy HDL cholesterol levels
Mainly from animal sources	From plant sources and fish
Butter, lard, ghee Coconut and palm oil Fatty and processed meats, sausages, bacon and cured meats Full fat milk and diary products (cream, ice cream, cheese) Chocolate	Vegetable oils and olive oil Nuts, flax seeds and sesame seeds Avocados and olives Fatty fish (salmon, sardines, mackerel)

Cholesterol - a fatty substance usually produced by the liver – is carried in the blood by proteins. When these proteins and fat combine, they are called lipoproteins. These two main lipoproteins can be good or bad for our health:

Low-density lipoprotein LDL is the bad type of cholesterol that can build up and clog the arteries, causing stroke and heart disease.

High-density lipoprotein HDL the good cholesterol can positively affect the body by helping clear cholesterol out of the arteries or removing excess cholesterol to the liver, where it is broken down and disposed by the body.

Fat-soluble Vitamins

Vitamin	Function	Sources
Vitamin A	Helps with vision in dim light Helps the body grow and develop Strengthens the immune system Skin health	Animal sources (retinol) - liver, milk, oily fish (retinol) Plant sources (beta carotine) - green leafy vegetables, carrots and orange and red coloured fruits (carotenoids) Added to margarine
Vitamin D	Absorption and use of calcium and phosphorus Maintenance and strength of bones and teeth Important in brain function Supports immune and nervous system Supports lung function	Oily fish, eggs and dairy products Fortified breakfast cereals and margarines (vitamin D added by law) Sunlight on the skin
Vitamin E	Healthy skin and eyes Boosts immune system Helps clots from forming in the arteries	Sunflower seeds Almonds, peanuts Avocados, butternut squash, asparagus, pumpkin, mango, dark green vegetables Vegetable oils Oily fish
Vitamin K	Blood clotting and help healing wounds Keeps bones healthy	Leafy green vegetables, kale, spinach, broccoli, asparagus Cheese Liver, bacon

Water-soluble Vitamins

Vitamin	Function	Sources
Vitamin B1 **Thiamine**	Release of energy from carbohydrates Healthy nervous system Normal growth of children	Wholegrain products, wheat, rice Meat, fish, milk and dairy Marmite Seeds, nuts, beans and lentils. Peas Fresh fruit – bananas and oranges
Vitamin B2 **Riboflavin**	Energy release from foods / break down protein from food Healthy nervous system Maintain healthy growth and skin	Same as vitamin B1 Mushrooms
Vitamin B3 **Niacin**	Energy release from foods Helps the body use of protein and fat Helps with lowering fat levels in the blood Healthy nervous system, skin and hair	Same as vitamin B1
Vitamin **B9 Folate/Folic acid**	Helps body form healthy red blood cells Helps body use protein Important for the development of unborn babies (essential for pregnant women)	Liver and kidney Wholegrain products Pulses and seeds Leafy green vegetables, asparagus Potatoes

Water-soluble Vitamins

Vitamin	Function	Sources
Vitamin B12 **Cobalamin**	Supports production of energy Protective coating around nerve cells Brain function Production of red blood cells Not enough B12 can cause anaemia	Meat, fish and shellfish Dairy products, cheese, milk, yogurt Eggs
Vitamin C **Ascorbic acid**	Helps absorb iron from foods Helps the immune system fight and prevent infection Production of collagen that binds connective tissue Antioxidant – protects from pollutants in the environment Helps heal wounds Helps skin health	Citrus fruits, lemon, oranges, limes kiwi, blackcurrants, strawberries, papaya, pineapple, mango Potatoes Salad and green vegetables, e.g. broccoli, kale, spinach Peppers, chillies, cauliflower

Minerals

Vitamin	Function	Sources
Calcium	Strengthens bones and teeth Bones are able to reach peak bone mass – maximum strength Growth of children Promotes nerves and muscles to work properly Vitamin D is needed to help absorb calcium	Dairy foods, milk, cheese, cream, yogurt Green vegetables, kale, spinach, cabbage White bread – calcium is added by law, Soya products, tofu Nuts and seeds
Iron	Supports the production of haemoglobin in red blood cells; this transports oxygen around the body Low iron levels cause anaemia Vitamin C is required to absorb iron	Red meats – liver and kidney Lentils, dried apricots, cocoa, chocolate, Curry spices, Green leafy vegetables, e.g. spinach, Breakfast cereals fortified with iron
Sodium	Regulate the amount of water in the body To assist the body in the use of energy To help control muscles and nerves Too much salt/sodium can increase blood pressure and heart disease	Processed foods – for flavour and as a preservative, Salt added to food in cooking process for flavour, Smoked meats Bacon

Dietary Fibre (NSP)

Insoluble fibre is not easily broken down by the digestive system. It passes through the body unchanged, keeping the bowels healthy and preventing digestive problems such as constipation and haemorrhoids.

Sources: Oats barley rye most beans and peas fruit root vegetables

Soluble fibre is broken down by bacteria in the bowel to be digested. It can help reduce cholesterol in the blood and guard against coronary heart disease.

Sources: wholegrain cereals, wholemeal bread Bran, nuts, corn, oats, fruit, vegetables (especially the skin)

Functions

Helps prevent constipation.
Helps prevent type 2 diabetes.
Helps reduce the risk of colon cancer.
Lowers the risk of coronary heart disease.
Reduces the temptation to snack between meals.
Helps support a healthy weight.
Slows down absorption of carbohydrates in the blood to help keep blood sugar levels constant.

Deficiency

A deficiency is often caused by eating too many refined foods, e.g. white bread instead of whole meal, or white rice instead of brown rice. It may also be caused by a general lack of fruit and vegetables in the diet. A deficiency can lead to constipation, haemorrhoids, colon cancer and/or diverticulitis.

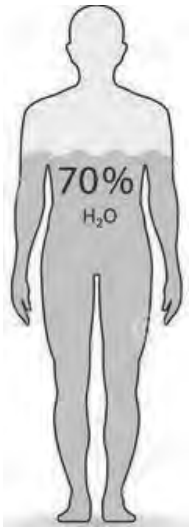
Water in the diet

Water is the major component of body fluid and has many functions in the body:

• it acts as a lubricant for joints and eyes;
• it is the main component of saliva;
• it helps get rid of waste;
• it helps regulate body temperature.

The body loses water all the time, when we go to the toilet, from sweat and also evaporation from skin. If we do not consume enough water, we become dehydrated.

- Water is provided by food and drinks.
- 20% of water consumed is from food.
- 80% is from drinks.
- Some fluids are less beneficial, coffee and tea can increase water loss, sweetened drinks contain a lot of sugar and fizzy drinks are acidic on the teeth.



Nutrition at different life-stages

Early childhood (3-8 years)

- Growth and weight are steady during the preschool age.
- All children will grow at a similar and steady rate until they reach adolescence.
- The brain is growing and developing during this stage.
- Muscles increase and body fat decreases.
- Stomachs are smaller; children require smaller meals which are full of nutrients.
- Children's food should be high in nutrients to promote growth and development.
- Children should consume healthy meals to encourage healthy eating habits.
- Young children are often active; therefore, they should be getting enough calories to provide the nutrients required.
- Children should consume a varied diet which is full of calcium and vitamin D to promote bone health and growth.
- Bone density increases and bone tissue gradually replaces cartilage.
- Processed foods should be avoided as they contain hidden saturated fats, salt, and sugar.
- A lot of energy is used for physical activity.

Adolescence (9-18 years)

- During puberty, young people will go through a big growth spurt; therefore, they will need extra food as they require more energy for growth.
- Protein is an essential macronutrient for bone and organ growth.
- The reproductive system will reach sexual maturity.
- Puberty starts - females usually start this before males. Females will need to increase their iron intake due to loss of iron during their menstrual cycle.
- Females need to make sure they eat enough food containing vitamin C and iron to prevent anaemia.
- High vitamin C intake is needed to help with the absorption of iron from foods.
- Teenagers can grow rapidly at this stage.
- Vitamins and minerals are vital for the correct development of bones and organs
- Males will start to develop muscle mass and will therefore require the right amount of protein each day.
- Processed foods should be avoided as they contain hidden saturated fats, salt, and sugar.
- A lot of energy is used for physical activity.

Nutrition at different life-stages

Early adulthood (19-45 years)

- The skeleton continues to take up minerals until peak bone mass is reached about 30 years of age.
- Adults should eat the recommended amount of nutrients to keep their immune system strong and prevent infection.
- Protein is required for repair and growth during this stage.
- The Eatwell Guide should be followed for a balanced diet.
- Pregnant and breastfeeding individuals need to increase folate, vitamins, and calories to help with foetus development and growth.
- Individuals who are breastfeeding will require more nutrients for the development of the baby.
- Women continue to menstruate until the menopause (approx late 40s to early 50s)
- Weight gain can occur if the energy intake of the diet is unbalanced and insufficient physical activity is taken.

Middle adulthood (46-64 years)

- Some females will go through perimenopause before transitioning into menopause.
- Perimenopause is when the ovaries produce less oestrogen.
- A female will go through the menopause later in this life stage - this is where the ovaries stop producing eggs.
- Both perimenopause and menopause can last up to 10 years; therefore, a female should increase calcium, magnesium and vitamins K and D to maintain bone health.
- Females going through the menopause should not consume too much phosphorous as it can accelerate the loss of some minerals needed for bone health.
- Dietary fibre should be eaten frequently during middle adulthood to aid the digestive system.
- Fats should be unsaturated and saturated fats should be consumed as little as possible as this could lead to obesity, heart disease or stroke.
- Weight gain can occur if the energy intake of the diet is unbalanced and insufficient physical activity is taken.
- Metabolic rate gradually slows down.
- The body needs to be maintained to keep it free from disease, strong and active.

Nutrition at different life-stages

Later adulthood (65+ years)

- Absorption of nutrients may decline during this stage as the digestive system becomes less efficient.
- Calorie intake decreases for those over 75 years old; this is because many older adults are less active at this age. The metabolic rate also slows down.
- The amount of fat needed decreases during this stage.
- Protein is needed to repair wounds and cells.
- Vitamin D should be consumed in the diet, and older people should get plenty of sunlight.
- Plenty of fruit and vegetables should be in the diet.
- Fatty foods and foods which are high in sugar should be limited as this can cause weight gain, and increase the risk of heart disease and type 2 diabetes.
- Chewing foods may become more difficult due to dentures or other health problems, which means softer foods are more desirable for some older adults.
- Dietary fibre is important as the digestive system may slow down
- Blood pressure may increase, only small amounts of salt/sodium should be consumed
- Eyesight may weaken – Vitamin A, C and E can help to prevent eye conditions
- The skeleton gradually starts to lose minerals and become weakened. This can develop osteoporosis. Calcium and vitamin D can help to maintain bone strength.

How to plan production

- **Before you start** make sure you have each of your recipes written out in clear simple step by step instructions

- **Identify your mise en place** for each dish and accompaniments and complete this section first.

- Write a **rough plan** on another sheet of paper of the order that you need to make your dishes in

- Writing up the time plan – **start with the process**; this needs to include every stage of the making process for both of you dishes and accompaniments. It needs to be detailed enough for someone else to make your dishes and include the quantities of ingredients needed.

- Include details about the serving of your dishes.

- Once the process section is complete, add the **timings**. Who long will it take you to complete each stage? This needs to start at 9.00 and end at 12.00 (3 hours)

- Finally the **special points**. This needs to include:
    - The 4 C's
    - **Chill** - Temperatures of storage
    - **Cook** - Core cooking temperature
    - **Clean** - Personal hygiene, kitchen hygiene
    - Ways to prevent **cross-contamination**
    - Types of risk, food safety or personal safety
    - Washing up regularly
    - **Contingencies / Quality control** – what could go wrong and how could you fix it?

How to plan production - Glossary

Commodity list with quantities

A production plan needs to include list of all the ingredients needed and their quantiles.
An ingredients list can be a stand-alone list or included in the production plan.

Equipment list

you need to note all the equipment you will need to prepare and cook the dish. The equipment list could be included as an additional column on the production plan or as a stand-alone list.

Health, safety, hygiene, and storage

An additional column on the product plan adds all the health, safety and hygiene points you need to consider. Such personal hygiene points would include wearing an apron, washing your hands and removing your jewellery. Food should be stored in the fridge between 2°C and 5°C and in the freezer below -18°C. Different chopping boards should be used for different foods, and raw meat should be prepared separately in the kitchen.

Mise en place preparation before cooking

Equipment should be prepared before weighing and measuring ingredients. Ingredients should be stored correctly, ready to be used. If preparing a fish to be cooked, it should be washed, cut, deboned, and filleted. The production plan should be read very carefully, and the stages should be understood. The oven must also be turned on to the correct temperature.

Quality points

Quality points should be checked before preparing, cooking and serving. All equipment should be checked for damage and cleanliness, and fruit and vegetables should be fresh, bright, and not bruised. When using fish, the 'use by' date should always be checked, and the fish should smell fresh, have bright eyes, and should be firm and shiny (not slimy). Meat should also be checked to make sure it is not past its 'use by' date; it should smell fresh and feel firm. Meat needs to be the right colour and shouldn't be too fatty.

Hot holding and serving

Food should be kept at 63°C for a maximum of two hours only. The correct equipment needs to be used to hot hold foods, the food should be served simultaneously, and the temperature of food needs to be checked using a food probe.

How to plan production - Glossary

Cooling

You should ensure that cooked foods are cooled rapidly at room temperature and placed in the fridge within one to two hours. Alternatively, a blast chiller can be used to decrease the temperature quickly.

Cooking

When cooking food, follow the recommended time, use a food probe to check the correct temperatures, follow all food hygiene standards, clear up as you go along and check the flavouring of dishes before serving.

Timing

The timing of each step is critical to make sure dishes are served to the customer simultaneously, and at the correct temperature. Planning for each stage of preparing and cooking will help with the organisation and overall success of the dishes.

Contingencies

A contingency plan is in place in case something goes wrong and should be considered in each stage of the production plan. For example, over-whipping the cream. In this case, you should have spare ingredients to replace the cream. If you cut yourself, you should know who the first aider is and where the first aid box is situated. If there is a fire, you should know what to do in a small kitchen fire, and you should be able to locate a fire blanket and the closest fire alarm.

Sequencing/dove-tailing

This is an essential process of planning; it is the order of the production. Sequencing or dove-tailing needs to be considered to ensure all dish parts are ready simultaneously. When designing the menu for your brief, you will need to consider the correct order of preparing and cooking the dishes.

For example, making ice cream after other dishes will mean it won't be ready in time, as it takes longer to set and freeze.

How to plan production – examples of special points

Safety	Hygiene	Temperature & Dates	Cooking	Contingencies
Use oven gloves	Check all equipment is clean before using	Fridge 1-4° C	Pre-heat oven	If dish is not cooked return to oven & cook further ……mins.
Hold knife point downwards	Use correct coloured knives/boards	Freezer -18 °C	Cooking time – in minutes	If pastry is too dry add more water
Do not put knives in sink	Meat - Red board Raw Fish - Blue board	Hot Holding above 63°C	Oven Temperature e.g. Gas 6 /200°C	If meat does not reach 75°C return to cook further……..mins.
Avoid cluttered work surfaces	Salad and fruit - Green board	Avoid Danger zone 5° – 63°C	Grease & line tin to prevent sticking	If sponge does not spring back return to cook further ….mins.
Open lids away from you to prevent scalding	Bakery & Dairy - White Cooked	Boiling Point 100°C	Cakes should be golden brown	If there is yolk in egg whites save for another dish and use fresh eggs
Don't overheat oil -know your temperatures	Store raw and cooked food separately	Core Temperature above 75°C	Bread & cakes should be well risen	Use lemon to avoid enzymic browning
Pan handles facing inwards	Wash hands using anti-bacterial soap.	Don't put hot foods in the fridge	Bread should sound hollow when cooked	Check quality of all ingredients/visual check Have extra ingredients in case something goes wrong
Put a damp cloth under boards	Cover food before placing in fridge	Pre-heat oven	Consistency of food - check recipe	If the sauce is too thick add more liquid If the sauce is too thin continue to simmer
Sharpen knives before use	Sanitise worktops to kill bacteria.	Cover and Chill in fridge 1° – 4°C	Use bones for stocks	Look through the glass panel in oven before opening door.
Store knives safely.	Wash up in hot, clean soapy water to kill bacteria	Use a temperature probe correctly	Use a cooling rack to cool effectively	Always check seasoning and adjust accordingly

How to plan production - examples of special points

Safety	Hygiene	Temperature & Dates	Cooking	Contingencies
Ensure frozen food is completely defrosted	Rinse in clear water and air dry	Wrap in cling film before chilling.	Use lids to conserve energy	Test oil temperature before deep frying- use bread or thermometer
Clean cooker to remove all food scraps.	Remove all jewellery	Check use by & best before dates.	Baking bind to prevent centre rising	Ensure food e.g. vegetables are the same size to ensure even cooking
Use electrical equipment safely. No wet hands	Always use a blue plaster for cuts	Store high risk food in the fridge	Turn off oven, rings when not in use	If you burn something you need to start again with fresh ingredients
Bridge & claw techniques when using knives	Remove nail varnish Hair correctly tied back	Always apply FIFO rule	Using a timer for accurate cooking	Ensure water is boiling before adding food or cooking time will be incorrect
Mop up any spills immediately	Put only cold food in the fridge or freezer	Never refreeze food	Use correct size ring to conserve energy	Sauce – stir to avoid lumps using a wooden spoon

How to evaluate a food product

What have you made?

What skills/techniques have you used?

What went well?

How did you decorate/garnish it?

What did you like/dislike about it?

How could you improve?

What sensory words would you use to describe it? (appearance, taste, texture, smell)

Is there anything you would change? **Why**?

How would you improve your product if you were to make it again?

Sensory Words

Appearance (Looks)

Appetising	Dry	Hot
Attractive	Fattening	Moist
Clear	Firm	Runny
Cold	Fresh	Smooth
Colour	Greasy	Soft
Colourful	Hard	Tasty
Crumbly	Healthy	Tough

Taste (Flavour)

Acid	Herby	Stale
Bitter	Meaty	Sweet
Bland	Old	Tangy
Burnt	Salty	Tasteless
Cheesy	Sharp	Tasty
Creamy	Sickly	Undercooked
Dry	Sour	Watery
Fruity	Spicy	

Rating Tests

People are asked to say how much they like or dislike a sensory characteristic of a product.

Smell (Aroma)

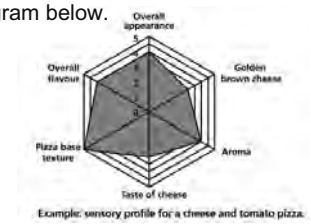
Burnt	Yeasty	Garlicky
Fragrant	Sickly	Spicy
Fruity	Spicy	Stale

Texture (Mouthfeel)

Airy	Firm	Mushy
Brittle	Fizzy	Powdery
Chewy	Flaky	Slimy
Creamy	Foamy	Smooth
Crisp	Gooey	Soggy
Crumbly	Greasy	Sticky
Crunchy	Gritty	Stringy
Dry	Hard	Tender
Fatty	Lumpy	Watery

Sensory Profiles

The results of sensory tests are often displayed visually using charts and sensory profiles, such as the star profile/radar diagram below.



Example: sensory profile for a cheese and tomato pizza.

Year 9

Spanish

Knowledge Organiser

2023-2024

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[1] Studies, likes & dislikes (present)

Este año (This year)	En este momento (At the moment)	aprendo (I am learning)	me concentro en (I am concentrating on)	el teatro (drama)	el francés (French)	las matemáticas (maths)	la ESO (in secondary school)	al insti (at school)	a la universidad (at university)		
Hace un año (For one year now)	Por ahora (For now)	estudio (I am studying)	me interesa en (I am interested in)	la química (chemistry)	la historia (history)	la física (physics)					
Lo que más me gusta estudiar (What I like studying the most)	Mi clase favorita (My favourite lesson)	es (·it is)	el teatro (drama)	el francés (French)	ya que (as)	en mi opinión es (in my opinion it is)		creativo (creative)	complicado (complicated)		
Lo que prefiero estudiar (What I prefer studying)	Mi asignatura preferida (My favourite subject)	son (·it is (pl))	el arte (art)		porque (because)	pienso que es (I think that it is)	bastante (quite)	entretenido (entertaining)	difícil (difficult)		
Lo que odio (What I hate)	Lo que no me gusta por nada (What I don't like at all)	Lo que no puedo soportar (What I can't stand)				lo encuentro (I find it)	muy (very)	fácil (easy)	duro (hard)		
							verdaderamente (really)	interesante (interesting)	aburrido (boring)		
								motivante (motivating)	inútil (pointless)		
								emocionante (exciting)	útil (useful)		
								relajante (relaxing)			
Me encanta (I love)	Me gusta (I like)	Me interesa (I'm interested in)	la biología (biology)	la historia (history)				creativa (creative)	emocionante (exciting)	dura (hard)	
			la química (chemistry)	la geografía (geography)				entretenida (entertaining)	relajante (relaxing)	aburrida (boring)	
			la educación fisica (PE)					fácil (easy)	complicada (complicated)	inútil (pointless)	
								interesante (interesting)	difícil (difficult)	útil (useful)	
								motivante (motivating)			

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[2] Importance of languages

<table>
<tr><th colspan="2">¿Por qué es importante aprender idiomas? (Why is it important to learn languages?)</th><th colspan="3">¿Qué idiomas hablas o puedes hablar? (What languages do you speak or can you speak?)</th></tr>
<tr><td>Estudio (I have studied)</td><td>español (Spanish)
francés (French)
polaco (Polish)
urdu (Urdu)</td><td colspan="3">desde hace 5 años (for 5 years)</td></tr>
<tr><td rowspan="2">Aprender un idioma (Learning a language)
Estudiar una lengua (Studying a language)</td><td>te permite (allows you)</td><td>apreciar la vida cultural de otros países (to appreciate the cultural life of other countries)
conocer a mucha gente distinta (to meet lots of different people)
descubrir nuevas culturas (discover new cultures)
encontrar un buen trabajo (find a good job)
establecer nuevas amistades (to establish new friendships)</td><td>hacer nuevos amigos (make new friends)
trabajar en el extranjero (work abroad)
estudiar en el extranjero (study abroad)
viajar a otros países (travel to other countries)
viajar a lugares más exóticos (travel to more exotic places)</td></tr>
<tr><td colspan="3">te abre la mente (opens your mind)
aumenta tu confianza (increases your confidence)
te hace parecer más atractivo (makes you seem more attractive)
mejora tus perspectivas laborales (improves your job prospects)
te ayuda a conocer nuevos sitios (helps you get to know new places)
estimula el cerebro (stimulates your brain)
te ayuda a mejorar tu lengua materna (helps you improve your mother tongue)
te da la oportunidad de ir a la universidad en otro país (gives you the opportunity to go to university in another country)
reduce los prejucios y el racismo (reduces prejudice and racism)</td></tr>
</table>

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[8.2] Jobs (TRABAJAR, full verb)

Yo trabajo (I work)	como (as (a))	abogado (lawyer (m))	dependiente (shop assistant)	ingeniero (engineer (m))
Tú trabajas (You work)		actor (actor)	enfermero (nurse (m))	mecánico (mechanic (m))
		amo de casa (house-husband)	fontanero (plumber (m))	médico (doctor (m))
		cocinero (chef (m))	granjero (farmer (m))	peluquero (hairdresser (m))
		contable (accountant)	hombre de negocios (businessman)	profesor (teacher (m))
Él trabaja (He works)		abogada (lawyer (f))	dependiente (shop assistant)	ingeniera (engineer (f))
Ella trabaja (She works)		actriz (actress)	enfermera (nurse (f))	mecánica (mechanic (f))
Mi padre trabaja (My father works)		ama de casa (house-wife)	fontanera (plumber (f))	médica (doctor (f))
Mi madre trabaja (My mother works)		cocinera (chef (f))	granjera (farmer (f))	peluquera (hairdresser (f))
		contable (accountant)	mujer de negocios (businesswoman)	profesora (teacher (f))
Nosotros trabajamos (We (m) work)	como (as)	abogados/as (lawyers)	contables (accountants)	mujeres de negocios (businesswomen)
Nosotras trabajamos (We (f) work)		actores (actors)	dependientes (shop assistants)	ingenieros/as (engineers)
Tú y yo trabajamos (You and I work)		actrices (actresses)	enfermeros/as (nurses)	mecánicos/as (mechanics)
Vosotros trabajáis (You all (m) work)		amos de casa (house-husbands)	fontaneros/as (plumbers)	médicos/as (doctors)
Vosotras trabajáis (You all (f) work)		amas de casa (house-wives)	granjeros/as (farmers)	peluqueros/as (hairdressers)
Ellos trabajan (They (m) work)		cocineros/as (chefs)	hombres de negocios (businessmen)	profesores/as (teachers)
Ellas trabajan (They (f) work)				
Mis hermanos trabajan (My brothers work)				
Mis hermanas trabajan (My sisters work)				

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[8.1] Talking about jobs [FUTURE]

Cuando (When)	sea mayor, (I be older,)	seré (I will be (a))	abogado (lawyer (m))	enfermero (nurse (m))	ingeniero (engineer (m))	médico (doctor (m))	y (and)	me gustará mi trabajo (I will like my job)	porque será (because it will be)	divertido (fun)
			cocinero (chef (m))	fontanero (plumber (m))	mecánico (mechanic (m))	profesor (teacher (m))				estimulante (stimulating)
		trabajaré como (I will work as (a))	abogada (lawyer (f))	enfermera (nurse (f))	ingeniera (engineer (f))	médica (doctor (f))				fácil (easy)
			cocinera (chef (f))	fontanera (plumber (f))	mecánica (mechanic (f))	profesora (teacher (f))				gratificante (rewarding)
	termine mis estudios, (I finish my studies,)									interesante (interesting)
		trabajaré en (I will work in)	el campo (the countryside)	un garaje (a garage)	una oficina (an office)	un taller (a workshop)	pero (but)	no me gustará (I won't like it)		aburrido (boring)
			un colegio (a school)	una granja (a farm)	un restaurante (a restaurant)	un teatro (a theatre)				difícil (difficult)
			una fábrica (a factory)	un hotel (a hotel)	un supermercado (a supermarket)	una tienda (a shop)				duro (hard)
										estresante (stressful)

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[6.2.1] Talking about a movie (past)

Anoche, (Last night,)	compré una entrada para ver (I bought a ticket to see)	fui a ver (I went to see)	una comedia (a comedy)	un cortometraje (a short film)	un dibujo animado (a cartoon)	
Anteayer, (The day before yesterday,)	fui al cine para ver (I went to the cinema to see)	vi (I watched)	una película (a ...film)	de acción (action·)	de horror (horror·)	de ciencia ficción (sci-fi·)
El viernes pasado, (Last Friday,)						

La película hablaba (The film talked)	de la historia (about the story)	de un agente secreto (of a secret agent)	cuya misión era (whose mission was to)	salvar el mundo (·to save the world)		
Trataba (It was [about])	de la vida (about the life)	del personaje principal (of the main character)	que tenía la misión de (who had the mission to)	encontrar su alma gemela (·to find their soulmate)		
Era la historia (It was the story)	del fin del mundo (·of the end of the world)	de las relaciones amorosas (·of romantic relationships)	y (and)	de la amistad (·of friendship)	de la infancia (·of childhood)	de la guerra (·of war)
	de la lucha entre el bien y el mal (·of the fight between good and evil)			de la avaricia (·of greed)	del espionaje (·of spying)	de la venganza (·of revenge)
				era una historia basada en hechos reales (it was a story based on real events)		

Me gustó (I liked)	la banda sonora (the soundtrack)	el final (the ending)	porque era (because it was)	cautivador(a) (captivating)	cómico/a (comical)	conmovedor (moving)	de risa (hilarious)
No me gustó (I didn't like)	el comienzo (the beginning)	la historia (the story)		angustioso/a (nerve-wracking)	defraudante (disappointing)	mediocre (mediocre)	previsible (predictable)

Me gustaron (I liked)	las actuaciones (the acting performances)	los efectos especiales (the special effects)	porque eran (because they were)	impresionantes (impressive)	originales (original)	fascinantes (gripping)	increíbles (incredible)
No me gustaron (I didn't like)	los diálogos (the dialogues)	las escenas de combate (the combat scenes)		defraudantes (disappointing)	mediocres (mediocre)	previsibles (predictable)	

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[7] Last weekend

El sábado pasado (Last Saturday) El domingo pasado (Last Sunday) El fin de semana pasado (Last weekend)	me levanté (I got up) dormí hasta tarde, (I had a lie in,)	temprano, (early,) tarde, (late,) y me levanté (and I got up)		a eso de (around)	las nueve (9:00) las diez (10:00) las once (11:00) mediodía (midday)
Primero (First of all) Luego (Then)	desayuné (I had breakfast)	con mis padres (with my parents) en la cocina (in the kitchen)	en mi dormitorio (in my bedroom) delante de la tele (in front of the TV)	y después (and after that)	me cepillé los dientes (I brushed my teeth) me duché (I had a shower) me lavé (I had a wash) tomé un baño (I took a bath)
Por la tarde (In the afternoon)	ayudé a mi padre (I helped my father) descansé (I rested) dormí (I slept) hice mi cama (I made my bed) hice mis deberes (I did my homework) no hice nada (I did nothing)	jugué al fútbol (I played football) lavé los platos (I did the washing up) leí el periódico (I read the newspaper) leí un poco (I read a bit) me metí en Internet (I went on the internet) vi una serie (I watched a series)		y luego por la noche (and then at night)	escuché música (I listened to music) fui al centro (I went to the town centre) fui a casa de mi amigo (I went to my friend's house) fui a una fiesta (I went to a party) fui al restaurante (I went to the restaurant) salí con mis amigos (I went out with my friends)
Me acosté (I went to bed)	a (at) a eso de (around)	las once (11:00) las once y media (11:30) medianoche (midnight)		y antes de acostarme (and before going to bed)	me cepillé los dientes (I brushed my teeth) me desmaquillé (I removed my make-up) me duché (I had a shower)

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[7] Plans for the weekend

Voy a (I'm going to) Vamos a (We are going to) Me gustaría (I would like to) Nos encantaría (We would love to)	hacer (to do)	boxeo (boxing) ciclismo (cycling) deporte (sport)	escalada (climbing) esquí (skiing) equitación (horse riding)	footing (jogging) natación (swimming) pesas (weights)	senderismo (hiking) surf (surfing) turismo (sightseeing)
	jugar (to play)	al futbolín (table football) al baloncesto (basketball) a las cartas (cards)	a las damas (draughts) al ajedrez (chess) al fútbol (football)	a los videojuegos (video games) al tenis (tennis) al voleibol (volleyball)	
	tocar (to play)	la batería (the drums)	la guitarra (the guitar)	el piano (the piano)	
	charlar con mis amigos (to chat with friends) escuchar música (to listen to music) leer tebeos (to read comics)	leer novelas (to read novels) meterme en Internet (to surf the internet) pasar horas en Internet (to spend hours on the internet)	salir con mis amigos (to go out with friends) ver dibujos animados (to watch cartoons) ver series (to watch series)		
Voy a hacerlo (I am going to do this) Vamos a hacerlo (We are going to do this) Lo haré (I will do this)	en el centro comercial (at the shopping mall) en el centro (in the town centre) en el cine (at the cinema)	en el colegio (at school) en el gimnasio (at the gym) en la piscina (at the swimming pool)	en la playa (at the beach) en casa (at home) en casa de mi amigo (at my friend's house)	muy raramente (very rarely) bastante a menudo (quite often) casi todos los días (nearly every day)	de vez en cuando (from time to time) una vez a la semana (once a week) dos veces al mes (twice a month)
Será (It will be)	muy (very) bastante (quite)	agradable (pleasant) divertido (entertaining) interesante (interesting)	gracioso (funny) apasionante (exciting) saludable (healthy)	pero también será un poco (but it is also a bit)	aburrido (boring) agotador (tiring) caro (expensive) peligroso (dangerous)

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[11] A past holiday

El año pasado (Last year) El verano pasado (Last summer) Hace dos semanas (Two weeks ago) Hace un mes (A month ago)		fui (I went) fuimos (we went)	de vacaciones (on holiday)	a Alemania (to Germany) a China (to China) a Escocia (to Scotland)	a los Estados Unidos (to the United States) a España (to Spain) a Francia (to France)		a Irlanda (to Ireland) a Italia (to Italy) a Japón (to Japan)	
Viajé (I travelled) Viajamos (We travelled)	en (by)	autocar (coach) avión (plane) barco (boat)	coche (car) tren (train)	y el viaje (and the journey)	fue (was)	cómodo (comfortable) divertido (fun)	largo (long) rápido (quick)	
					duró (lasted)	una hora (1 hour) dos horas (2 hours)	diez horas (10 hours) dos días (2 days)	
Me alojé (I lodged (i.e. paid)) Nos alojamos (We lodged (i.e. paid))	en (in)	un albergue juvenil (a youth hostel) un camping (a campsite)	una granja (a farm) un hostal (a hostel)	un hotel barato (a cheap hotel) un hotel de lujo (a luxury hotel)	y (and)	fue genial (it was great) me encantó (I loved it) me gustó mucho (I liked it a lot) lo pasé bomba (I had a great time)		
Me quedé (I stayed) Nos quedamos (We stayed)		casa de mis abuelos (my grandparents' house) casa de un amigo (a friend's house)						
Nos encantó (We loved it) Lo pasamos bomba (We had a great time)	porque (because)	había (there was)	un gimnasio (a gym) un parque acuático (an aqua park) un buen restaurante (a good restaurant)	una playa bonita (a lovely beach) una sala de juegos (a games room) una zona de spa (a spa area)	y (and)	la gente era simpática (the people were nice) el hotel era genial (the hotel was great) había mucho que hacer (there was a lot to do)		

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[12] Past holiday activities (I, we)

Durante las vacaciones (During the holidays)	alquilé una bici (I rented a bike)	conocí a mucha gente (I met a lot of people)	jugué al fútbol (I played football)	saqué fotos (I took photos)	con mi hermana (with my sister)
	comí comida deliciosa (I ate delicious food)	descansé en la playa (I rested on the beach)	nadé en el mar (I swam in the sea)	vi un partido de fútbol (I watched a football match)	con mi hermano (with my brother)
	compré recuerdos (I bought souvenirs)	di un paseo (I went for a walk)	probé platos típicos (I tried typical dishes)	visité el castillo (I visited the castle)	con mi madre (with my mother)
El primer día (On the first day)	hice (I did)	buceo (diving)	natación (swimming)	senderismo (hiking)	turismo (sightseeing)
El segundo día (On the second day)	fui (I went)	al centro comercial para comprar cosas (to the shopping mall to buy things)	a la montaña para hacer senderismo (to the mountains to do hiking)	a la playa para nadar en el mar (to the beach to swim in the sea)	
El tercer día (On the third day)	fuimos (we went)	al centro de la ciudad para hacer turismo (to the city centre to do sightseeing)	al parque para jugar al tenis (to the park to play tennis)	a la playa para tomar el sol (to the beach to sunbathe)	
Un día (One day)	hicimos (we did)	buceo (diving)	natación (swimming)	senderismo (hiking)	turismo (sightseeing)
El último día (On the last day)	alquilamos una bici (we rented a bike)	conocimos a mucha gente (we met a lot of people)	jugamos al fútbol (we played football)	sacamos fotos (we took photos)	
Lo mejor fue cuando (The best thing was when)	comimos comida deliciosa (we ate delicious food)	descansamos en la playa (we rested on the beach)	nadamos en el mar (we swam in the sea)	vimos un partido de fútbol (we watched a football match)	
	compramos recuerdos (we bought souvenirs)	dimos un paseo (we went for a walk)	probamos platos típicos (we tried typical dishes)	visitamos el castillo (we visited the castle)	

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[14.1] La Tomatina (part 1)

En agosto (In August) El fin de semana pasado (Last weekend) El miércoles pasado (Last Wednesday)	fui (I went) fuimos (we went)	a Buñol (to Buñol)	para ver (to see) para participar en (to take part in)		la Tomatina (the Tomatina)
Me desperté (I woke up) Me levanté (I got up)	a las ocho (at 8) temprano (early)	y después de (and after)	desayunar (having breakfast) tomar un café (having a coffee)	salí de casa (I left the house) salimos de casa (we left the house)	
Viajé (I travelled) Viajamos (We travelled)	en autocar (by coach)	en tren (by train)	y el viaje fue (and the journey was)	bastante (quite)	aburrido (boring) corto (short)
Alquilé un coche (I hired a car)	Alquilamos un coche (We hired a car)				largo (long)
El día de la fiesta (On the day of the festival) Después de un viaje agradable (After a pleasant journey)	llegué (I arrived) llegamos (we arrived)	temprano (early)	al pueblo (to the town) a la plaza del pueblo (to the town square)	para (in order to)	coger sitio (to get a good place) prepararme / prepararnos (to get ready)
En esta fiesta hay (In this festival there are) Esta fiesta tiene (This festival has)	algunas reglas. (a few rules.)	Por ejemplo, (For example,)	no se debe (one must not) nunca se debe (one must never) solo se debe (one must only) solo se permite (one may only)	tirar (to throw)	botellas (bottles) piedras (stones) tomates (tomatoes)
Se debe cumplir con (One must comply with)	las reglas. (the rules.)		se recomienda llevar (it's recommended to wear)	gafas de natación (swimming goggles)	ropa vieja (old clothes) zapatillas (trainers)

SentenceBuilders
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[15.2] A trip to Sevilla (future)

Hoy (Today) Mañana (Tomorrow)	voy a ir (I am going to go) vamos a ir (we are going to go)		a Sevilla (to Seville)	en autocar. (by coach.) en tren. (by train.)	El viaje dura (The trip takes)		media hora (half an hour) dos horas (2 hours)
En Sevilla (In Sevilla)	voy a alojarme (I am going to stay) vamos a alojarnos (we are going to stay)		en un albergue juvenil (in a youth hostel) en un hotel (in a hotel)		al lado de (next to) cerca de (near)		la Catedral de la Giralda (the Giralda Cathedral) la Plaza de España (Spain Square)
El primer día (On the first day) El segundo día (On the second day)	por la mañana (in the morning) por la tarde (in the afternoon)	voy a (I am going to) vamos a (we are going to)	dar un paseo por (to go for a walk around) visitar (to visit) ver (to see)		el barrio de Triana (the Triana district) el casco antiguo (the old town) los jardines del Real Alcázar (the gardens at the Real Alcázar) el Museo de Bellas Artes (the Museum of Fine Arts) el Parque de María Luisa (María Luisa Park)		
Finalmente (Finally)	el domingo (on Sunday) el lunes (on Monday)	por la mañana (morning) por la tarde (afternoon)	voy a (I am going to) vamos a (we are going to)		volver a casa (to return home)		en avión (by plane) en coche (by car)
Creo que (I believe that) Pienso que (I think that)	mi viaje (my trip) nuestro viaje (our trip)		a Sevilla (to Sevilla)	será (will be)	fenomenal (phenomenal) genial (great)		increíble (incredible) inolvidable (unforgettable)

Year 9 Geography Knowledge Organiser

How to protect our crumbling cliffs
Development & globalisation
How ecosystems functions
Ecosystems under threat
Tourism

Contents Page

GEOGRAPHY OVERVIEW

Key Terminology

SEEP

Social = Issues to do with peoples lives

Economic = Jobs, business and money

Environmental = The Environment

Political = Countries and Governments

Stakeholder = Somebody who has an interest in an issue

Timescale = Are you talking short term (days and weeks) Or long term (months and years) ?

Spatial = What scale are you looking at ? Is it *local* scale, *regional* scale , *national* scale or *global* scale ?

Sustainability

"*Meeting the needs of the present without compromising the ability of future generations to meet their own needs"*

Enough , For all, Forever

Geography Connectives

At the end of every sentence ask yourself – *'So ?'* , '*And ?'* and '*Why ?'*

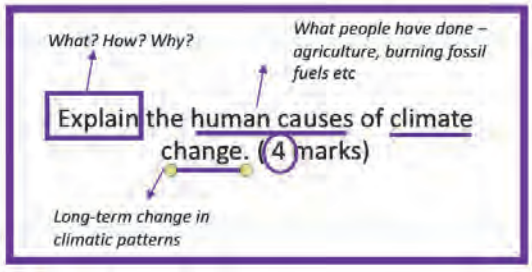
This means that …
As a result of this …
This leads to …
The result of this …
This results in …
In the future this may lead to …
As a consequence of this …
This occurs because …
The reasons for this is …
This causes …
An example of this is …
The reason for this is …

… leading to …
… meaning that …
The impact of this is …
This produces …
This may bring about …
…and because of this …
This is due to …
This suggests that …
…and this means that …
One reasons for this is …
…and due to this …

BUG the exam question

Before you answer any question remember to **BUG** the question

B – box the command work
U – Underline any other key words
G – glance at the mark



Developing your points using the PEEL structure

Point
What is the point you are making ?

Evidence
Which examples / facts / data link to your point ?

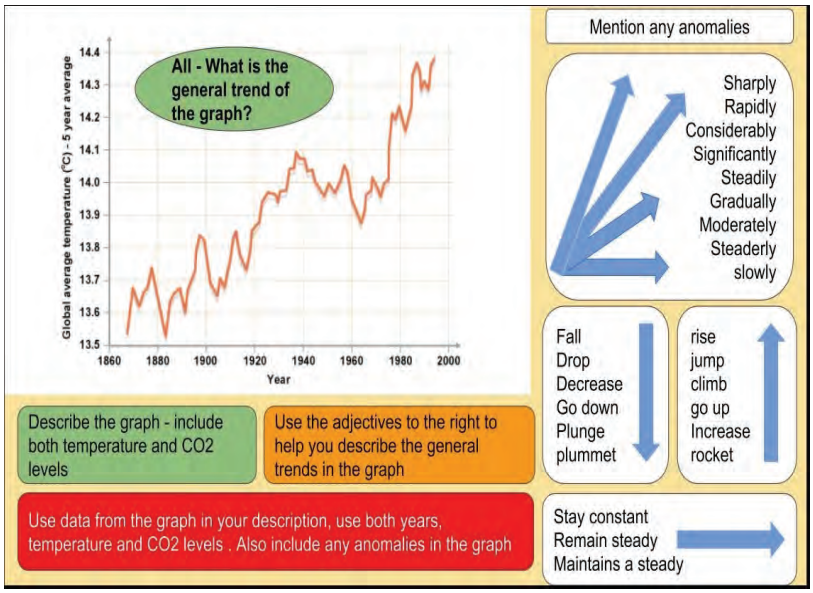
Explain
Develop your point using connectives such as '*This means that*' or '*therefore*' or '*this shows that*'

Link
How does your point link back to the question ?

Reading a graph in Geography

PEA

P	**Pattern**	E.g. “Its increasing”
E	**Evidence**	E.g. “Between 1990 and 2005 it increased …”
A	**Anomalies**	Is there anything different ? A sudden drop ? Point it out.



Reading maps in Geography – *‘CLOCK'*

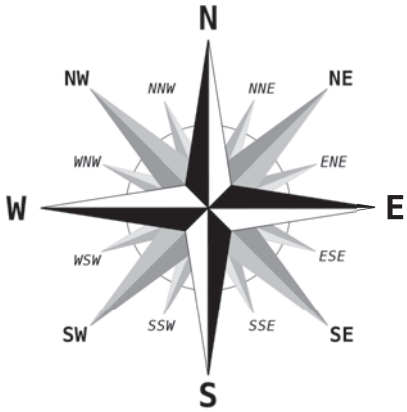
C = Country

L = Latitude / longitude

O = Oceans and Seas

C = Compass points

K = Kilometres (distance and scale



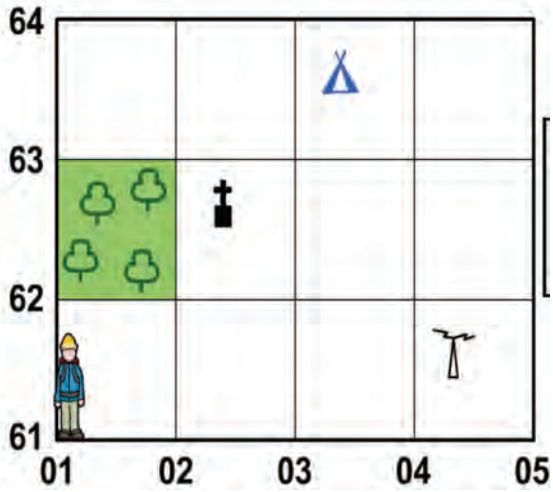
Using OS maps in geography

Follow the 3 Grid reference rules

1. Always go across the landing and then up the stairs .

2. If you are 'in' a square, then go down and left.

3. If you are given a grid reference and need to find it ,go up and right.



Decision making exercises checklist.

Did you …

1. Plan your answer ?
2. Rank your option choices ?
3. Develop your points using TAT ?
4. Link to SEE ? (*Social , Economic, Environmental*)
5. Mention stakeholders ?
6. Use the resource booklet ?
7. Link to scale – *local, regional and national* ?
8. Link to time – *short term vs long term* ?
9. Think about the bigger picture – national or global issues ?

How to Protect our crumbling cliffs

Coasts: Waves

Key Term	Definition
Constructive Wave	A low energy wave characterised as having a strong swash and a weak back wash. Leads to the build up of a beach.
Destructive Wave	A high energy wave characterised as having a strong backwash and a weak swash. Leads to the removal of beach material.
Swash	The forward motion of waves up a beach.
Backwash	The backwards motion of waves down a beach.
Fetch	The distance travelled by wind or waves across open water.
Frequency	How often the waves occur. Low frequency = 6-8 waves per minute High frequency = 10-14 waves per minute
Wave Peak	The highest point of the wave.
Wave Trough	The lowest point of the wave, occurs between two peaks.

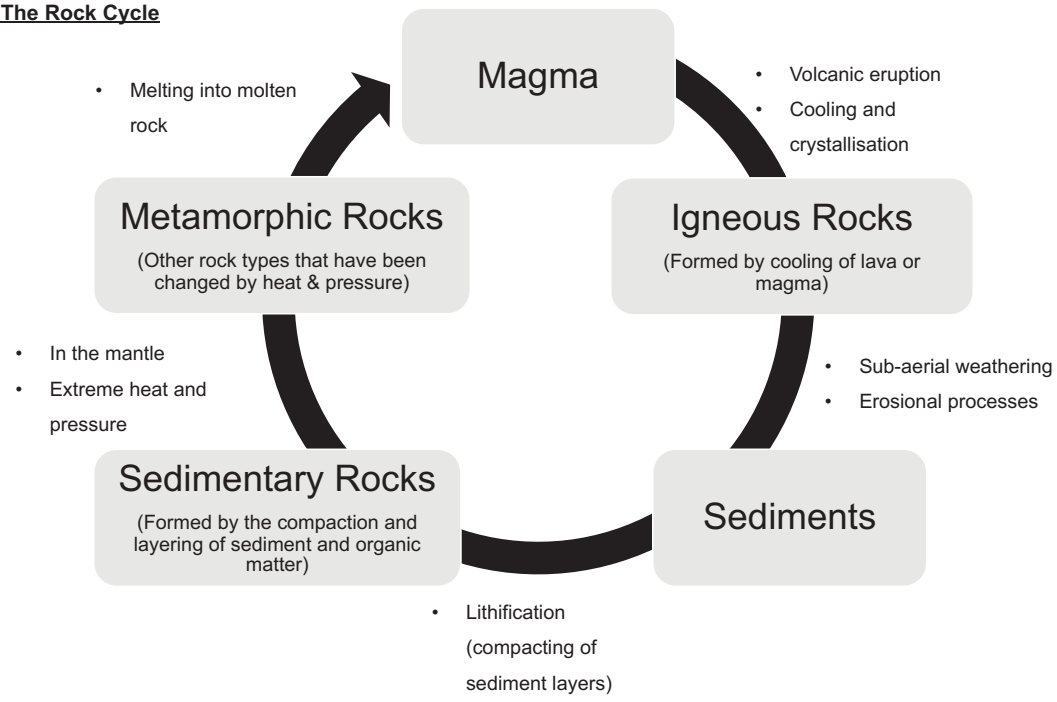
Constructive Waves:

- Strong swash AND weak backwash
- Contribute to the build up of beach material
- Elliptical wave orbit
- Low frequency and long wave length
- Shallow wave height

Destructive Waves:

- Weak swash AND strong backwash
- Leads to the removal of beach material
- Circular wave orbit
- High frequency and short wave length
- Steep wave height

Coasts: The Rock Cycle



Coasts: Sub-Ariel Weathering and Mass Movement

Sub-Ariel Weathering
The breakdown of rocks at Earth's surface, without the influence of marine erosion.

Biological Weathering
Breakdown of rock due to plants or animals
- Animals burrowing into the cliff face, displacing rocks
- Plant roots growing into rock cracks and breaking them apart

Chemical Weathering
Breakdown of rock through changing its chemical composition.
- Carbonation (acidic rain dissolving rocks)

Physical Weathering
The breakdown of rock without changing its chemical composition.
- Freeze-Thaw (water getting into cracks, freezing- pushing rocks apart, thawing then repeating process until rock breaks apart)
- Wetting and Drying (shrinking and expanding of material)

Mass Movement
Large movements of soil and rock debris down slopes in response to the pull of gravity.

Types of Mass Movement	Description	Diagram
Rockfall	Rock fragments break away from cliff face due to weathering	
Landslide	Blocks of rock slide downhill along a slide plane	
Mudslide	Saturated soil flows down a slope	
Slumping	Saturated soil slumps along a curved surface	

Coasts: Marine Erosion Key Terms

Hydraulic action

Air becomes trapped in joints and cracks on a cliff face. When a wave breaks, the trapped air is compressed which weakens the cliff and causes erosion.

Attrition

Waves smash rocks and pebbles on the shore into each other, and they break and become smoother.

Abrasion

Bits of rock and sand in waves grind down cliff surfaces like sandpaper.

Solution

Acids contained in sea water will dissolve some types of rock such as chalk or limestone.

Coasts: Erosional Landforms (Headlands & Bays)

Alternating bands of hard and soft rock.

↓

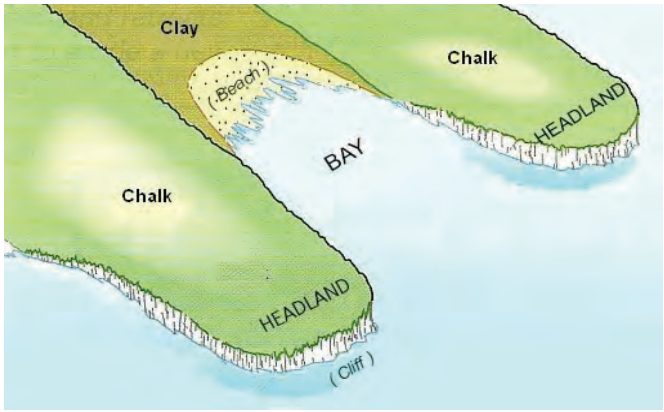
The bands of soft rock, such as sand and clay, erode more quickly than those of more resistant rock, such as chalk.

↓

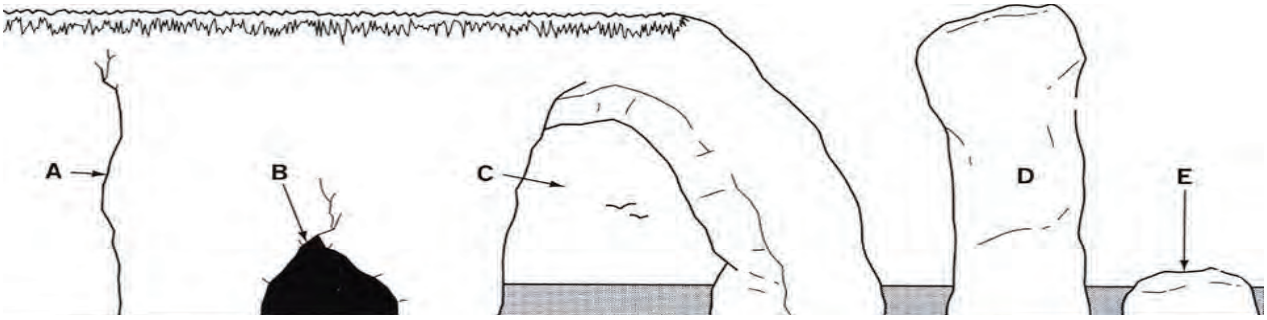
This leaves a section of land jutting out into the sea called a headland.

↓

The areas in-between headlands, where the soft rock has eroded away, are called bays



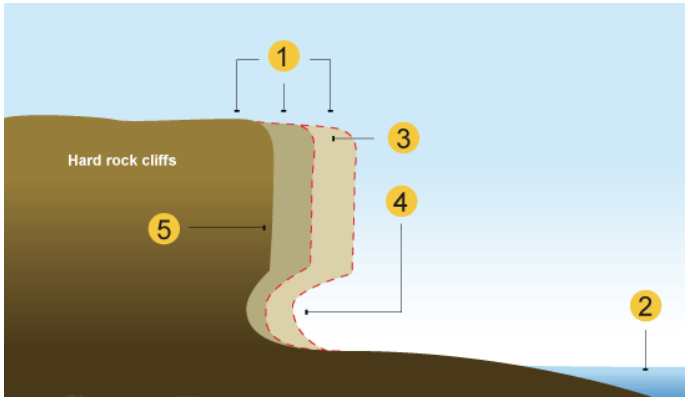
Coasts: Erosional Landforms (Caves, Arches, Stacks, Stumps)



Cracks forms in the cliff face due to hydraulic action → Hydraulic action and abrasion force the crack to grow into a **cave** → The cave become larger before breaking through the headland, leaving a natural **arch** → The arch us broken down by subaerial weathering and collapses → This leaves a tall rock column called a **stack** → The stack is eroded and weathered forming a **stump**

Coasts: Erosional Landforms (Wave-Cut Platforms)

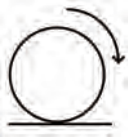
1. Weather weakens the top of the cliff.
2. The sea attacks the base of the cliff forming a wave-cut notch.
3. The notch increases in size causing the cliff to collapse.
4. The backwash carries the rubble towards the sea forming a wave-cut platform.
5. The process repeats and the cliff continues to retreat



Coasts: Transportation Key Terms

Transportation
The movement of material in the sea and along the coast by waves.

Traction
Large pebbles and boulders are rolled along the seafloor.



Suspension
Beach material is suspended and carried by the waves

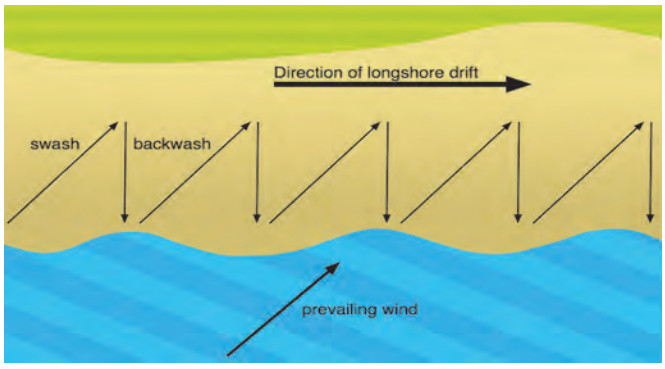
Saltation
Beach material is bounced along the seafloor

Solution
Material is dissolved and carried by the water

Coasts: Longshore Drift

The movement of material along the coast is called longshore drift.

- The prevailing wind blows waves carrying sediment into the beach at an angle
- The waves break on the shore and due to gravity the water runs back, perpendicular to the angle of the shoreline
- The sea carries the sediment back down the beach in its backwash
- This results in a zigzag motion as sediment is transported laterally along the coastline



Coasts: Depositional Landforms (Beaches)

Beaches are found between the high water mark and low water mark

↓

Formed by constructive waves depositing material

↓

Sand beaches are flat and wide, particles are small and the beach profile is gently sloping

↓

Shingle beaches are steep and narrow, particles are large and the beach profile is steeply sloping

Key Terms

Sediment

Sediment is a naturally occurring material that is broken down by processes of weathering and erosion

Shingle

Small rounded pebbles

Coasts: Depositional Landforms (Spits)

Spits form where the coast sharply changes direction

↓

Longshore drift transports sediment past the bend in the coastline and deposits it in the sea.

↓

Strong winds and waves curve the end of the spit (recurved tip)

↓

Sheltered areas behind spits are protected from waves- which means plants can grow there

↓

Overtime this sheltered area can become a mudflat or salt marsh

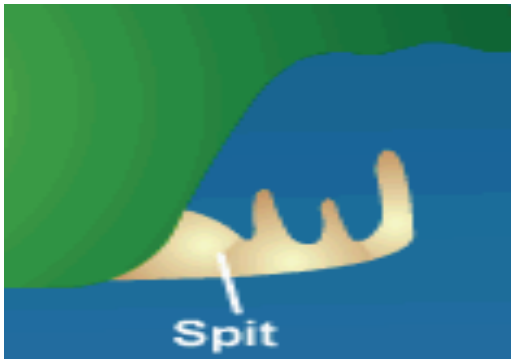
Key Terms

Mudflat

Also known as 'tidal flats' – it is a stretch of muddy land left uncovered at low tide

Saltmarsh

An area of coastal grassland that is regularly flooded by seawater



Coasts: Depositional Landforms (Bars)

Formed when a spit joins together two headlands

The bar cuts off the bay between the headlands from the sea

A lagoon forms behind the bar

Key Terms

Lagoon

A pool of shallow salt water separated from the sea by a low sand bar or coral reef

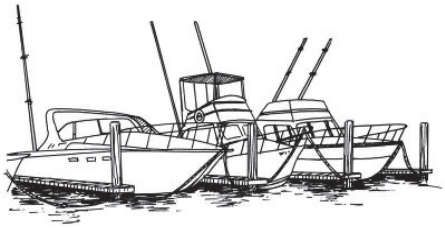
Coasts: Human Activity and The Coast

The uses of the coast:

1. Water Sports

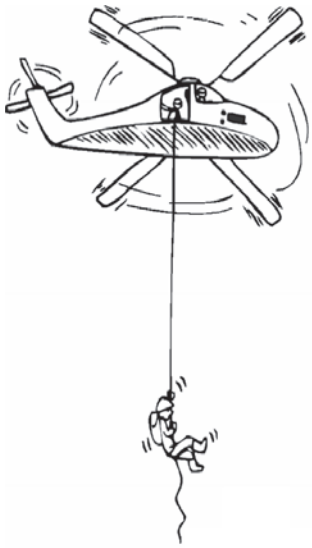
2. Offshore Wind Farm (Energy)

3. Tourism



4. Ports and Harbours

5. Fishing



6. Security and Rescue

Coasts: Human Activity and The Coast **Threats to the coast:**

1. Coastal Flooding

2. Beach Litter/ Garbage Dumping

3. Oil Spillages

4. Over Fishing

5. Coral Bleaching

6. Increased Erosion

Coasts: Coastal Management

Shore Line Management Plans:

- Local councils prepare shoreline management plans to prepare and protect against coastal flooding
- Councils will weigh up the benefits of building the defences against the cost of building them

Option	Description	Explanation
Do Nothing	Do nothing and allow gradual erosion	• Option if the land has a lower value than the cost of building expensive sea defences
Hold the Line	Use hard-engineering techniques to defend the coastline	• Hard-engineering techniques are only used when the land being protected is particularly valuable • Sea defences need continuous maintenance and upgrading which is expensive
Retreat the Line	Allow a break in existing coastal defences to allow land to flood naturally between low and high tide	• Option if the area is at high risk of erosion. It usually occurs where the land is of low value (e.g. farm land) • People will need to be evacuated from flood risk areas.
Advance the Line	Build new coastal defences further out to sea	• Most expensive option as it requires a huge engineering project.

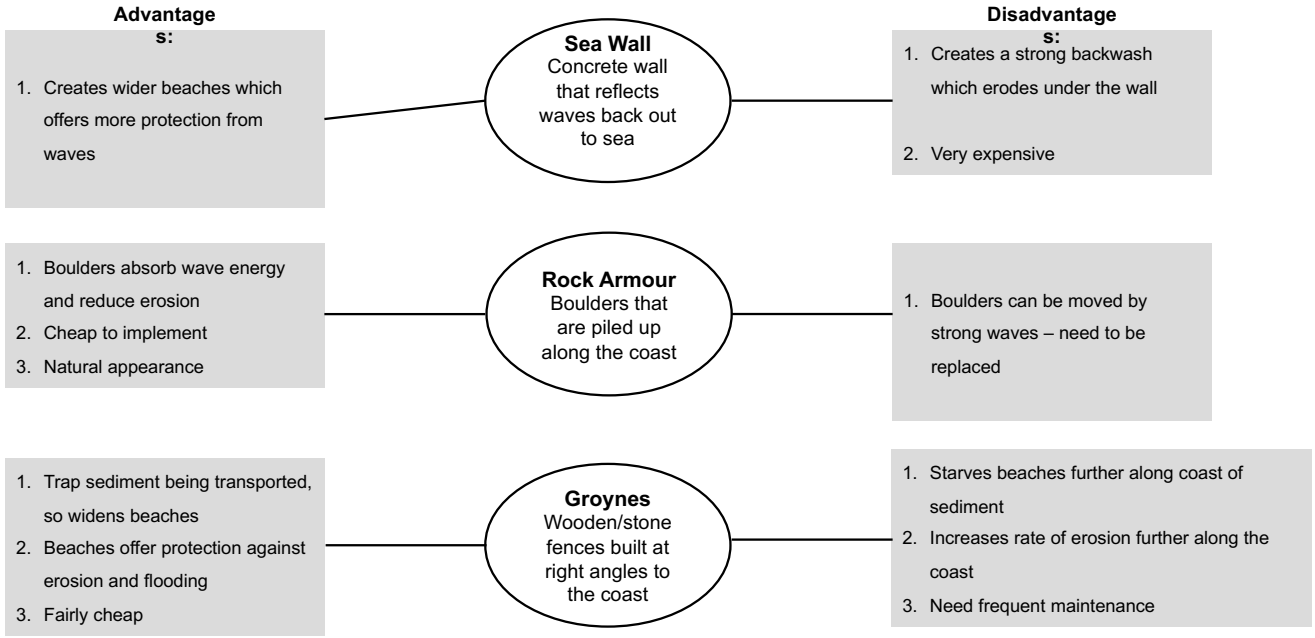
Key Terms

Hard Engineering
Man-made structures built to control the flow of the sea and reduce flooding and erosion

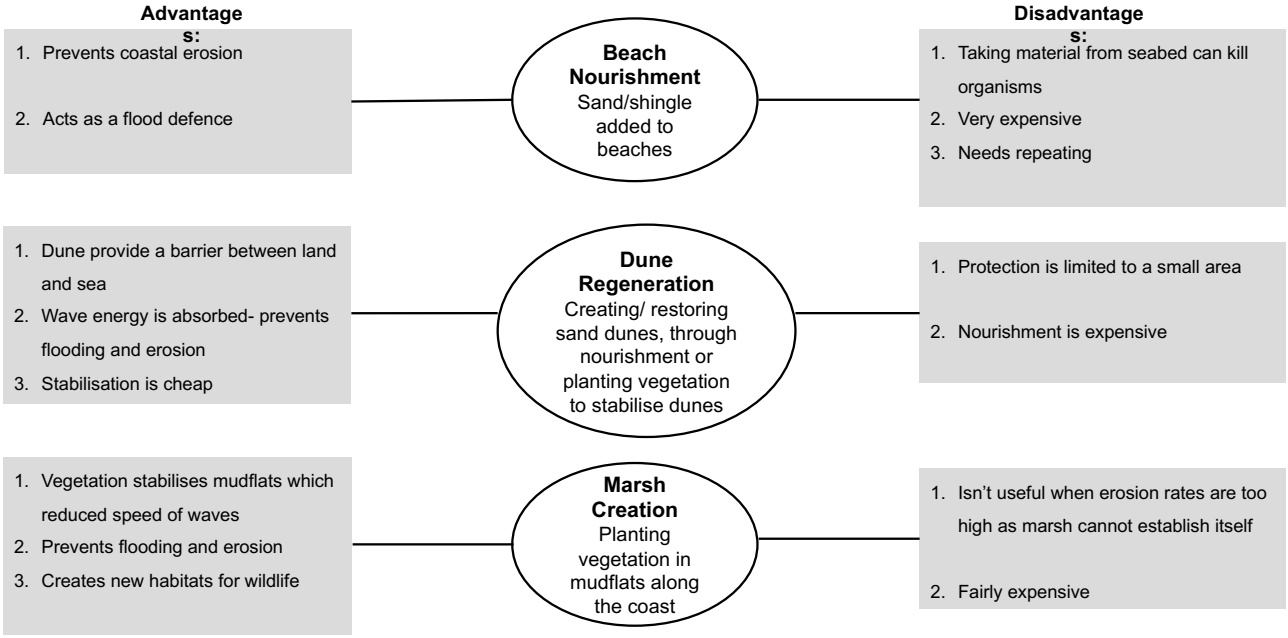
Soft Engineering
Schemes set up using knowledge of the sea and its processes to reduce the effects of flooding and erosion

Shoreline Management Plan
A non-statutory document that provides an overview of the long-term risks associated with coastal processes.

Coasts: Coastal Management- Hard Engineering Strategies



Coasts: Coastal Management- Soft Engineering Strategies



Coasts: Holderness Case-Study (1)

Location: Holderness, East Yorkshire, UK
Distance: 61km from Flamborough Head (headland) - Spurn Head (a spit)
Erosion: 1.8m of land lost/ year (fastest eroding coastline in Europe)

Reasons for rapid erosion:

1. Easily eroded rock type (boulder clay cliffs are likely to slump when wet)
2. Narrow beaches don't slow the speed of oncoming waves
3. Sea defences worsening the erosion rates further along the coastline (groynes trap sediment, so beaches further along coast are malnourished)
4. Powerful waves- deep water, storm surges and long fetch

The Effects of Rapid Erosion-

Social Impacts:

1. Homes near the cliffs are at risk of collapsing into the sea (e.g. in Skipsea)
2. Accessibility to some settlements affected as cliffside roads have been lost due to erosion
3. Gas terminal at Easington is at risk (only 25m from cliff edge) This terminal accounts for 25% of Britain's gas supply

Environmental Impacts:

1. Some Sites of Special Scientific Interest (SSSI) are threatened (e.g. the lagoons near Easington)

Economic Impacts:

1. Property prices along the coast have fallen sharply
2. Businesses and jobs are lost (e.g. Seaside Caravan Park at Ulrome is losing approx. 10 pitches/ year to erosion)

Coasts: Holderness Case-Study (2)

Coastal management: The Issues

1. Terminal groyne syndrome (where the rate of erosion following the last groyne is increased) e.g. Cowden Farm, South of Mappleton is now at risk
2. Groynes prevent eroded material being transported to the Humber Estuary = increased risk of flooding there
3. Coastal erosion has increased at the Lincolnshire Coast (south of Holderness)
4. Spurn Head is at risk of being eroded away as less sediment is being added to it
5. Sea defences need continuous maintenance = expensive

Engineering Strategies along the Holderness Coastline:

Bridlington
- 4.7km long sea wall
- Groynes

Mappleton
- Groynes
- Rock Armour
- Gently sloping cliff profile

Hornsea & Withernsea
- Sea wall
- Groynes
- Rock Armour

Spurn Head
- Groynes
- Dune Stabilisation

Easington
- Rock Armour

Skipsea and **Great Cowden** do **NOT** have coastal defences and so are experiencing enhanced erosion due to **'Terminal Groyne Syndrome'**

Terminal Groyne Syndrome – Accelerated erosion of the beach down drift of the last groyne. There is a lack of sediment because longshore drift has been interrupted by the groynes.

Coasts: Climate Change and the Coast

Sea levels are rising due to Global Warming

- Global sea levels are rising at a rate of approx. 2mm per year
- Predictions estimate that by the year 2100, sea levels could have risen between 30cm-1m

Key Terms:

Global Warming
The gradual increase in the overall temperature of the Earth's atmosphere

Global Warming has two effects that causes Sea Levels to rise:

Melting Ice

- Increased temperatures melt glacial ice caps
- This melted ice water returns to the oceans
- This increases the volume of water in the oceans and causes the sea levels to rise

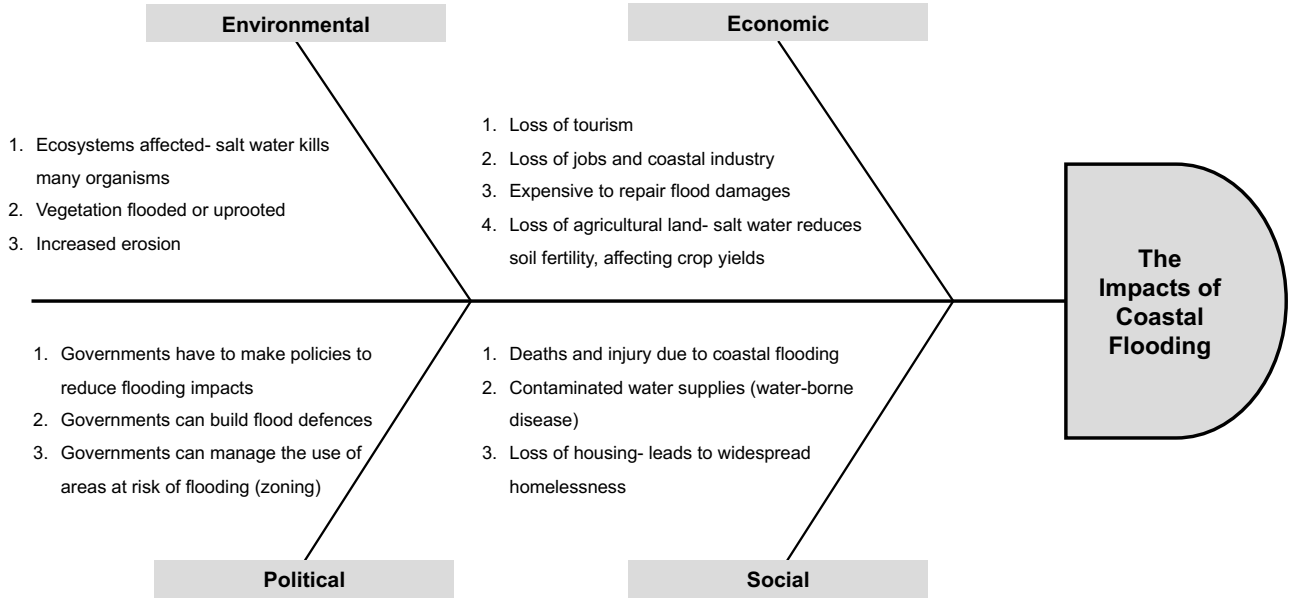
Thermal Expansion

- Increased global temperature causes oceans to get warmer
- Heated water particles expand
- This expansion increases the volume of water, causing sea levels to rise

Rising sea levels mean that low-lying parts of the world are at increased risk of coastal flooding.

E.g. Bangladesh and the Maldives

Coasts: The Impacts of Coastal Flooding



Coasts: The Maldives Case-Study

Location: The Maldives, Group of Islands in the Indian Ocean

Number of Islands: Approx. 1200- of which 200 are inhabited

Average Island Height: 80% of land is below 1m

Population: Approx. 440,000 people

The Problem: Due to rising sea levels, scientist predict The Maldives will be completely submerged within 50- 100 years

Key Terms:

Submerged
To be completely covered by the sea/ocean

Desalination
The expensive process of removing salt from sea water, making it drinkable

Carbon Neutral
Action to remove as much carbon dioxide from the atmosphere as each put into it.

The Impacts of Coastal Flooding on the Maldives

Social
1. Severe flooding causes housing damage, leaving whole communities homeless
2. Less fresh water available- saltwater contaminates freshwater supplies so locals have to rely on rainwater or build expensive desalination plants

Environmental
1. Loss of beaches- flooding erodes beaches which destroys animal habitats
2. Loss of soil- soil on the island is shallow and easily washed away, leaving the land infertile so crops cannot grow

Economic
1. Loss of tourism- largest industry in the Maldives. If main airport cannot operate then international tourism will be lost
2. Disrupt fishing industry- fish are the Maldives largest export. Coastal flooding may damage fish processing plants

Political
1. Maldivian government has asked the Japanese government to give them $60 million to build the 3m high sea wall that protects the capital city, Malé
2. The Maldives has pledged to become carbon neutral so as not to contribute to global warming
3. Government is considering buying land in countries like Indian and Australia and moving Maldivians there (environmental refugees)

Development and Globalisation

Development keywords

Key term	Definition
Development	The change that a place goes through to improve the standard of living and quality of life, including income, equality and education.
Sustainable development	Development that occurs which meets the needs of the present without ruining it for future generations.
Development indicator	Ways to measure the level of development of a place.
Social development indicator	Measurements of how people live in an area, e.g. Health (life expectancy, numbers of doctors per 1,000), Education (% in primary education) and Equality (fair distribution of wealth, equal gender pay).
Economic development indicator	Measurements of the wealth of an area, e.g. Gross Domestic Product per capita (GDPpc), Gross National Product or types of jobs (primary, secondary, tertiary, quaternary).
Composite (combined) development indicator	Where the measurement of development takes more than one development indicator, e.g. The HDI.
Gross National Product per capita (GDP pc)	Gross Domestic Product (the total value of all goods and services in that country) plus earnings from foreign investment divided by total population (an average).
Purchasing Power Parity (PPP)	Compares what the same amount of money can buy in different countries taking into account the different cost of living.
Human Development Indicator (HDI)	A measure from 0-1, where 1 is the most developed. It uses GNP pc, number of years in school, and life expectancy to get a good measure of how people are invested in by the government.
Globalisation	The process of a place becoming more interconnected to the world trade, communication, culture and technology.
Infrastructure	The basic structures and services needed by any society such as water supplies, sewage systems, roads or bridges

Key term	Definition
Low Income Countries (LICs)	Poorer countries with a Gross National Income of less than $1,045/year, per person, e.g. DR Congo and Mali.
Medium Income Countries (MICs)	Countries with a Gross National Income of between $1,045 and $12,735/year, per person. Split again between Lower Middle Income ($1,045-$4,126 and Upper Middle income). Lower MIC e.g. s India and Turkey. Upper MIC egs Brazil, China and South Africa.
High income Countries (HICs)	Richer countries with a Gross National Income of more than $12.375/year, per person, e.g. UK, USA, Germany.
Newly Industrialised Countries (NICs)	Countries that are developing fast because of rapid growth in recent years, e.g. Brazil, Russia, India and China (the BRICs).
Multinational Companies (MNCs)	A company that manufactures and trades across the world. They usually have their headquarters in MICs, where the profit goes to shareholders, e.g. Nike, Apple, Google and Amazon.
Brandt Line	An imaginary line that has split the world into the 'Rich North' and the 'Poor South', based on GDP pc in the 1980s.
Poverty Line	The estimated minimum level of income needed to secure the necessities of life (food, water, shelter).
Formal jobs	Jobs that the government are aware of and that pay tax so can help reinvest into the country. They have contracts and come with workers protection.
Informal jobs	Jobs that don't pay taxes, that don't have formal contracts, benefits or protection. HICs have very few informal jobs with LICs having a lot.
Primary economic sector	All jobs involving extracting raw materials, rearing animals and growing crops.
Secondary economic sector	A type of industry where raw materials are made into something, often called manufacturing.
Tertiary economic sector	Providing services including retail (shops), tourism, education, health and banking.
Quaternary economic sector	Section of employment that is knowledge-based, e.g. ICT and research.

What is development and how can we measure it ?

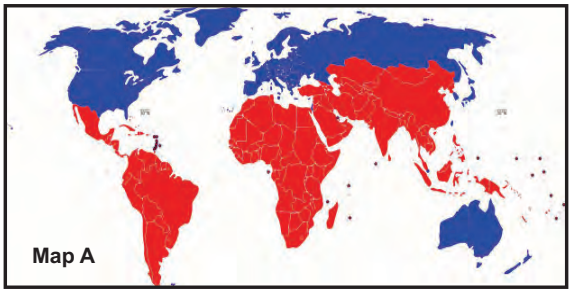
Development is the changes that a place goes through to improve the standard of living and quality of life, including income, equality and education.

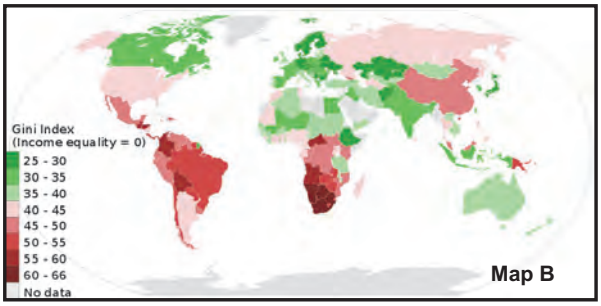
Development involves reducing levels of poverty, increasing wealth, bringing benefits to all.
It should also reduce the gap between rich and poor, create equality between men, women and people of all race and religion, making everyone safe, make sure everyone has a right to education and that everyone has their needs met of food, water and shelter.
Many indicators can be used to measure development .
These can be **social indicators** such as *Birth rate, Life expectancy* or *literacy rate*
Or they can be **economic indicators** such as *GDP (gross domestic product) , GNI (Gross national income)* or *employment rate*.
GDP and GNI give the total money in a country , and if it is then divided by the amount of people e in the country it is called GDP or GNI *per capita*. It is always in $ so countries can be compared.
Using just an economic indicator isn't accurate, as it is an average (and there can be lots of inequality in a country) and it depends on what the government spends their money on as to whether is raises standard of living / quality of life.
Therefore the best measure is a **composite** (combined / more that one) indictor such as *HDI* (Human development index) which measures GNI, life expectancy and education.

What is development and how can we measure it ?

Countries can be categorised into High Income Countries (HIC's) , Low Income Countries (LIC's) or Newly Industrialising Countries (NIC's)
HIC's are richer countries with a Gross National Income of more than $12.375/year, per person, e.g. UK, USA, Germany.
LIC's are poorer countries with a Gross National Income of less than $1,045/year, per person, e.g. DR Congo and Mali.
MIC's are countries with a Gross National Income of between $1,045 and $12,735/year, per person. Split again between Lower Middle Income ($1,045-$4,126 and Upper Middle income). Lower MIC e.g. s India and Turkey. Upper MIC egs Brazil, China and South Africa.
NIC's Countries that are developing fast because of rapid **industrial** growth in recent years, e.g. Brazil, Russia, India and China (the BRICs).
Countries develop in a variety of ways. Some have resources such as gold or oil. Some sell crops. Some use industry. Some are lucky enough to have features or climates that attract tourists e.g. Egypt. Many countries develop through trading with other countries and some have benefitted from the growth of Globalisation.
However, other countries find it harder to develop. This may be due to its physical geography such as poor climate (too hot or cold) , natural hazards e.g. drought, few natural resources to use or sell or because its landlocked
Or it may find it hard to develop due to human causes such as suffering from conflict and political instability, poor infrastructure (roads / rail) or because there is little investment by business.

The Brandt Line





The Brandt Line In the 1980s, the Germany Chancellor, Willy Brandt defined the world as the 'Rich North' and the 'Poor South'. This is shown in Map A.
This is a useful starting point but is now very out-of-date and too simplistic. Many '*poor*' countries have now developed and are LIC's or HIC's.
The modern way of classifying countries is by their income levels - measured in US$ and adjusted **for Purchasing Power Parity (PPP)** so high costs of living in countries such as Sweden do not distort the figures. This is shown in Map B

Scatter graphs

A scatter graph is a type of graph shat shows the relationship between 2 indicators

The X-axis will show 1 indicator and the Y-axis the other. Crosses are then placed to show the points where the 2 indicators meet

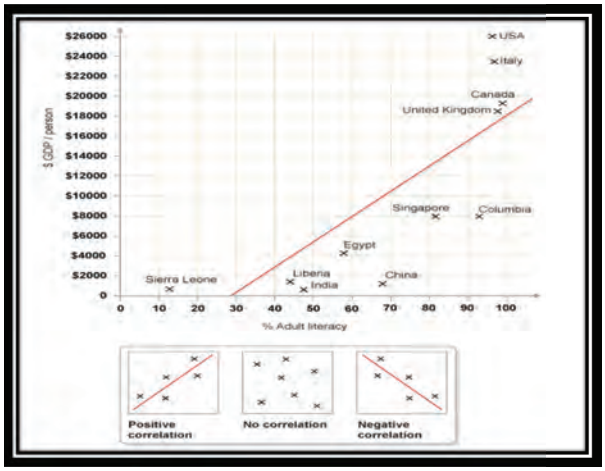
A **line of best fit** is then drawn. This line needs to have the same number of points on each side of the line

A **positive relationship** is where 1 indicator increases as the other indicator increases e.g. GNI and Life expectancy

A **negative relationship** is where 1 indicator increases as the other indicator decrease e.g. GNI and Infant mortality

No correlation is when there is no link between the 2 indicators.

An **Anomaly** is where there is a relationship (+ or -) but some data does not fit the pattern



The growth of Globalisation

Globalisation: "When available goods and services, or social and cultural influences gradually become similar in all parts of the world"

Factors that drive globalisation

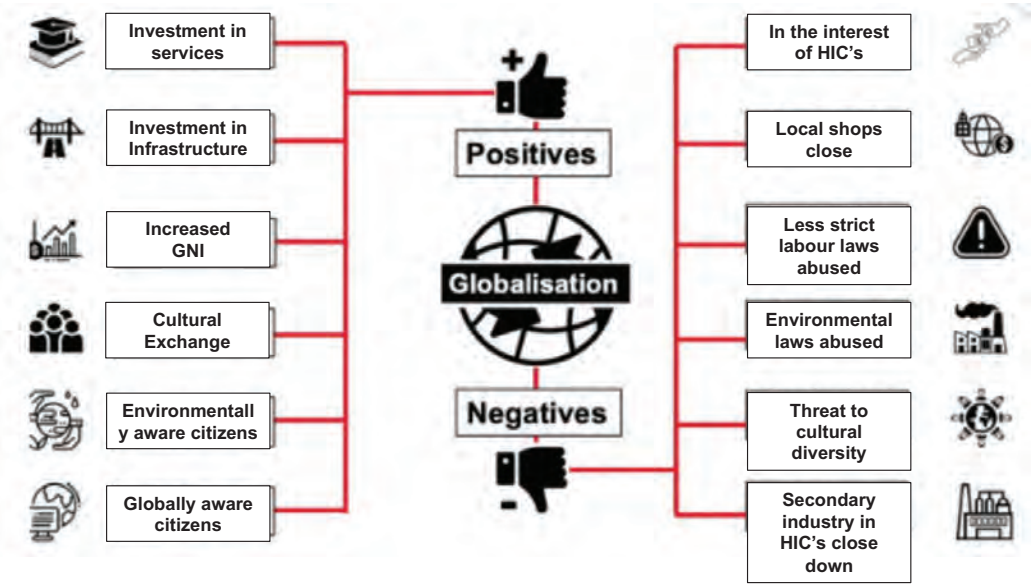
Trade – Goods from around the world can be traded in different countries

Multinational Companies – Large companies manufacture and sell in different parts of the world

Culture – Films from one country are released around the world

Communications Smartphones
Fast Internet – Ideas from around the world spread easily and companies can communicate with other countries quickly.

Positives and negatives of Globalisation



Multinational Companies (MNC's)

TNC's and MNC's
TNC's = Trans-National Companies and MNC's = Multi-National Companies are companies which operate in multiple countries. They usually have their headquarters' in HICs with production in LICs, selling worldwide.
Walmart is the worlds richest company. It earned $485.9 billion in 2017. This means it has a revenue higher than 182 countries in the world!
MNCs have been successful in reducing costs (especially labour) to such minimal levels it leaves two main winners: The MNC and the Retailer.
Outsourcing is the process by which a company employs other companies to make its products for it and not directly owning production facilities
Many companies like Nike **outsource** production. This means they can drive costs down further by squeezing small factory owners who are desperate for contracts and avoid taking responsibility for poor working practices if they are exposed by the media.

Case-study 1 : Nike In Vietnam

Positives of Nike operating in Vietnam	Negatives of Nike operating in Vietnam
400,000 jobs have been created and the skills of local people have been improved	Factories gained reputation of sweatshops
Nike pay higher wages than most companies	There were no trade unions or strikes for pay in Vietnam
They help to create the multiplier effect	Nike has a large demand for water and energy
Helps to attract more MNC's	The company and advertising can undermine local culture
Nike pay tax which the government can spend	It often subcontracts its good to other companies which makes it hard to monitor
They can sometimes build infrastructure which can also benefit the country	Nike can leave at any time – they moved from China when the costs there increased

Case-study 2 : Apple

Apple in China
The location of Apples Headquarters are in Silicon Valley in San Francisco USA
Steve Jobs founded Apple in 1976
Apple built up $100 billion in cash reserves (which is more than the US government
Cheap labour to manufacture one mobile phone in China would be $7.10 (roughly 8 hours work) but if the same phone was manufactured in America it would cost $337
Apple outsource the making of their phones in China to a company called Foxconn.
Nets have had to be put up around the factory buildings so it stops factory workers jumping to their deaths

Impacts on the environment
Environmental regulations are lower in China
Apple products are designed to use less material, smaller packaging and be free of toxic substances
Apple recycled used material, for example glass and metal can be reprocessed for a new product
Impacts on people in China
Many workers work long hours (more than 76 hours a week and 11 days in a row, with no breaks in a cramped and hot factory . They do not receive paid holiday or sickness benefits. Many workers have tried to protest against these conditions.
There have at least 12 suicide attempts in the spring of 2012
At least 62 workers fell sick after inhaling n-hexane (a chemical used to clean touch screens)
62% of factory workers thought the factory provided sufficient protective equipment to prevent work injuries
66% of the factory workers were partly proud to work for their factory
Impacts on people in America
Benefits for working for Apple such as paid holidays, health and life insurance

How ecosystems function

How ecosystems function keywords

Keyword	Definition
Ecosystem	A community of plants and animals and the environment in which they live. Ecosystems include both living (biotic) and non-living (abiotic) parts.
Biome	Very large ecosystems
Climate	Long term weather pattern in a particular region.
Semi-arid climate	A climate of hot temperatures and rainfall for only half of the year
Adapt / adaptation	Adjust or change
Transpiration	Evaporation from leaves, trees and vegetation
Photosynthesis	The process of converting light energy from the sun into chemical energy
Producer	Plants that create chemical energy from the suns light. Producers are at the bottom of the food chain.
Primary consumers	Animals that eat vegetation (producers) in the food chain. These are herbivores. These animals may be eaten by secondary consumers.
Secondary consumers	Animals that are higher up the food chain and that eat primary consumers

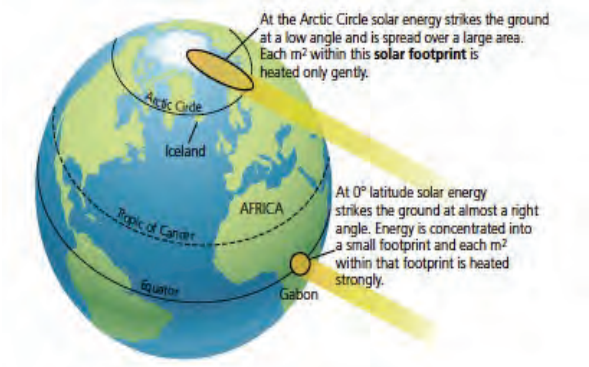
Keyword	
Tertiary consumer	Tertiary consumers eat primary and secondary consumers as their main source of food.
Decomposers	An organism such as fungus, worms, slugs that breaks down (decomposes) dead animals.
Xeraphytic	A type of plant that has adapted to survive in an environment with little water.
Biomass	The measure of all the plant or animal material in an area
Leaf litter	Leaves that have fallen to the ground and are decomposing
Stakeholder	A group of people who have an interest or concern in something

Global Biomes

A **Biome** is a very large ecosystem

A **Ecosystem** is A community of plants and animals and the environment in which they live. Ecosystems include both living (biotic) and non-living (abiotic) parts.

The intensity of the sun's rays at the equator compared to the Poles creates differences in climate

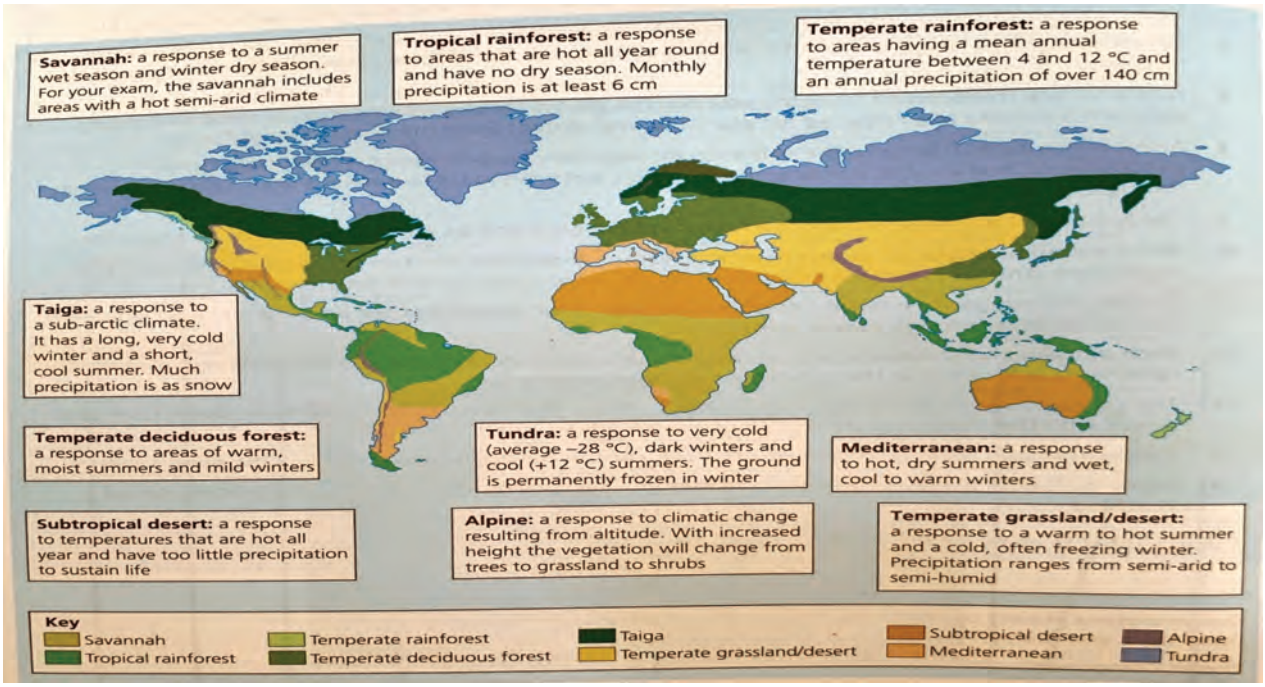


Climate is such an important factor in influencing the natural vegetation and wildlife of a region that **biomes** broadly match the world's climate zones.

Tropical rainforests grow in a band around the Equator where the equatorial climate is hot and wet

The **Semi arid grassland** is found in places that have hot summers and mild or warm winters,

Global Biomes



Biome 1 : The Tropical Rainforest

Equatorial climate

Tropical rainforests are located in a band around the equator (Zero degrees latitude), mostly in the area between the Tropic of Cancer and the Tropic of Capricorn.

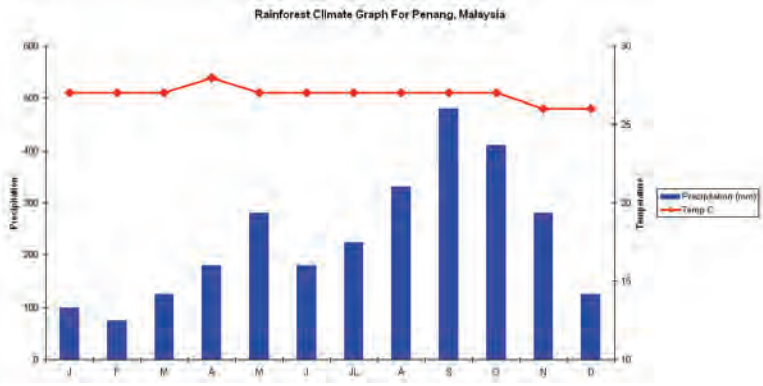
They are generally found in the West of continents, notably the Congo Basin in Africa, the Amazon in South America and also in Malaysia.

The equatorial climate is hot and wet all year,.

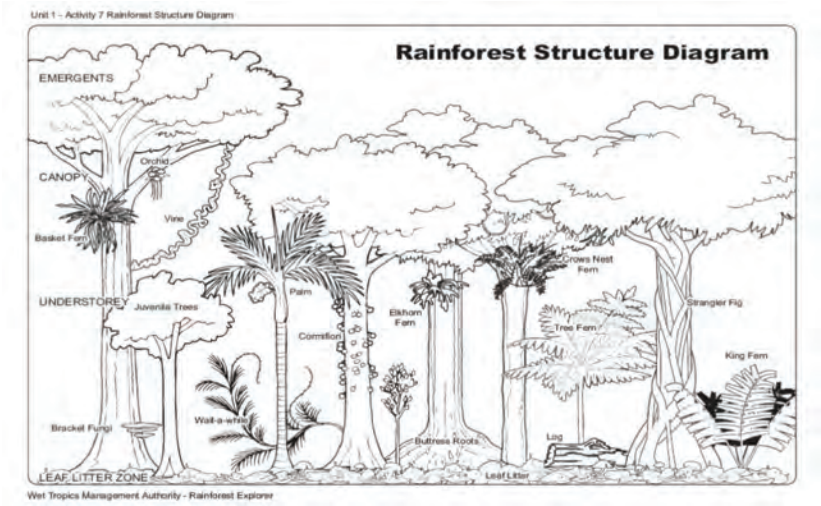
Temperatures are constant at 28°C, with very little variation.

Rainfall is also constant , with between 1500 mm and 2000 mm of rainfall a year. The rainfall is created by the heat creating massive zones of **low pressure**

Any vegetation living in this Biome will have to **adapt** (*adapt means to adjust or change*) to this lack of rainfall for half of the year .



Vegetation in the Tropical Rainforest



Tropical Rainforest Structure

Plants are constantly competing for sunlight. They aim to grow as tall as possible to get as much light as possible

This has led to distinct layers in the Rainforest

The canopy layer blocks out up to 90% of the light to the layers below

The soil is very poor in the rainforest

Because the trees grow so tall, Buttress roots are needed to help the trees stand up

Vegetation in the Tropical Rainforest

Plant adaptations in the Rainforest

Because the trees grow so tall, Buttress roots are needed to help the trees stand up

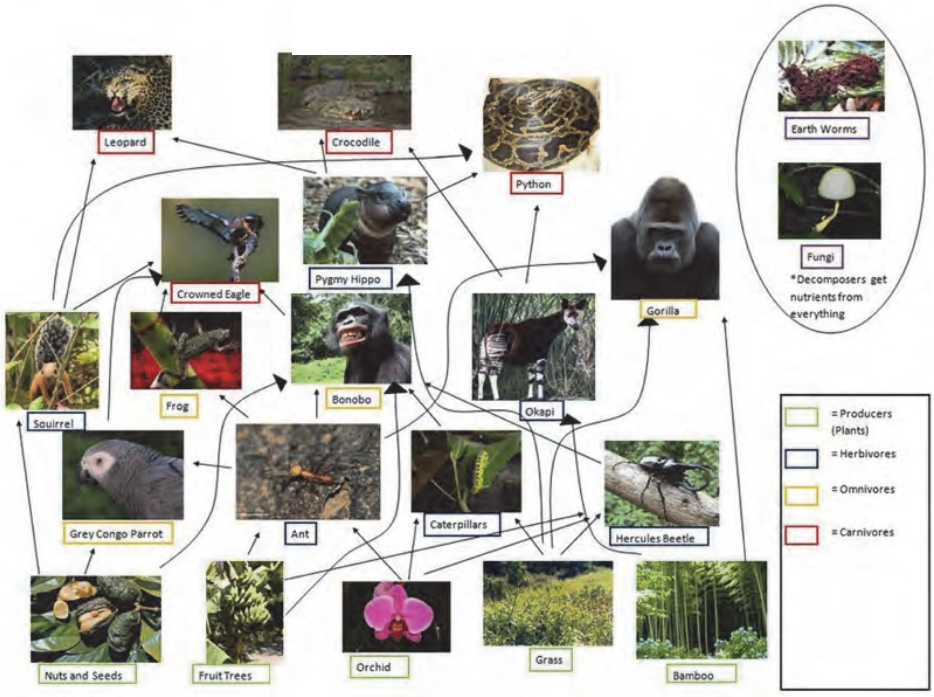
Drip dip leaves make sure that the rainfall runs off

Shallow roots because although the soil is poor, due to the constant heat and humidity, biomass decomposes quickly and nutrients recycled.

Some leaves are waxy to repel rainwater, or have holes in them to let the rain go through

Climbing plants such as lianas, use the tree trunks to climb up to the sunlight

The Rainforest food web



Energy flows

The main source of energy for all living things is sunlight. This is absorbed by producers such as plants. They convert the light energy from the sun into chemical energy by the process of **photosynthesis**.

This energy is passed on to animals when they eat the plants.

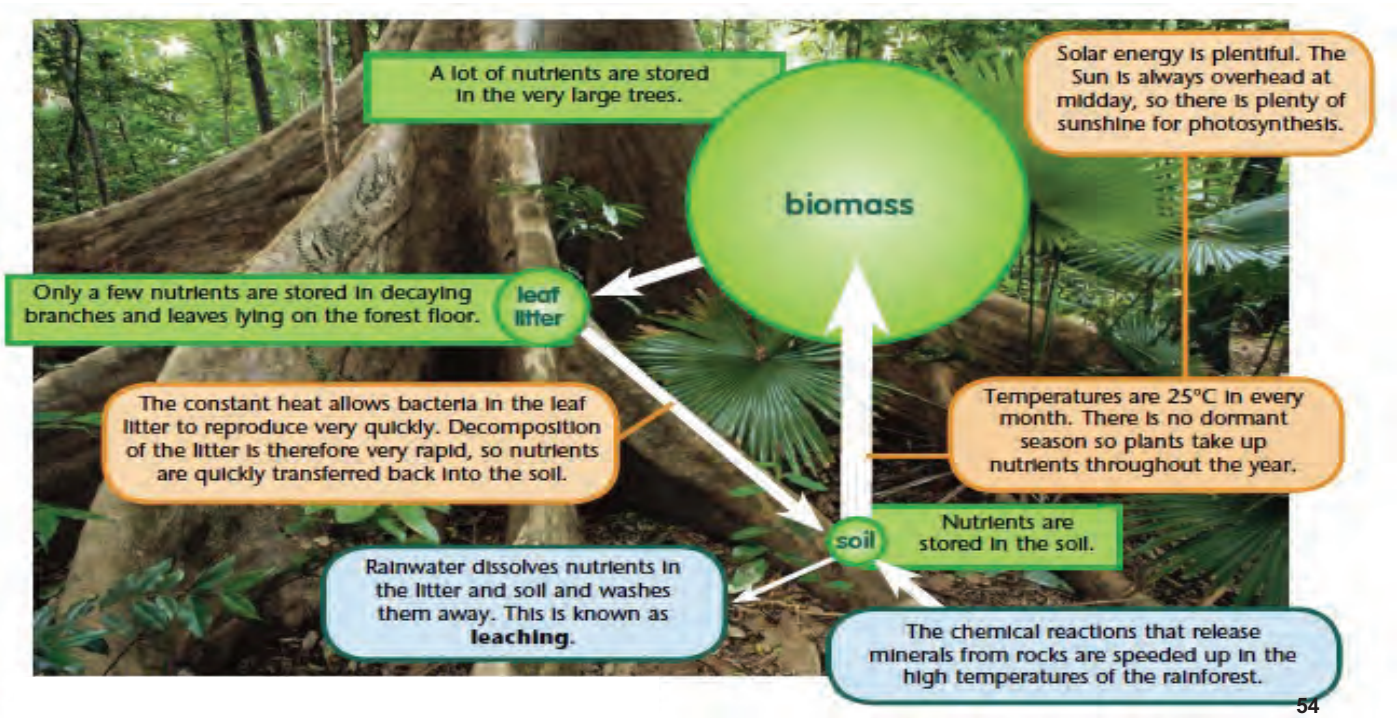
These animals are called herbivores or **primary consumers.**

In turn, these are eaten by other animals called carnivores or **secondary consumers**.

An omnivore eats both vegetation and animals

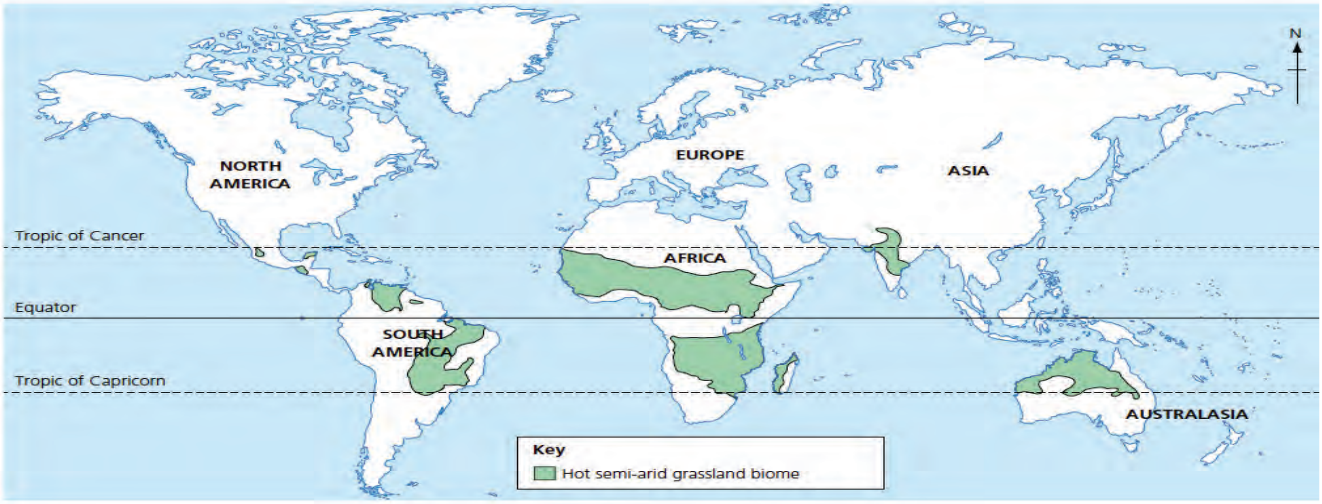
This is called a food chain. Energy flows up the food chain .

The Nutrient cycle in the Tropical Rainforest



Biome 2 : The Semi-Arid Grasslands

Semi-Arid Grassland Location



The Semi-Arid grassland climate is found between the tropics of Cancer and Capricorn in South America, Africa and Oceania.

There is none in Europe or North America.

They are found in zones between hot deserts and areas having a tropical climate

Semi-Arid Grassland Climate

The climate is hot all year due to the sun remaining high in the sky throughout the year. Mean temperature is 18°C .

Precipitation totals are lower than 600mm per year.

However, It is called a **semi-Arid climate** ('*Semi*' means half)

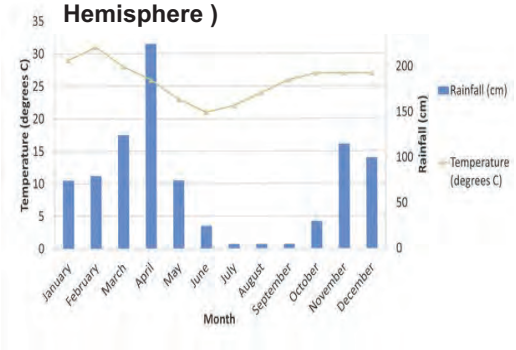
This is because it only has rainfall for half of the year (in heavy storms and high humidity) and then little or no rain for the other half of the year.

This means that it has 2 seasons – a wet season and a dry season.

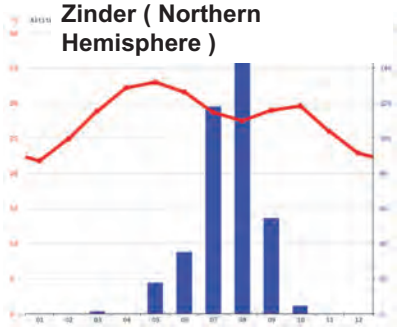
When the rain falls will depend on whether it is in the northern or southern hemisphere, but the key point is that it will only fall for half of the year.

Any vegetation living in this Biome will have to **adapt** (*adapt means to adjust or change*) to this lack of rainfall for half of the year .

Serengeti (Southern Hemisphere)



Zinder (Northern Hemisphere)



Vegetation in the Semi-Arid Grassland Climate

Baobab Tree
Grows over 30m in height and 7m in diameter. It can live for thousands of years
Lots of shallow roots spread out from the tree. They collect water as soon as It rains
The thick bark is fire resistant
Few leaves reduce water lost by transpiration
Its large barrel-like trunk stores up to 500 litres of water

Vegetation in the Semi-Arid Grassland Climate

Acacia Tree
Broad flat canopy reduces water loss. It provides shade for animals
Thorns on branches deter animals from eating them
Long roots reach ground water deep underground
Small leaves with waxy skin reduce the amount of water lost through transpiration
Grows up to 20m in height and 2m in diameter

The baobab and acacia are examples of xerophytic (drought-resistant) trees found in this biome .

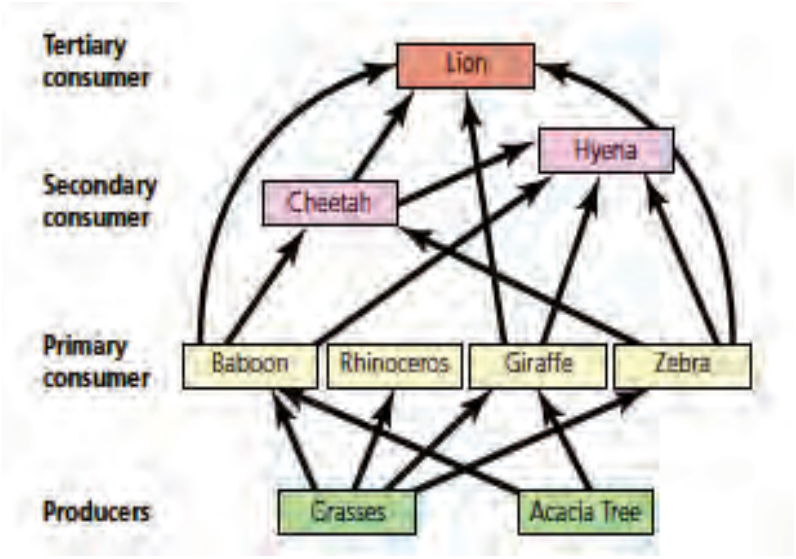
This means they can survive long periods with very little rainfall during the dry season of the year.

It is difficult for trees to grow so thick forests are not present.

Between the widely spaced trees and bushes there are also grasses that grow rapidly to 3-4m in height in the wet season.

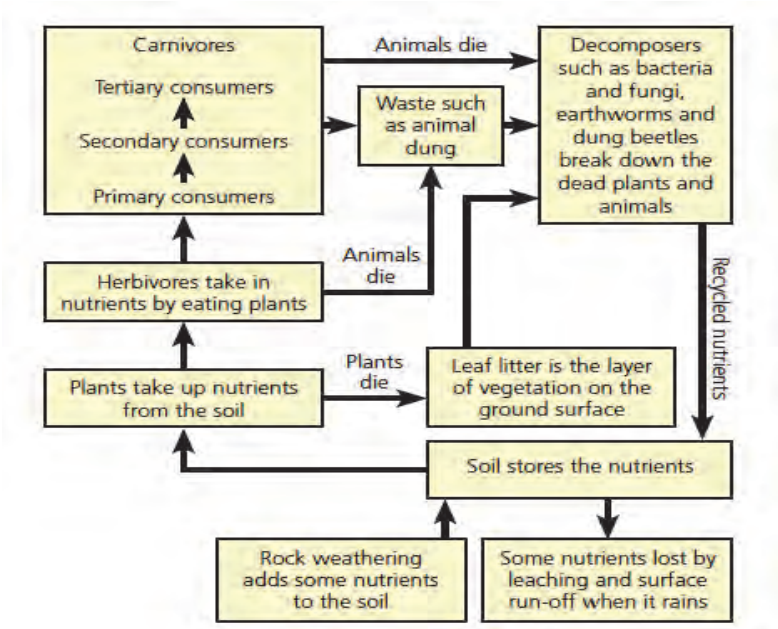
In the dry season they turn yellow and die back.

The grassland food web



Energy flows
The main source of energy for all living things is sunlight. This is absorbed by producers such as plants. They convert the light energy from the sun into chemical energy by the process of **photosynthesis**.
This energy is passed on to animals when they eat the plants.
These animals are called herbivores or **primary consumers.**
In turn, these are eaten by other animals called carnivores or **secondary consumers**.
This is called a food chain. Energy flows up the food chain .

The Nutrient cycle in the semi-arid grassland



As well as energy , plants need essential chemicals such as iron and nitrogen

These nutrients are recycled though the ecosystem between the soil, biomass and leaf litter

When pants and animals di, they decompose and the nutrients are released and returned to the soil

This process is called the nutrient cycle

Tourism

Tourism keywords

TOURISM

Keyword	Definition
Tourism	Is the industry where people travel for fun or business. It includes activities such as sightseeing and camping. It is the business of attracting, accommodating and entertaining tourists.
Tourist	People who travel for fun
Over-tourism	Where there are too many visitors to a particular destination
Multiplier effect	Where a change can cause a bigger change. There can be a '*positive*' multiplier effect or a '*negative*' multiplier effect.
All-inclusive holiday	This is where a holiday includes accommodation, meals, snacks and all drinks. It can sometimes include other services such as sports.

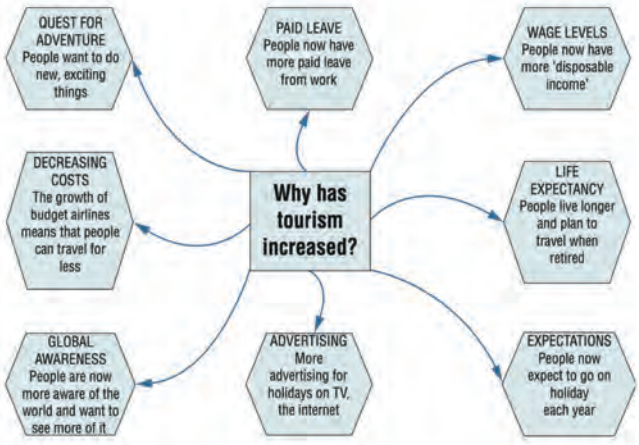
Keyword	Definition
Sustainable Tourism	This is sometimes known as '*Responsible tourism*'. This is tourism that does not cause damage or change to the place that is visited and where you try to make a positive impact on the environment, culture and economy.
Glacier	Glaciers are masses of ice that fill valleys and hollow and slowly move downhill
Mass Tourism	This is a form of tourism that involves tens of thousands of people going to the same resort at the same time of the year. It is the most popular form of tourism.
Leakage	This is where money 'leaks' back out from a country it is spent in, back to another country. For example if you stay at a hotel in Spain, some of the money will not stay in Spain, but will leak back to the country that house the headquarters of the hotel.
Package Holiday	A holiday organised by the travel agent, with arrangements for transport, transfer and accommodation

How important is Tourism ?

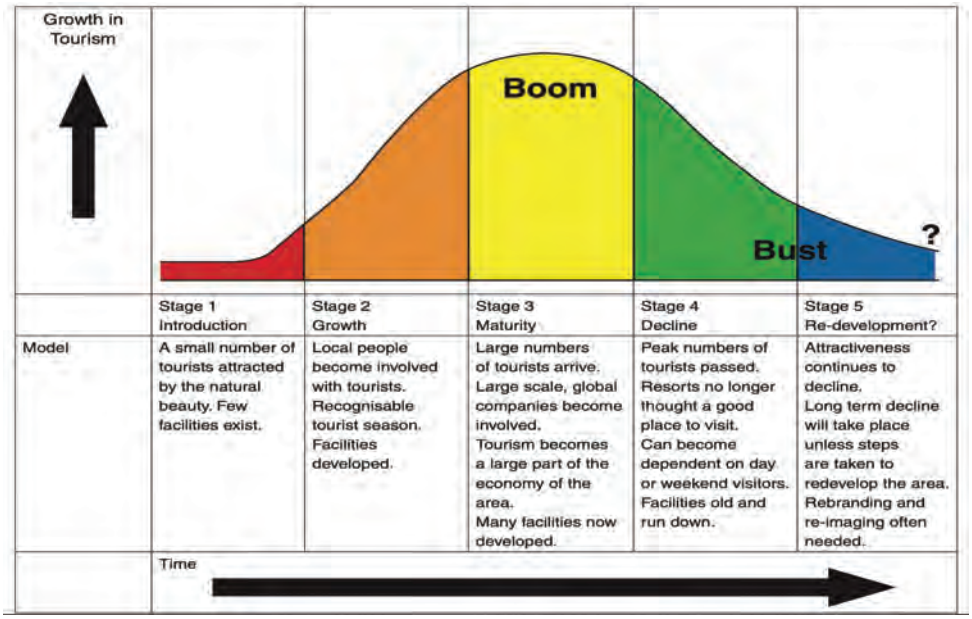
Tourism Is the industry where people travel for fun or business. It includes activities such as sightseeing and camping. It is the business of attracting, accommodating and entertaining tourists.

Tourism employs 330 million jobs – this is 1 in 10 global jobs
Tourism contributed approximately $2.9 trillion to GDP – this accounts for 10.3 % of the worlds economy
Tourism is worth more than £120 billion a year to the UK
There were 1.5 billion tourist arrivals in 2019
Tourism was responsible for 58% of global air travel
Projected travel and tourism decline due to COVID-19 is $264.53 billion

Why has Tourism grown ?



The Tourism growth model



What happens to a tourist area if the tourists find somewhere else to go and spend their money?

New tourist places develop; old resorts become run down, people want something new.

To keep bringing the tourists in, places have to make sure that they change and adapt and keep up to date, or they lose out

Sustainable / responsible Tourism

Sustainable Tourism is tourism that does not cause damage or change to the place that is visited and where you try to make a positive impact on the environment, culture and economy.

Responsible Tourism minimises the effects of Tourism

Responsible Environmental Tourism can help the environment by looking after biodiversity, wilderness and natural and human heritage

Responsible Social Tourism respects local culture and traditions. This leads to a greater understanding between tourists and local people

Responsible Economic Tourism leads to financial benefits for the local people and is based on fair trade

Costa Rica

Facts about Costa Rica

Its GDP per capita is $16,900. This makes it 63rd out of 189 countries

Its life expectancy is 79

Its death rate is 4.9

3.1 million tourists visited Costa Rica in 2019

Costa Rica is known for its 27 incredible national parks which are home to 5% of the worlds Biodiversity..

There are over 500,000 species of animals, including scarlet macaws, howler monkeys, colourful butterflies, humpback whales, iguanas, sea turtles, and sloths.

There are currently 6 active and 60 dormant or extinct volcanoes

There are dozens of tour companies that specialize in river rafting, driving, scuba diving, tubing, horseback riding, and even zip lining through the rainforest.

One of the best-known Costa Rican mottos is "*pura vida,*" which means "pure life."

The cultures and the people are quite diverse, but many like to live by this simple sensibility to live life to the fullest, and this is probably why the country is considered the happiest, according to the *Happy Planet Index*.

The phrase is also used as a greeting or as an answer when someone asks, "How are you?"

Location of Venice

Venice

Venice is a city in northern Italy.
It is built on more than 100 small islands in a lagoon in the Adriatic Sea. It has no roads – just canals.
Venice is known as ‘The floating city’, ‘The city of Bridges’ and ‘The city of Canals’ and is
Its population is only 55,000
Between 26-30 million tourists visit each year.
Tourists visit to go on a Gondola on the canals, to visit the palaces and because it is known as one of the most romantic cities in the world
Many tourists who visit Venice come by Cruise ships and only stay for 1 day. About 30,000 cruise ship passengers arrive in Venice each day.

Venice

Advantages of Tourism to Venice
600 cruise ships visit Venice each year
Tourism is the main economic activity in Venice bringing in $450 million a year to Italy.
The tourists need food, tours and souvenirs
The average tourist to Venice from a cruise ship spends about 180 euros ($204) .
The cruise ship industry has more than 4000 permanent employees and many tens of thousands of indirect jobs from the pubs, cafes and shops.
The cruise ship only generate 8% of total emissions for the areas in summer and 2% in winter

Disadvantages of Tourism to Venice
In June 2019 2 cruise ships collided. Luckily only 4 passengers were injured
The huge cruise ships do not fit in with the historic city centre
Most tourists on a cruise ship only visit for a day and therefore only buy food and souvenirs. They return to their cruise ship at night and do not stay in Venetian hotels .
The huge number of tourists means that there is conflict with the local people.
There is a huge amount of overcrowding, litter waste and pollution from the cruise ships
The huge ships are damaging the cities ancient foundations

Venice

Possible solutions to the cruise ship problem

Do nothing, and allow the cruise ships to continue as normal

Ban cruise ships entirely

Limit the number of cruise ships that are allowed to visit Venice

Increase the cost to cruise ships to visit Venice . The money raised would go towards protecting the buildings in the city.

Larger cruise ships would be diverted elsewhere and only ships of 55,000 tonnes or less would be allowed to continue into the city centre

Re-route ships away from Venice's city centre. Instead ships will dock at ports such as Fusina and Lombardia on the Italian mainland, three miles across the lagoon

Make day trippers pay an entrance fee to the city of £10. Tourist overnighting in the city would not have to pay as the tax is already included in their hotel rate

Tourism in Iceland

keywords

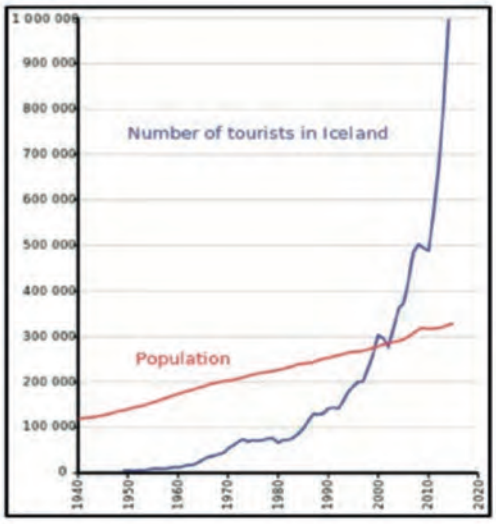
Keyword	Definition
Geothermal energy	This is thermal energy generated and stored in the earth. Water can be pumped into the ground where is will heat up. This can create cheap hot water or heated until it turns to steam and then turn a turbine to create cheap electricity. Geothermal energy is cost-effective, reliable, sustainable and environmentally friendly.
Hydroelectric power	Hydroelectricity captures the energy of falling water to create electricity. It is a clean and renewable source of energy
Geology	The study of rocks
Fertile soil	Soil rich in nutrients.
Lahar	A mudflow formed when volcanic material mixes with water from rainfall or snow melt
Pyroclastic flow	
Plate	A piece of the Earths crust

Keyword	Definition
Destructive boundary	The plates move together and the oceanic plate moves under (subducts) below the continental plate
Constructive boundary	The plates move apart creating a gap. Magma rises up into the gap
Glacier	Glaciers are masses of ice that fill valleys and hollows and slowly move downhill
Till	The unsorted mixture of material moved by a glacier
Moraine	Landforms made out of till dropped by the glacier as it moves
Freeze thaw weathering	Freeze-thaw weathering is where water gets into cracks in rocks. The water freezes and expands, putting pressure on the rock. The ice then thaws, releasing the pressure. If this process is repeated it can make bits of the rock fall off.
Plucking	When meltwater freezes onto the rock. AS the glacier moves forward it pulls pieces of rock out.

Iceland

Iceland is 1,300 miles north west of the UK
Iceland is about 2.5x smaller than the UK and has a population of only 364,134 people (Derby has a population of 260,000 people)
Its GNI per capita is $37,065 compared to the UK's GNI of $37,931
Its average life expectancy is 82 years compared to the UK's life expectancy of 80 years
The UK's %employment is 59% versus Iceland's % employment of 70%

Why do Tourists go to Iceland



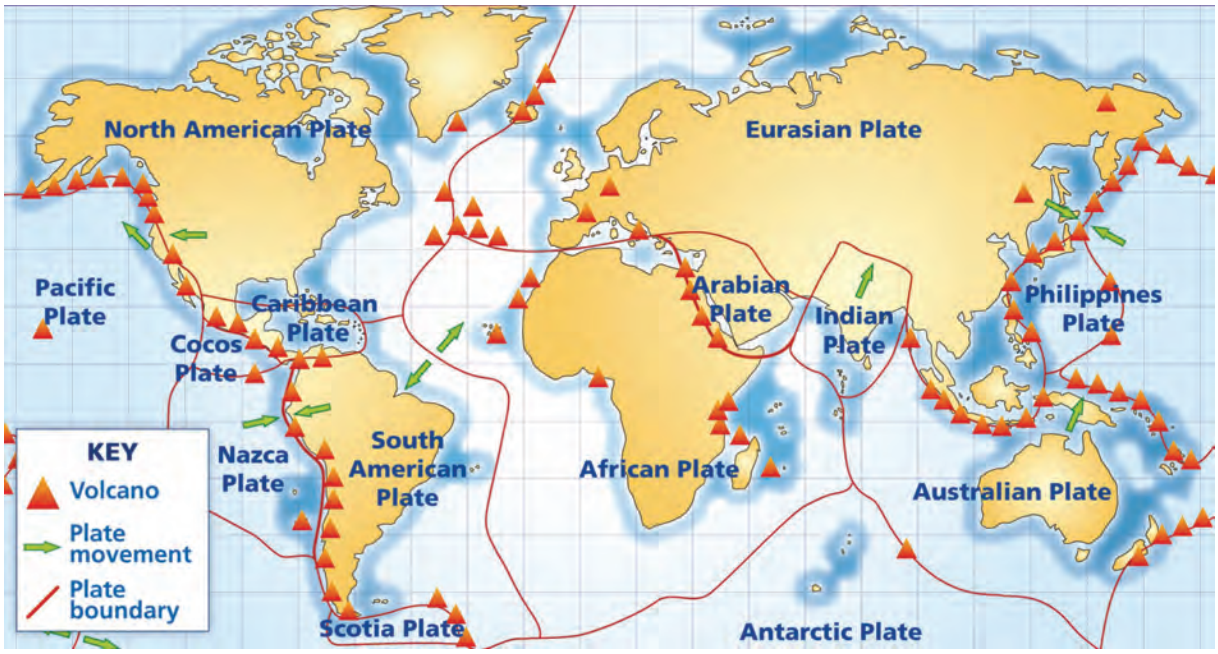
2.7 million tourists visited Iceland in 2018

11% of its land area is covered by glaciers, and tourists come to visit its 269 named glaciers

Iceland is one of the most volcanic regions in the world with a huge number of active volcanoes. Tourists come to visit the volcanoes and see the tectonic plates

The Blue lagoon is probably the most famous attraction in Iceland, and is a geothermal spa made of heated seawater that is an amazing turquoise colour.

Plate boundaries

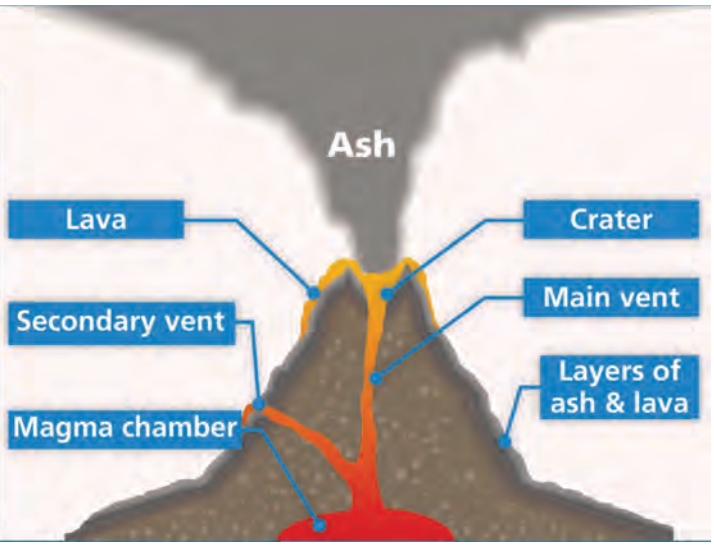


Volcanoes

Volcanoes are found at both destructive and constructive plate margins.

Shield volcanoes are found primarily at **constructive plate margins.** Magma is thin and runny **(non-viscous)**, so eruptions are gentle and the lava can travel long distances. As a result, these volcanoes have shallow sides.

Composite volcanoes are found primarily at **destructive plate margins.** Magma is thick and sticky **(viscous)**, so eruptions are explosive and lava cannot travel far. As a result, these volcanoes have steep sides.



Effects of Volcanoes

Primary effects
Buildings, structures and homes are destroyed by Lava and pyroclastic flows
Communication and transport links are disrupted
People and animals are injured or killed by falling debris, lava, poisonous or suffocating gases or pyroclastic flows
People are left homeless
Crops and water supplied are contaminated by falling ash

Secondary effects
Pyroclastic flows can burn and destroy forests
Emergency aid may not reach those in need for extended periods
If volcanic material combines with water, destructive mudslides (Lahars) and landslides can occur.
Disease can spread because of contaminated water and poor sanitation
Reconstruction can be costly.
Lost tourism and trade can damage the local economy

Responses to Volcanoes

Immediate response
Evacuate anybody at risk, rescue and survivors and treat injuries
Extinguish any fires
Send aid workers, supplies, equipment and financial help to people affected
Recover any dead bodies
Set up temporary shelters (e.g. tents) for the homeless
Provide temporary supplies of food, water and energy for those in need

Long-term response
Rehouse those who have lost their homes
Reconstruct or repair damaged buildings
Improve monitoring and evacuation plans for any future disasters
Restore water, energy and gas supplies, and reconnect communication links
Restore transport links
Boost the economy by promoting investment in the area.

Advantages of living near to volcanoes

Geothermal energy : This is thermal energy generated and stored in the earth. Water can be pumped into the ground where is will heat up. This can create cheap hot water or heated until it turns to steam and then turn a turbine to create cheap electricity. Geothermal energy is cost-effective, reliable, sustainable and environmentally friendly.
Tourism : people wish to visit volcanoes and so jobs are created in the tourism industry as guides or working in hotels and shops.
Fertile soil : The soil in volcanic areas is fertile because it is full of minerals from volcanic ash and lava. This makes it good for growing crops.
Minerals ands stones : volcanic minerals are mined and so jobs are created and money earned

Case-study : Eyjafallojokull. March-May 2010

Primary effects
Volcanic ash contaminated local streams and water supplies killing plants and animals
Over 3,000 tonnes of CO_2 per day were released into the atmosphere
Poor visibility and ash forced roads to close.
Schools and businesses were closed
People had to wear face masks and goggles

Secondary effects
Jokulhlaups (glacial floods) were caused by glacial melting
The loss of crops and livestock meant farmers lost valuable sources of income
Winds carried the ash over Europe, grounding over 100,000 flights. This cost airlines around £130 million per day for 8 days.
Tourism numbers decreased temporarily

Immediate responses
Rescue workers evacuated around 700 people
Farmers received financial support to cover the loss of profits
Temporary shelter, fresh water and food were provided for evacuees

Long-term responses
Homes and infrastructure were repaired
Government agencies promoted the volcano as an attraction to restore the tourism industry
Technology) e.g. drones) were used to further improve Iceland's volcanic monitoring systems

Benefits and negatives of tourism in Iceland

Benefits of Tourism visiting Iceland ?
In 2018, Iceland received over 2.7 million visitors, which is a 500% increase since 2010.
From 2010 to 2014, total tourism-related jobs in the Icelandic economy increased 38 percent.
The average wage has increased by 6% and by 2028 93,000 Icelanders will have jobs directly linked to the tourist industry".
The wealth generated by tourism, "will allow Iceland to fully recover from the 2008 banking collapse, where many Icelanders lost jobs

Negatives of tourists visiting Iceland ?
Job opportunities created for the locals by the tourist industry are usually low-paid jobs, such as tour guides, waiters, life guards, jobs in travel agencies and so on.
The income tourist workers earn is low compared to the high price of goods in Iceland.
Food and gas prices have also been increasing for native Icelanders
There is a housing problem as people are renting out their properties to tourists because you make so much money. This is pushing up property prices and many Icelanders are being forced out of the cities that they work in.
As more tourists from around the world come to visit, other countries' ideas and cultures are inserted into Iceland's society, which causes lose of culture and identity,
Iceland's energy is mainly supplied by geothermal and hydro power because of its special geological location. But due to mass tourism, there's a rapidly increasing demand for energy supply, which causes more development on wildness areas as geothermal plants are built near volcanoes and dams are built across rivers.
Iceland's soil is erodes easily due to its high content of volcanic ash. Off-trail hiking of tourists worsens soil erosion

How can Tourism in Iceland be made sustainable ?

Possible sustainable strategies
Restrict the number of tourists who can visit Iceland at any one time of year
Increase the cost of tourist attractions in Iceland
Introduce an additional 'tourist tax' which could be used to conserve wildlife and develop infrastructure
Introduce new regulations so that all new hotels and tourist infrastructure must be built in a sustainable manner
Ensure that all international visitors to Iceland are given a welcome talk on the importance of sustainable tourism when they first arrive
Issue fines to tourists for environmental damage, e.g. litter
Place signposts at all major tourist attractions with guidance on how to care for the environment
Encourage tourists to visit attractions in the north and the east to take pressure away from the south west of the country
Introduce a tourist visa, which tourists would have to apply for in advance of their trip. In order to be successful in a visa application, they would have to pass a test on sustainable tourist practice in Iceland
Employ rangers at major tourist hot-spots to monitor tourist behaviour and advise tourists on how to act responsibly and sustainably

Contents

EUROPE: Were the peacemakers successful at Versailles?

Big 3: Aims

Name	Country	Motive	Aims
Georges Clemenceau 	France	REVENGE: Most of the fighting took place in France. She suffered the most damage and deaths.	Cripple Germany to make sure it was never able to attack France again. Cut its armed forces Push back the border over the Rhine – taking away its defences. Money – He wanted money from Germany to pay for the damage they had caused.
David Lloyd-George 	Britain	MAKE GERMANY PAY: The British people wanted revenge, but Lloyd-George wanted a middle way – he was a REALIST	Wanted Germany punished, fairly. He was concerned that punishing them too harshly would lead to an angry Germany who wanted revenge. He wanted to keep Germany strong so she could trade with Britain. Lloyd George wanted to gain control of Germany's colonies.
Woodrow Wilson 	USA	PEACE: The USA had joined the war late and had suffered few losses by comparison to Britain and France. He was an IDEALIST	Wanted Self-determination for countries that had been in large empires. He wanted a League of Nations set up to avoid future wars.

Paris Peace Conference– Key Terms

Term	Definition
Paris Peace Conference	Meeting held at the Palace of Versailles to decide how to punish the countries who lost WWI
The 'Big Three'	Representatives of the most powerful victorious countries. Britain, France and USA. (Italy if it's the Big Four)
idealist	A person with committed ideas
League of Nations	A group of countries who worked towards global peace and international cooperation.
Self-determination	The idea that countries should be allowed to govern themselves, rather than being in an empire.
Armistice	First agreement to stop fighting – then a treaty is made
Reparations	Money paid as compensation to country/person that had been harmed
Rhineland	An area of Western Germany that borders France
Allies	A group of countries or people working together – usually Britain, France, USA
Fourteen Points	Woodrow Wilson's rules to create world peace.
Empire	A group of countries or states that are owned by another country
Tsar	Russian leader
Communists	Left wing political organisation in which everyone is believed to be equal and everyone works for the good of the state.
disarmament	The reduction or limitation of the number of weapons and/or troops a country has.

Wilson's Fourteen Points	
No secret treaties	Free seas
Disarmament	Alsace-Lorraine to go to France
Self-Determination	Independence for Serbia
Independent Polish state	League of Nations to be formed

Treaty of Versailles – What factors affected the Settlement?

Term	Definition
The Armistice	When the Germans first surrendered the agreed to an 'Armistice' This would make the fighting stop immediately. The original Armistice agreement included Reparations, Alsace-Lorraine and removing troops from the Rhineland. Clemenceau used these principles to force the Big Three to include them in the final treaty.
Prior Agreements	The Allies had made lots of promises to other countries to get their support in the War. At the end of the War, these countries wanted to claim what they saw as their right. Italy had been promised land from Austria. Japan had been told their claims to land in China would be supported (Manchuria)
Time Constraints	The Conference took a year but with over 32 countries included this was not a long time. Victorious countries were keen to reach a settlement and start claiming their reparations.

Term	Definition
The state of Europe	As so many empires had collapsed after the war, Europe was in chaos. Russia was in revolution and had been taken over by the Communists. Europe lay in tatters and the Big Three were fearful that if they took any longer over the treaty, Communism would spread.
Conflicts of Interest	The Big Three all wanted very different things This made it hugely difficult to agree on anything. Wilson wanted a treaty that would build a fairer world based on his 14 Points Lloyd-George was concerned about balancing making the Germans pay and supporting their economy. The British people wanted to 'squeeze Germany until the pips squeak'. Clemenceau wanted revenge for France

Treaty of Versailles – Why did the Big 3 fall out?

Area	Disagreement
Naval Supremacy Vs Freedom of the Seas	Wilson wanted everyone to have access to the seas. Lloyd-George wanted to protect Great Britain's naval dominance.
Germany's armament Vs Germany as a buffer against Communism	Clemenceau want to protect France from a German invasion (1870+1914) again. Lloyd-George wanted to keep Germany strong as an ally against the Communist Russians.
Revenge Vs Idealism	Clemenceau and the French needed revenge for their hurt, loss and damage. Wilson and the USA had not suffered the same and was concerned a harsh treaty would lead to another war.
Self-determination Vs The British Empire	The USA & Wilson hated empires (they had once been part of England's) and felt countries should be independent. Britain had the largest empire in the world and wanted to keep it.
Huge Reparations Vs Stable Germany	Clemenceau wanted huge amounts of money in compensation for the damage they'd suffered. Britain had very little damage at home and wanted to keep Germany as their main trading partner, as they had been before the war.

Peace Treaties after World War One

Treaty	Reparations	Land	Military	War Guilt
Versailles Germany 1919	Clause 232 Germany agreed to pay in 1919 Figure of £6.6 billion wasn't set until 1921 1988 to pay back	No Anschluss Danzig taken & became a Free City Colonies taken and given to Britain and France as Mandates Saar under LON control for 15 years – coal to go to France 10% of land lost. Alsace Lorraine to France. Eupen-Malmedy to Belgium. North Schleswig to Denmark	100,000 men 6 battleships No air force, conscription, submarines or tanks Rhineland demilitarised	Clause 231 placed ALL the blame for the war on Germany. They hated this the most.
St Germain Austria	They were told to pay, but the amount was never fixed.	Land lost to Italy and Romania Land taken to make Czechoslovakia, Yugoslavia and Poland	30,000 men No conscription No navy	
Neuilly Bulgaria	£100 million	Lost land to Yugoslavia, Greece and Romania	20,000 men No conscription or air force 4 battleships	
Trianon Hungary	They were told to pay, but the amount was never fixed. Hungarian economy collapsed.	Land lost to Romania, Czechoslovakia, Yugoslavia and Austria	30,000 men No conscription 3 patrol boats	
Sevres Turkey 1920	They were told to pay, but the amount was never fixed.	Land lost to Greece. In Europe it lost all land apart from Constantinople (Istanbul) Empire was split up	50,000 men 7 sail boats, 6 torpedo boats Allies were allowed to keep troops in Turkey	
Lausanne Turkey 1923	Reparations cancelled	Regained land back from Greece Retained control of Dardanelles and Bosphorus Straits.	Dardanelles straits had to be open to all. Right to decide own army size	

Treaty of Versailles – Key Terms

Term	Definition
Isolationism	A policy in which a country does not get involved in foreign affairs.
Ratify	Agree with or make official
Abdicate	To give up the throne of a country – such as Kaiser Wilhelm in 1918
Weimar Republic	The democratic government that ran Germany from 1919-1932
Weimar Constitution	The rules setting out how to govern Germany during the Weimar era.
Democratic	System of government where people vote for their leader.
Hyperinflation	When money becomes worthless

Term	Definition
Diktat	A forced treaty or 'dictated peace. The Germans called the TOV a 'Diktat'.
Clause	A term in an agreement or treaty
Demilitarise	To remove all military/weapons from an area
Anschluss	The union between Germany and Austria
League of Nations	Formed under the TOV – a group of countries that were formed to keep the peace
Conscription	Forced military service
Mandates	A former colony that was given to the LON to run it was ready to run itself
Propaganda	Using the media to persuade people to think or behave in a certain way.

Was the Treaty of Versailles fair?

YES	NO
It seemed right that the losing countries should pay for the damage.	6 million Germans lived outside Germany – they feared persecution.
Germany had inflicted a similarly harsh treaty on Russia in 1917.	Many felt a harsh TOV would cause another war.
Europe was falling apart – the peace makers had to act quickly.	Germany felt vulnerable as their military had been reduced.
	Germany had to accept total blame for the war even though all had been involved in causing the war.
	It was a Diktat. Germany though the peace would be based on Wilson's 14 Points – if they knew how few would make it through they might not have signed the armistice to begin with.
	The reparations crippled Germany
	Many new countries united people who didn't want to be together leading to many bloody Civil Wars.
	The Treaty of Sevres was so bad that it had to be replaced by the Treaty of Lausanne.

B A map of Europe after 1919

Many new countries were made after WWI – countries like Czechoslovakia did well.

It had resources and was well respected in Europe. Poland was created as a barrier against Russia, but was weak.

Poland was given the Polish Corridor from Germany and the Germans hated being Polish.

Poland was surrounded by enemies.

Reactions to Versailles

	Leader	Public
Britain	Lloyd-George felt the TOV had been too harsh. He worried about those who had been separated from Germany and that the reparations had crippled its economy so it couldn't trade.	The public believed the propaganda and had no sympathy for the Germans. People had suffered and wanted to see Germany 'pay'. People felt the TOV could have (and should have) been much harsher.
France	Clemenceau wanted no army for Germany & that the Rhineland should have been taken away completely. The reparations weren't high enough either. Invaded the Ruhr with Belgium in 1923 when Germany missed its reparations payment.	Furious that the treaty wasn't harsher! The French voted Clemenceau out of office for doing a poor job.
The USA	Wilson was devastated at the harshness of the treaty. He was pleased the LON had been created but upset his 14 points had been ignored. In 1924 he died of a stroke letting the Republicans into office who followed Isolationism.	Wanted to follow a policy of isolationism to avoid future conflicts. The Senate (government) refused to sign the Treaty so the USA couldn't join the LON.

Reactions to Versailles

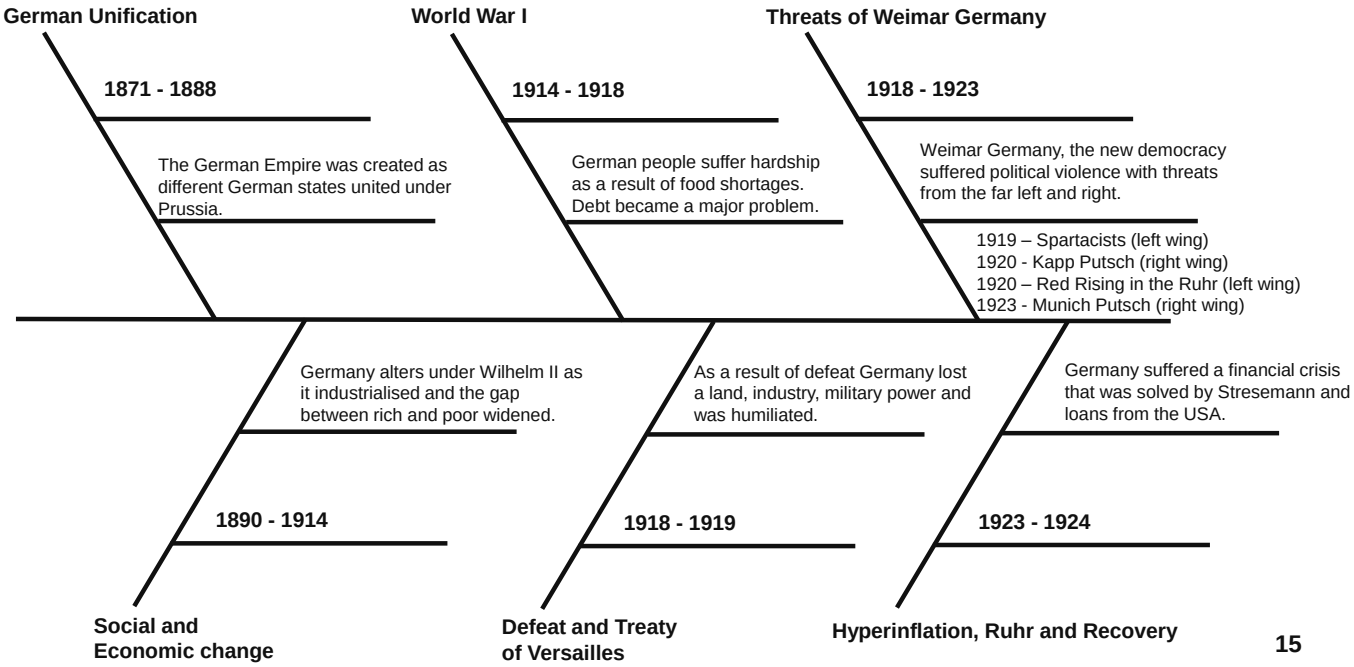
	Impact	Significance
Germany	Shock at the harshness. The Diktat was neither expected nor justified. The government had no choice but to sign on 28th June 1919 Germany lost 16% of its coal, 48% of its steel. 6 million Germans now lived in another country. Ruhr invaded by France in 1923. German government ordered factories to shut down in passive resistance. Money was printed to pay the striking workers leading to hyperinflation.	They became known as the 'November Criminals' and the 'Stab in the back' theory was born. The Weimar government faced uprisings from both the left and right wing extremists. Germany claimed 763,000 had died of starvation by 1921. Germany was angry and humiliated. Hyperinflation destroyed the German economy and allowed Hitler and the Nazi party to attempt to seize power in November 1923 in the Munich Putsch.
Turkey	The people of Turkey overthrew their government and threatened war unless a new Treaty was signed. In 1923 the allies signed the Treaty of Lausanne.	By signing a new treaty the allies undermined all the others and people like Hitler and Mussolini knew it.
Austria	Much of Austria's industry was given to Czechoslovakia. Its empire was completely broken up.	Austria's economy collapsed in 1921

Big 3: Satisfaction

Name	Country	Aim achieved?	Aim not achieved?
Georges Clemenceau 	France	Germany had to accept the War Guilt Clause – Clause 231. This damaged Germany PRIDE Armed forced were all reduced Rhineland demilitarised Reparations figure was set at 6.6 billion in 1921 France gained coal from the Saar for 15 years.	Guilt was not enough – they wanted Germany destroyed. Clemenceau was voted out. Clemenceau wanted NO ARMY People wanted it to be INDEPENDENT The war cost France 200 billion Francs – not enough money! They wanted the Saar forever
David Lloyd-George 	Britain	War Guilt Clause pleased the British. British received Reparations even though little damage had been done at home. Navy reduced meant Britain maintained its dominance. Britain gained control of many German colonies	Lloyd-George worried the Treaty was too harsh and that Germany would seek revenge in another 25 years. Germany economy was crippled by the reparations – they could not trade with anyone
Woodrow Wilson 	USA	Many smaller countries were given their independence – such as Czechoslovakia. The LON was created, 42 countries joined in 1920 Those countries agreed to work together to avoid future wars	Parts of Germany were given away to other countries – Germany didn't think this was fair The USA senate refused to join the LON. The USA began a policy of Isolationism. Wilson felt the TOV was too harsh and they would seek revenge

GERMANY: Was democracy a success in Germany between 1890-1928?

Germany 1890 – 1919



Germany before World War ONE

Problems faced by the Kaiser	
Debt	Germany was in debt as the Kaiser was spending lots of money on building up his navy.
Socialists	The Socialists (who did not like the Kaiser) got 1/3 of votes in elections to the Reichstag.
Competition	Germany was competing with Britain and other nations over the size of the militaries and empires.

Key Individual	Details
Kaiser Wilhelm II	Leader of Germany. Not elected. Wanted to rival Britain's empire (a place in the sun) and Navy. Related to the British Royal family – his grandmother was Queen Victoria Jealous of his cousins' empires

1871 Unification of Germany
Before this point Germany had been separate states. Bismarck unified all the states into one country.

1888 Kaiser Changes.
Wilhelm's Father dies and he becomes Kaiser Wilhelm II of Germany.

1898 –1912 Naval Laws
Allowed for building of Dreadnought ships. Caused huge amounts of debt for Germany and higher taxes.

1913 Economic Development
German iron and steel production overtakes Britain's

1914 World War 1 began.
Germany and Austria were against France, Britain and Russia.

28 October 1918 Kiel Mutiny
German sailors refuse to follow orders to attack the Royal Navy. Workers support the sailors.

9th November 1918 Kaiser Wilhelm abdicated and fled from Germany.
SPD leader, Ebert takes control. Revolution in Germany as workers and soldiers take over German cities.

11th November 1918 Armistice .
German politicians sign the Armistice bringing the fighting of World War I to an end.

Germany before World War ONE

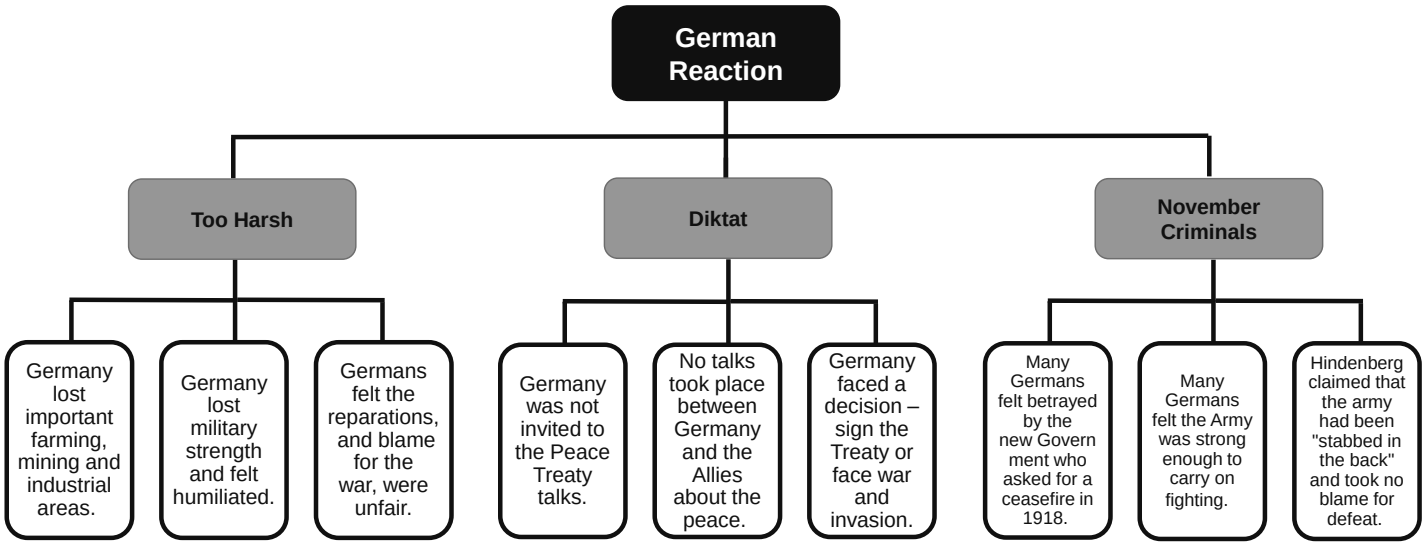
Keyword	Definition
Kaiser	Emperor and leader of Germany
Reichstag	German Parliament. Only men over 25 could vote. The Kaiser controlled it.
Socialism	Ideology that wants people to be equal. Opposed to the Kaiser and his power.
Communism	Left wing ideology that believe in equality. Wanted the workers to run Germany.
SPD	Socialist Party of Germany. Supported by the workers. Did not like the Kaiser.
Dreadnought	Powerful battleship.
Trade Unions	Represented workers and tried to improve conditions for them. Did not like the Kaiser.
Weltpolitik	World Policy. Germany trying to gain an empire like Britain's. They took over countries such as Kaiser Wilhelm land and Togoland.
Navy Laws	Granted money for the building of Dreadnoughts. Left Germany in debt.

Problems caused by World War One	
Bankrupt	Germany had borrowed money from USA. Factories were exhausted and had only produced material for the war. War pensions would cost the government a lot of money.
Society Divided	Some factory owners had made a lot of money Workers thought this was unfair as they had to put up with rationing and food shortages. Women had worked in the factories whilst most men thought their place was in the kitchen.
Politically unstable	People felt betrayed by the government and thought it was their fault Germany lost. They were called the November Criminals.
Leadership	9th November 1918 the Kaiser abdicated (resigned) as leader of Germany

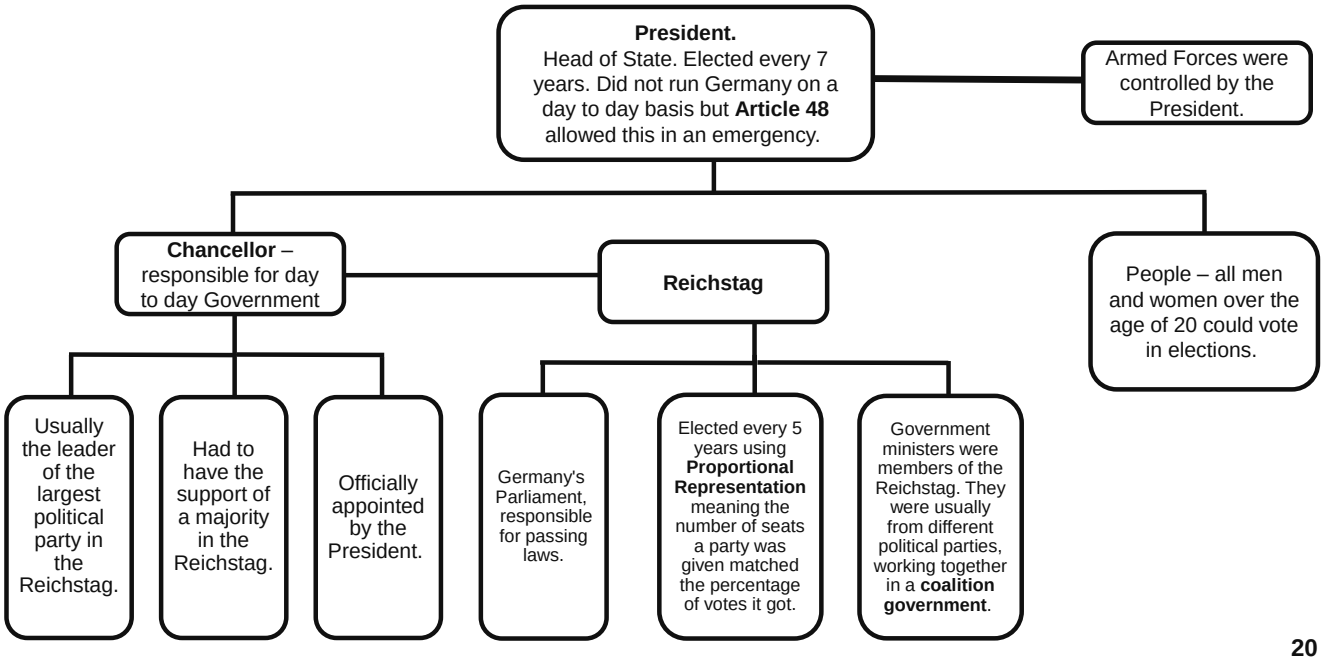
The impact of the Treaty of Versailles

Terms	Detail
War Guilt	Clause 231 The war was Germanys fault It must pay the full cost of the war
Reparations	Set at £6.6 billion
Land	Germany had to hand over its colonies Areas of land taken and given to France – Alsace Lorraine Czechoslovakia - Hultschin Poland - Silesia Danzig placed under LON control
Army	Limited to 100,000 Never join with Austria again – no Anschluss
Rhineland	No troops allowed to be placed in the de-militarised zone between Germany and France
Saar	Given to the LON for 15 years but France could take coal for that time.

What did Germans think of the Treaty of Versailles?



The Structure of Government in Weimar Germany

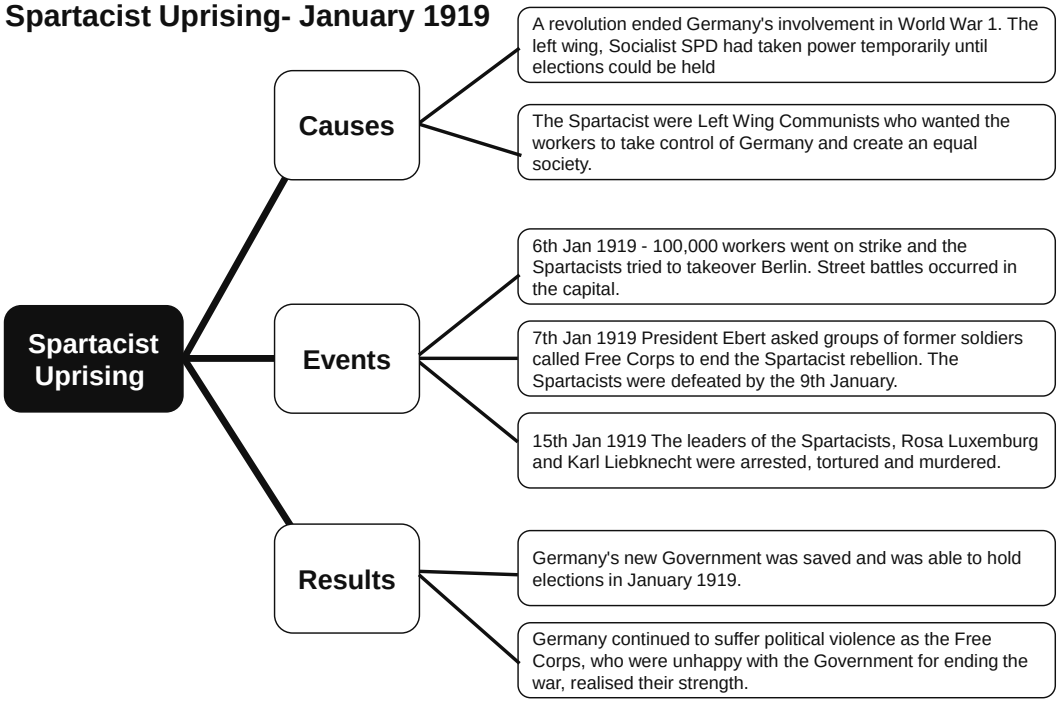


Weimar Republic - Structure

Would the Weimar Republic work?		
Advantages	Proportional representation meant the system was fairer.	Smaller parties got more of a say.
Disadvantages	Article 48 meant the President could do whatever he wanted in an emergency. Not very democratic.	Proportional representation led to coalition governments These often collapsed. This made it hard to achieve anything.

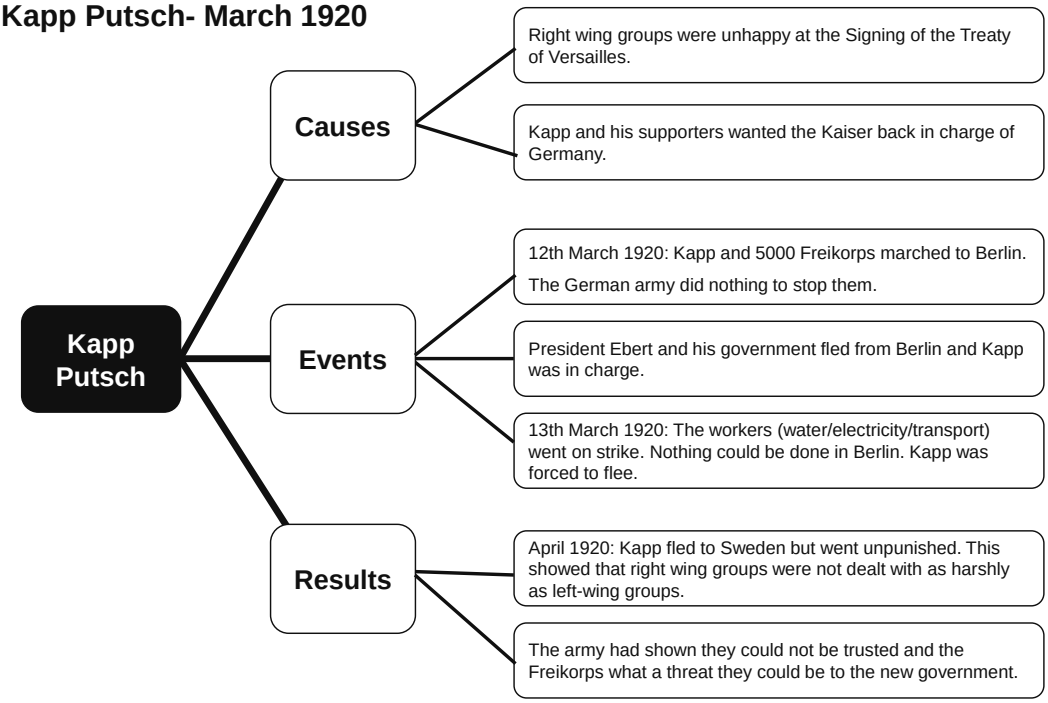
Keyword	Definition
Article 48	Part of the Weimar Constitution that gave the President the right to rule in crisis without the Reichstag.
Coalition Government	Government with more than one party in it. Often led to disagreements.
Proportional Representation	% votes in an election = % seats in the Reichstag.
Reichstag	German Parliament

Spartacist Uprising- January 1919



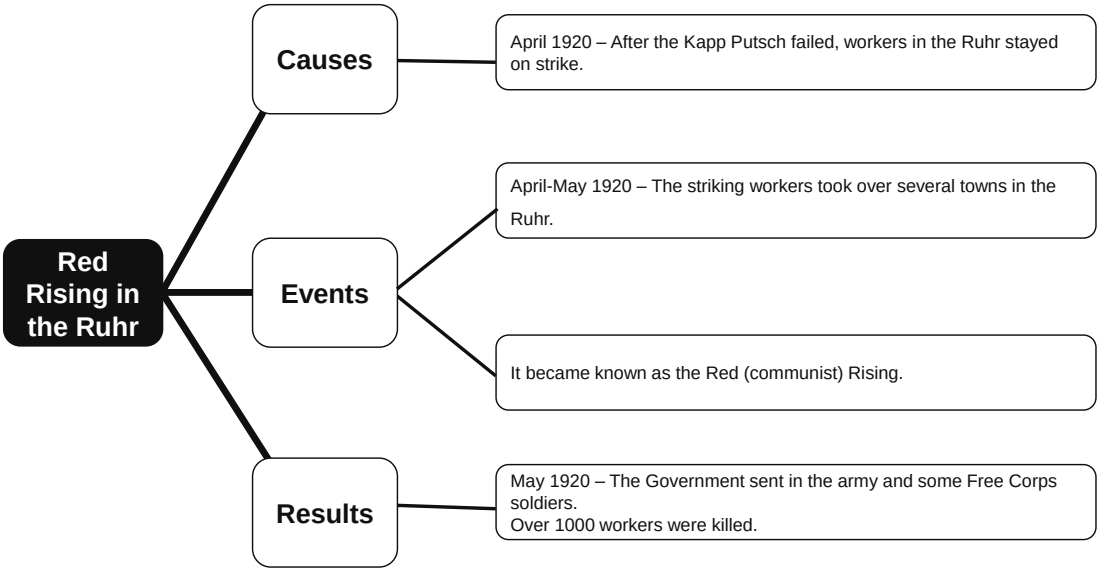
Keyword	Definition
Spartacists	Group who wanted Germany to be Communist
Communism	Left wing ideology that believe in equality. Wanted workers to run Germany.

Kapp Putsch- March 1920

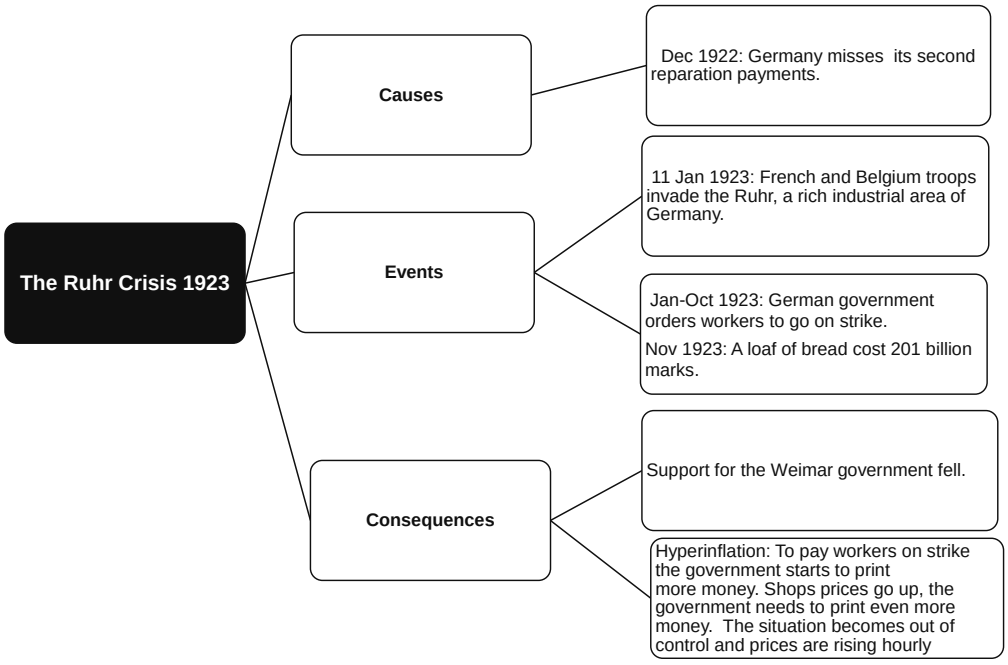


Keyword	Definition
Putsch	Rebellion or attempt to take over the government.
Free Corps	Ex-soldiers, right-wing who did not like the new Weimar government or communism.

Red Rising in the Ruhr- March 1920 (following the Kapp Putsch)



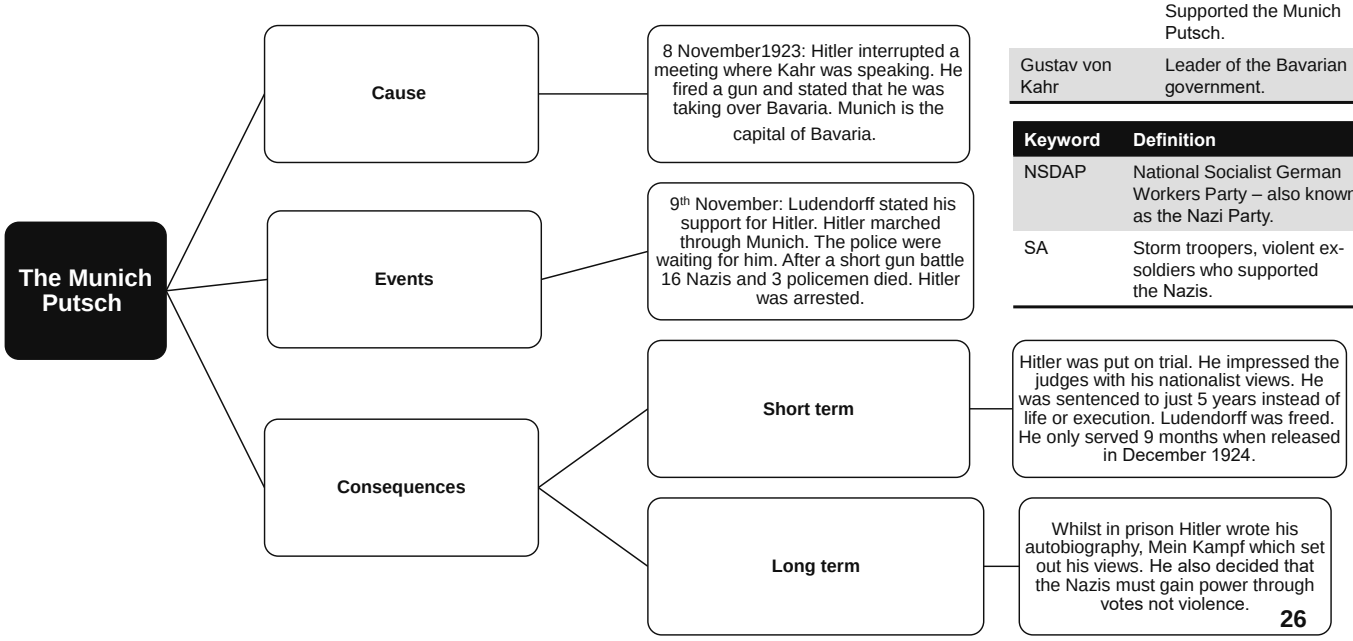
Ruhr Crisis- 1923-1924



Keyword	Definition
Hyperinflation	Prices go up and money decreases in value at a very fast rate.
Diktat	Germany's name for the Treaty of Versailles, as it had been dictated to them.

Winners	Losers
People with loans could easily pay them off.	Anyone on fixed incomes, pensioners, could not afford food.
	Savings were now worthless.
	Many businesses collapsed.

Munich Putsch – November 1923



Key Individuals	Details
Adolf Hitler	Leader of the Nazi Party
Ludendorff	Former army leader. Supported the Munich Putsch.
Gustav von Kahr	Leader of the Bavarian government.

Keyword	Definition
NSDAP	National Socialist German Workers Party – also known as the Nazi Party.
SA	Storm troopers, violent ex-soldiers who supported the Nazis.

Weimar Recovery – Stresemann Recovery

Problem	Solution
Hyperinflation	Stresemann introduced a new currency, the Rentenmark. Prices were brought back under control.
French troops in the Ruhr	Started to pay reparations. The French left the Ruhr
Germany is not trusted by other countries	Stresemann signed the Locarno Treaty in 1925. Locarno meant Germany accepted the TOV. In 1926 to Germany being allowed to join the League of Nations.
The economy is not doing well	Stresemann signed the Dawes Plan in 1924 with the USA. This lent Germany 800 million gold marks to help pay reparations and re-build the economy. A further deal in 1929, Young Plan, gave Germany longer to pay the reparations.

Consequences
The economy began to grow and hyperinflation was brought under control.
People with savings did not get their money back and were unhappy with the government.
Germany was now too reliant on US loans.
Support for the Nazi party fell.

Key Individuals	Details
Stresemann	Foreign Minister of Germany 1923-29
Charles Dawes	US politician who negotiated the Dawes Plan.

Weimar Culture

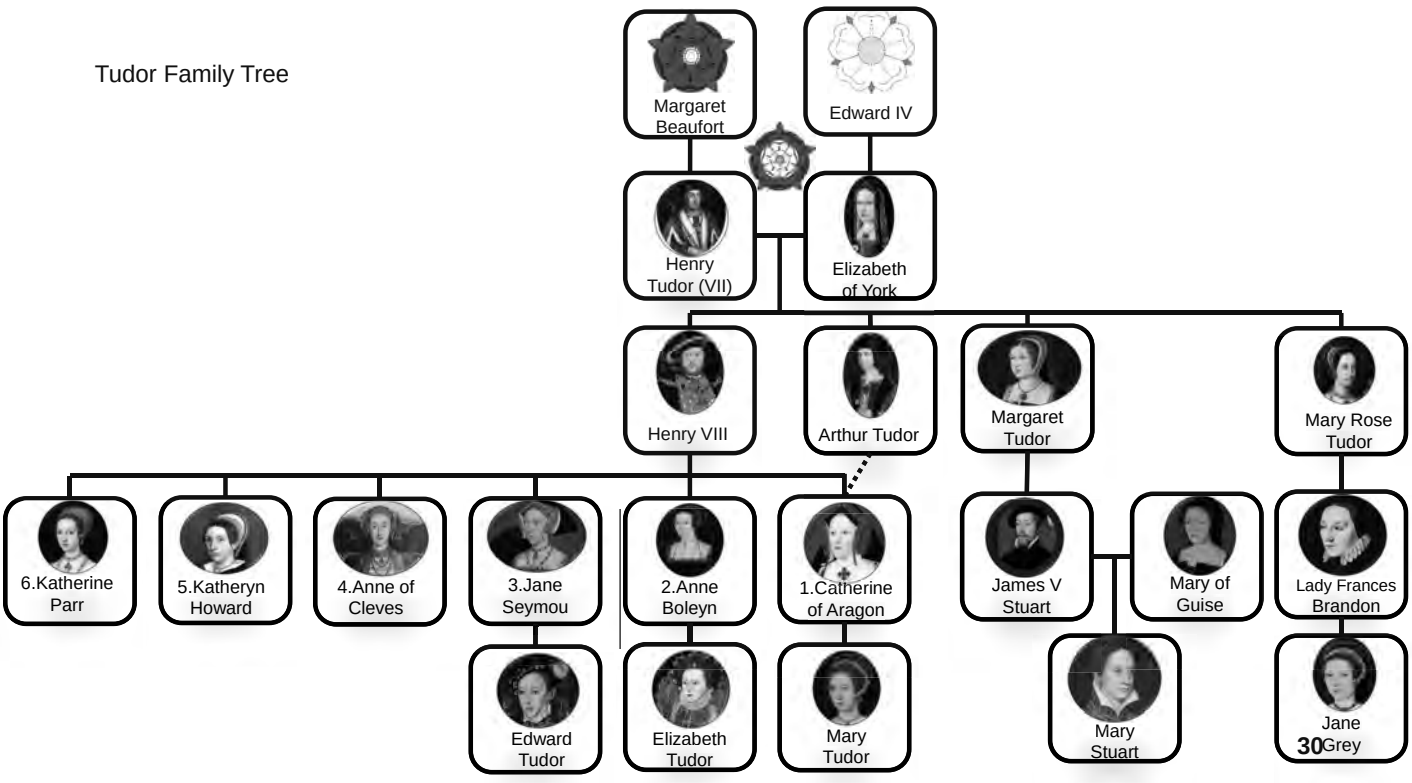
Topic	Detail
Literature	All Quiet on the Western Front, an anti-war book became a best seller.
Nightlife	Jazz music was popular in clubs. Increased freedom allowed for transvestite evenings at clubs.
Art	Artists like Grosz began to paint ordinary people and their lives for the first time.
Cinema	Marlene Dietrich was a worldwide movie star. Metropolis was the most advanced film of the decade.
Design	Bauhaus, with its focus on simplicity, became the most popular school of design.

Consequences
Lack of censorship meant artists had more freedom. However, right wing groups thought it was decadent. The extremists (Nazis) felt new culture reflected a decline in Germany.
Berlin became a culture capital and even rivalled Paris.

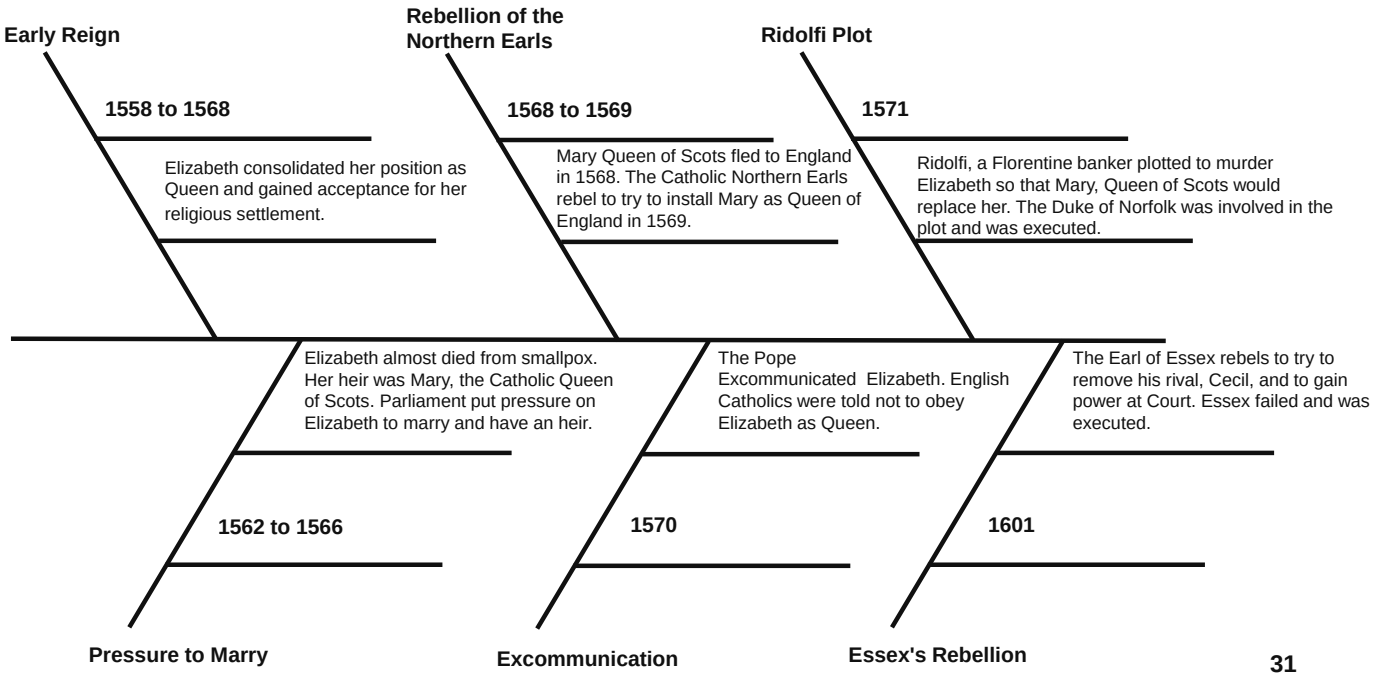
Key Individuals	Details
George Grosz	Famous artist from the Weimar period
Marlene Dietrich	Famous German movie star

BRITAIN: How successful was Elizabeth in her early reign?

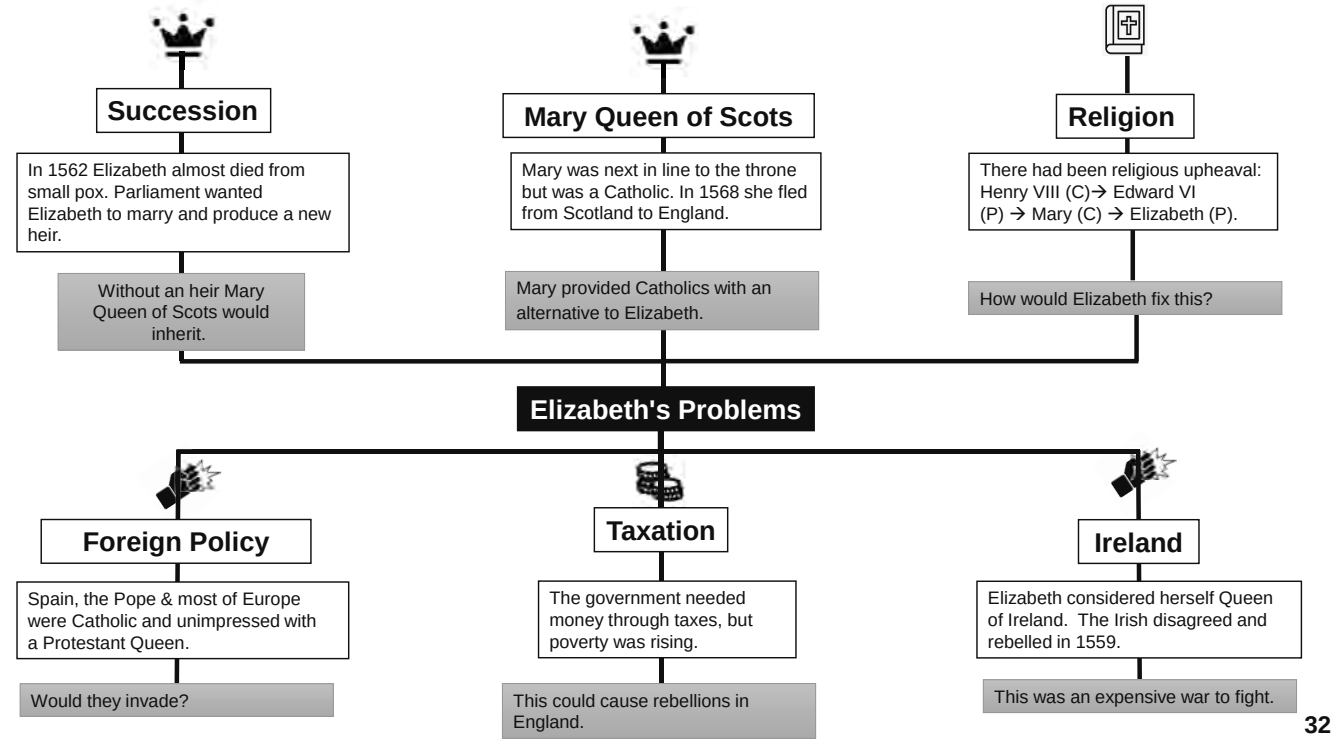
Tudor Family Tree



Elizabethan England Unit



Elizabeth: Problems



Elizabeth: Court key terms

TERM	DEFINITION
Inherit	To gain possessions after someone dies
Treason	Attempt to kill a King/Queen. Punishable by death
Royal court	Nobles, advisers & others who surrounded the Queen
Nobility	Earls, dukes, lords & ladies. Special rights/privileges
Secretary of State	The leader of the Privy Council – a very powerful position. For most of Elizabeth's reign it was William Cecil.

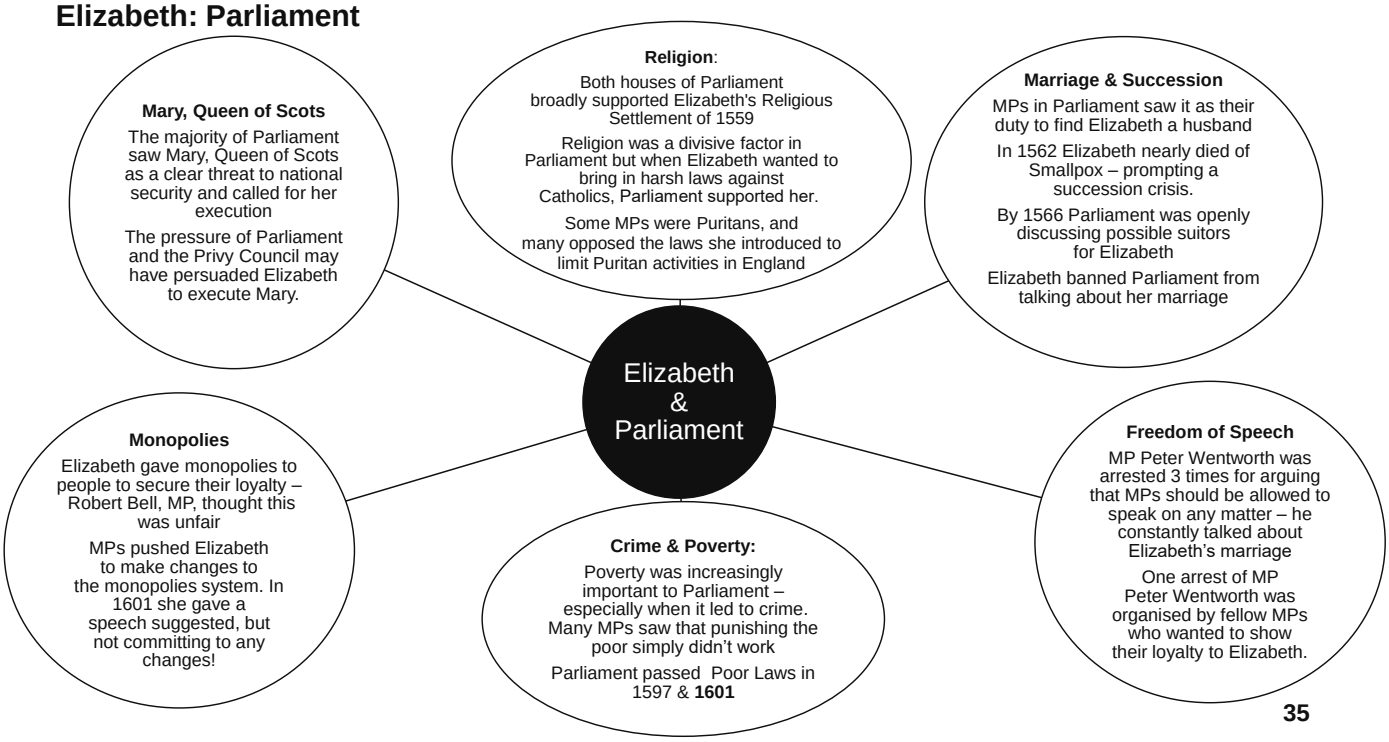
TERM	DEFINITION
Militia	A non-professional army raised for a rebellion/war
Privy councillor	A King/Queens private councillor. Usually a great noble landowner. Exclusion from the PC could lead to rebellion.
gentry	High social class, below nobility, could be a JP.
patronage	Land/title's/power given to ensure an individual's support.

Elizabeth: Court

ELIZABETHS COURT	
Parliament	House of Lords (nobility) & Commons (MPs, still wealthy). Much less powerful than today's Parliament. Influenced taxes and passed laws. Queen decided how much to call it, and indeed, if she listened to it.
Privy Council	Day to day running of the country. Main advisors. She chose, but often the most powerful men in the country. Dealt with military, foreign, religion, security. If they agreed it was hard to ignore them. Led by the Secretary of State. William Cecil & Francis Walsingham key members.
JPs	Kept law and order. Selected from local gentry. 1 JP could send to prison, 2 for execution. JPs swore to deal with all fairly, rich or poor.
Lord Lieutenants	Admin for a particular area of the country – e.g. the North. Responsible for raising a militia. Often also on Privy Council = powerful

KEY INDIVIDUALS	
William Cecil (1520 – 98)	MP who served twice and Elizabeth's Secretary of State. One of her most trusted advisors. Played a key role in the development of the Poor Laws and Elizabeth's religious policies. Encouraged Elizabeth to take control of Catholic Ireland and to fight other Catholic rivals overseas.
Francis Walsingham (1532 - 90)	Served as Elizabeth's Secretary of State from 1573. One of her most trusted advisors. Elizabeth's 'Spy Master' said to have eyes and ears everywhere. Played a large role in the trial and execution of Mary, Queen of Scots. Helped to develop England's naval power.

Elizabeth: Parliament



Elizabeth: Marriage

WHO SHOULD ELIZABETH MARRY?		
Robert Dudley	✓Queens friend and favourite	×Death of wife in 1560 led to rumours he had killed her to marry Elizabeth ×Might cause jealousy
Francis, Duke of Alençon	✓Could lead to influence in France	×By the time marriage was considered, she was 46 – too old ×He was French AND Catholic
King Philip II of Spain	✓Powerful and wealthy. ✓He controlled South America.	×He had been married to Mary Tudor – the people didn't like him. ×He was a Catholic – what would their child be raised as?

Elizabeth: Rebellions

KEY PEOPLE	EXPLANATION
Mary, Queen of Scots	Elizabeth's cousin, a Catholic and heir to the throne after Elizabeth. She was the figurehead for most of the plots in Elizabeth's reign
Duke of Norfolk	Queens's second cousin and leading English nobleman. Raised a protestant, but from a Catholic family. Lord Lieutenant of the North
Northumberland	Father executed for leading a rebellion against Henry VIII. Didn't inherit his father's title until Mary I. Was a Catholic but treated well.
Westmorland	Catholic who had been powerful under Mary I, lost influence under Elizabeth. Remained powerful in the north. Linked to the Howards
Ridolfi	Italian banker who travelled widely through Europe. Sent money to support Catholic rebels in England. Worked for the Pope as a spy.
Essex	Robert Devereux, step son of Queens favourite the Earl of Leicester. Had a factional rivalry with Robert Cecil for the Queens attention.
Babington	Rich, young, devoted Catholic who lead a plot in 1586

TERM	DEFINITION
Mass	An illegal catholic church service in Elizabethan England
Monopoly	The exclusive rights to trade in a particular product
Excommunicate	To remove from the Catholic Church by the Pope.

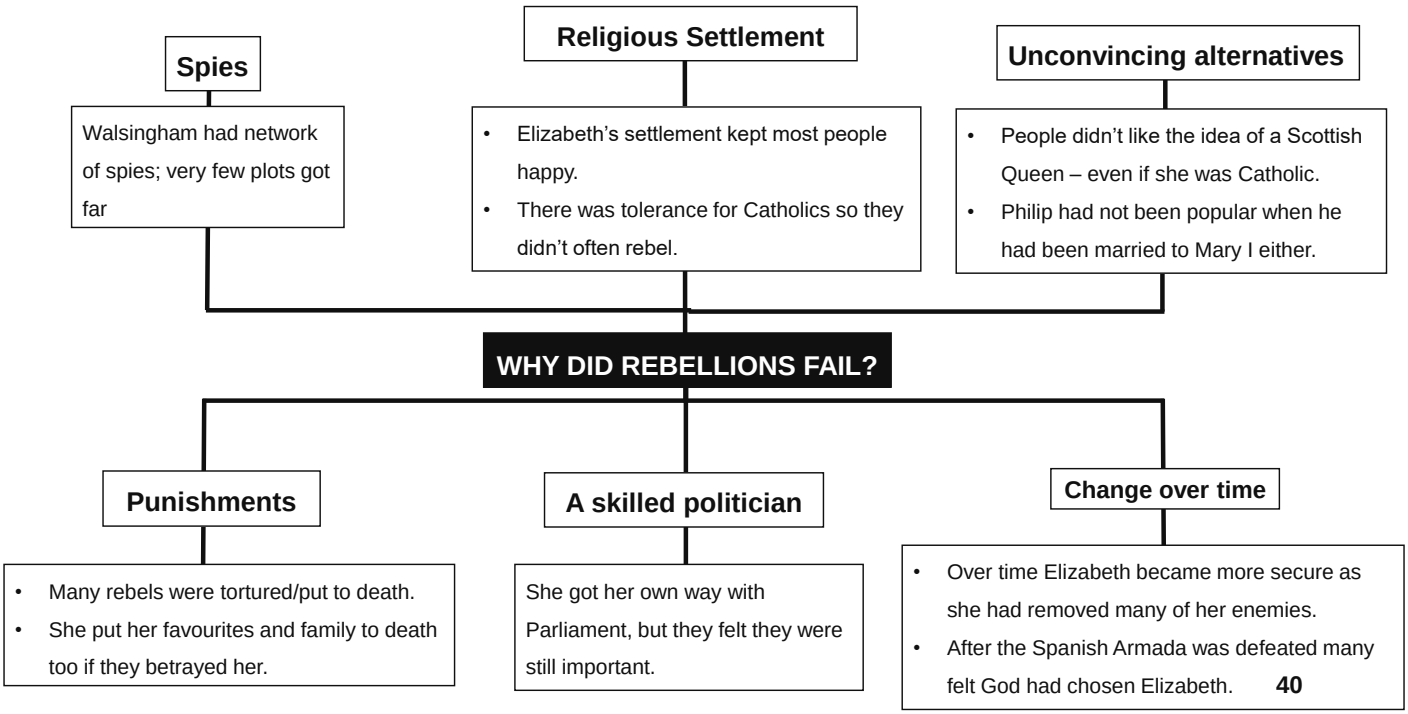
Elizabeth: Rebellions

Rebellion	Events	Consequences/Significance
Northern 1569	MQOS arrived in 1568, the Duke of Norfolk wanted to marry her, Elizabeth said no. Norfolk left court without permission and went north. Northumberland & Westmorland held an illegal mass in Durham Cathedral then marched south with 4,600 men.	Elizabeth struggled to raise an army, but the earl of Sussex managed to – the rebels disbanded. Northumberland was executed, Westmorland fled to France & Norfolk was placed in prison then under house arrest. Led to the Ridolfi plot.
Ridolfi 1571	Ridolfi felt for a plot to succeed, it needed foreign support. In 1570 the Pope had excommunicated Elizabeth, commanding all Catholics to removed her. The plan was for an invasion force from the Netherlands to meet Norfolk and another northern rebellion. Elizabeth would be replaced by Mary who would marry Norfolk.	Plot was foiled as a bag of coins and letters were discovered on their way north. A code was found at Norfolk's house. He was executed in 1572. Treatment of Catholics got worse after this – they had shown then could not be trusted.

Elizabeth: Rebellions

Rebellion	Events	Consequences/Significance
Essex 1601	In 1598 he argued with the Queen over Ireland. She hit him round the head, he almost drew his sword. He was placed under house arrest. In 1599 he was sent to Ireland. This made him angry and resentful of Cecil who stayed in London. He called a truce with the Irish, rushed back to London and burst into the Queens bedchamber dirty with her not in her wig. In anger, she refused to renew his sweet wines monopoly which bankrupted him. He rebelled in 1601 by taking 4 privy councillors hostage and marching with 200 supporters on London.	Cecil labelled Essex a traitor and the rebels abandoned the march. Essex returned to his house to find the privy councillors had been freed. He was arrested and executed in 1601. Most of the others were simply fined. Significant for showing the role of factionalism (rivalry) in Elizabethan court & the power of monopolies and wealth in driving people to rebel – not simply religion.

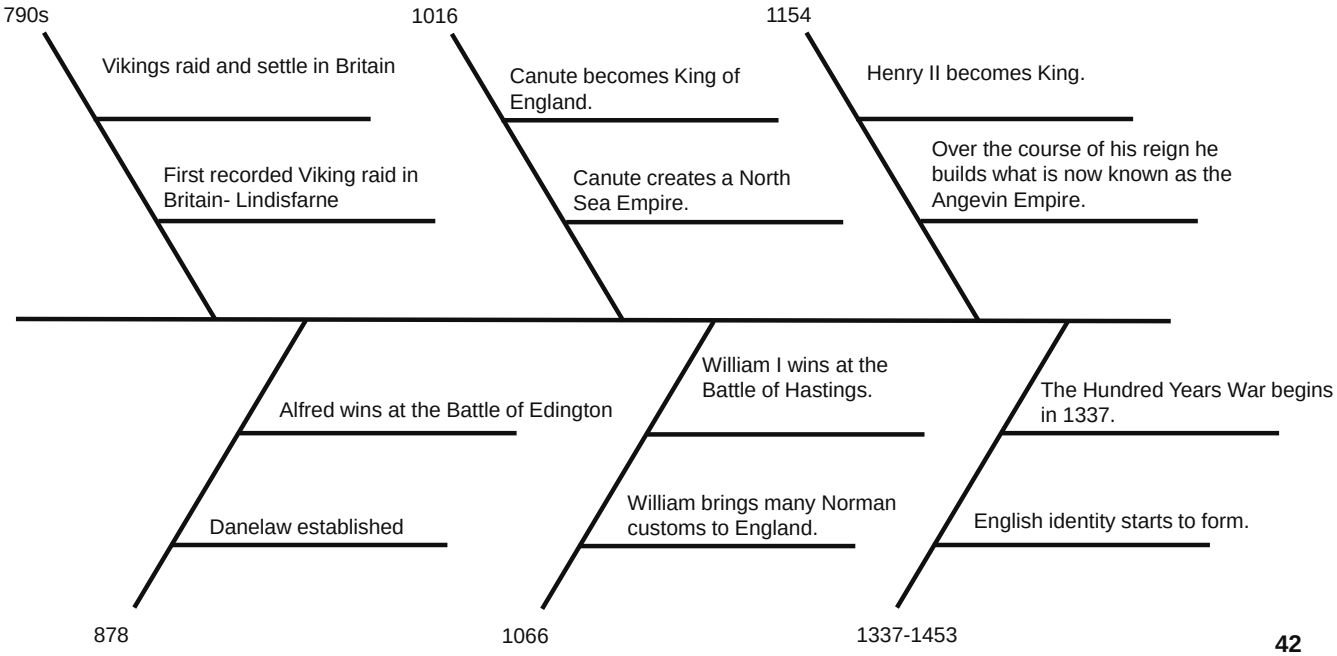
Elizabeth: Why did rebellions fail?



BRITAIN: Why did people migrate to Britain 790-1453?

Migration and Empires overview timeline

Medieval



Time Period, Factors & Themes

Time Period	Details
790 -1490	Medieval
1490 – 1750	Renaissance
1750 –1900	Industrial
1900 +	Modern

Themes
Motivations behind migration to and from Britain
Impact of migration on Britain
Gaining and losing empire

Factor	Symbol
War/violence	
Religion	
Government	
Science and technology	
Economy/resources	
Role of the individual .	
Ideas (imperialism, social Darwinism and civilisation	

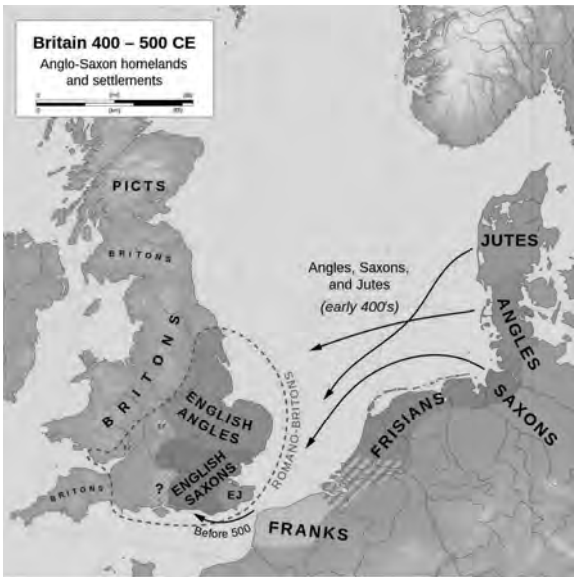
Medieval

Before the Anglo-Saxons

Date	Event	Detail
Before 4000BC	First Britons	The first people to live in Britain were immigrants. They arrived from Europe and were hunter-gatherers.
4000BC	Farmers arrive	Farmers from Europe arrived in Britain bringing seeds to grow crops and animals. They created farms and built homes.
500-43BC	New settlers	New waves of settlers from Europe arrive: -Beaker people: named after the beaker-shaped pottery cups they made -Celts: farmers who also were fierce fighters and fought between themselves as well as people already in Britain.
43-401AD	Romans arrive	Romans from Italy conquer most of the British tribes. They rule for over 400 years; Britain becomes a part of the Roman Empire.
401AD onwards	Roman Empire falls	The Romans in Britain leave to defend their homeland. New tribes arrive and invade from Denmark and northern Germany looking for a better climate and good farmland. They were known as the Angles, Saxons and Jutes. They soon became known as the Anglo-Saxons and after fighting with the British tribes, they capture most of Britain (except for Cornwall, Wales and the far north)

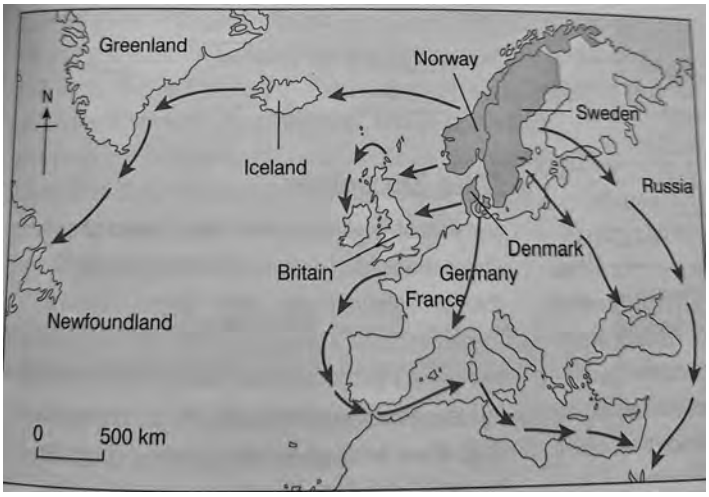
Keyword	Definition
Immigrant	People who move into a country
Conquer	To take over an area, normally by force/through war.
Bretwalda	Ruler of Britain, title given to Anglo-Saxon chieftains/leaders
Merchants	People who buy and sell goods through trading.

Anglo-Saxon invasion of Britain



Viking invasion of Britain

Date	Event	Detail
Mid-700s AD	Vikings start to explore	The people of Scandinavia (Norway, Denmark and Sweden) began to explore, raid and invade countries around them. They sailed to: Britain, Ireland, France, Spain and Italy. Others travelled to places as far as Israel, Greenland and America. They were known as the Vikings or Northmen.
790s AD	Viking raids on Britain	The Vikings attacked Britain because they had traded goods with the Anglo-Saxons for many years and knew of their wealth.
793 AD	Raid of Lindisfarne	The first recorded Viking raid was on a monastery at Lindisfarne in Northumbria.
795 AD	Attack on Iona	The Vikings attacked the Isle of Iona in Scotland.
850 AD	Settlers	Vikings decided to settle in Britain. They landed along the eastern coast and built large, well-protected camps. Soon they captured British towns and villages.



Viking invasion of Britain

Landscape

The land in Norway was very hilly and Denmark had sandy soil.

The land in Britain was better for farming and grazing animals.

Wealth

The Vikings knew how wealthy some of the Anglo-Saxons had become.

Dublin became a key slave trading centre for the Vikings.

Opportunity

Recruiting young men into the Viking armies was easy as only the eldest sons inherited farmland in Scandinavia.

Britain offered younger brothers a chance to make their fortune.

Why did Vikings invade Britain?

Overcrowding

Scandinavia was becoming overcrowded.

Britain was close by and had more space for families to grow.

Science and Technology

Viking longships were cutting-edge technology.

They were used to explore new lands, transport goods, treasure and slaves internationally.

Religion

Vikings believed in the Norse Gods, such as Odin.

To gain a place in Valhalla, Vikings believed they needed to be fierce warriors.

Viking impact on Britain

How did the Vikings change Britain?

Place names:

Viking settlements can be easily detected through the use of the suffix 'by' which means homestead or village.

An example of this is Derby.

The suffixes Thorpe (new village) thwaite (meadow or piece of land) are also have Viking roots.

Days of the week:

Thursday gets its name from the Norse God of Thunder, Thor.

Friday was named after Freya, the goddess of love.

Words and language:

Many British surnames have Viking origins such as Adamson, Holt and Thorn.

Words such as egg, bread, sister, happy, ill and muck are all Viking words.

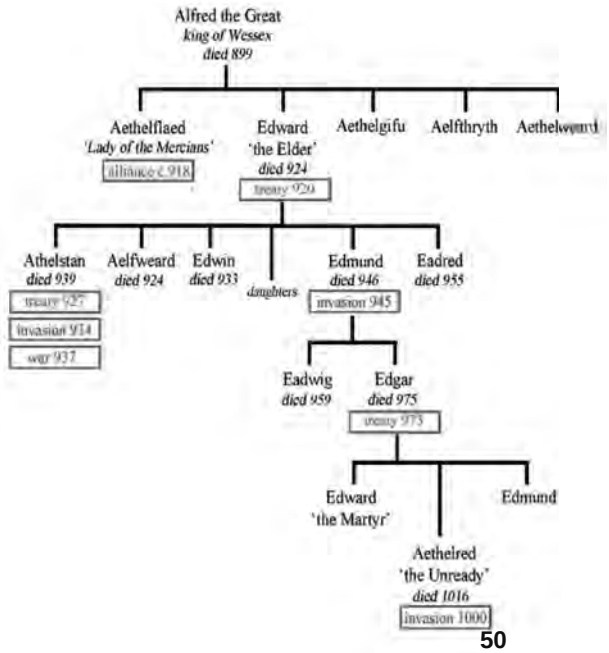
Map of England 886 CE

Viking clashes with the Anglo-Saxons

Capture of York	**Viking expansion**	**Alfred the Great**	**Battle of Edington**
• 866 AD • An army of Danish Vikings captured the city of York.	• By 870 Vikings had conquered several Anglo-Saxon kingdoms. • These included: Northumbria, East Anglia and much of Mercia. • Wessex was the next obvious target.	• In 871, Alfred became the King of Wessex. • In 876, the Vikings attacked Wessex which led to him having to hide on the Isle of Athelney. • Over a few months, Alfred had gathered enough support to attack the Vikings once more.	• May 878 • Alfred beat the Vikings at the Battle of Edington. • Alfred met with the Viking leader, Guthrum, to discuss peace terms. • Alfred made Guthrum convert to Christianity and promise to never attack Wessex again. • The two leaders settled on a boundary between their territories: the Vikings were to live in the north and east of the country (Danelaw).

Alfred the Great

Short term Significance	Long term Significance
Alfred united the Anglo-Saxons to fight for him by promoting himself as the defender of Christianity against the heathen Vikings.	Alfred's grandson, Athelstan, became the first King to control the whole of England, around 927 and he defeated the Vikings in the final large battel at Brunanburh in 937.
Alfred defeated the Vikings at the Battle of Edington and made Guthrum agree to peace terms.	By the time Alfred's great-grandson (Edgar the peaceful) became King in 959, the country was settled more than it had been for generations.
After the peace with Guthrum, Alfred built burhs (fortresses or castles) across the country from 880s to strengthen England's defences.	Alfred encouraged all young noble men to learn English and translated many books from Latin to English. This created a common language which influences our language today.
Other Anglo-Saxon kingdoms in England saw Alfred as their 'overlord' or the dominant ruler over them.	Under Alfred's rule, the Anglo-Saxons began to all themselves Angelcynn- the English for the first time; this started the creation of an English identity.
Alfred created an English law-code which focused on defending the weak.	This was the start of a shared system throughout England and unified the legal system which had influenced our system today.



Aethelred 'The Unready'

Date	Event	Detail
975	Death of Edgar	After years of peace, Edgar the Peaceful died. He had 2 sons by 2 different mothers, Edward (oldest) and Aethelred (youngest). Edward became the King when Edgar died.
978	Edward murdered	Supporters of Aethelred murdered his half-brother Edward. Aethelred became King but was considered a poor judge of character and was taken advantage of by his advisors.
991	Vikings arrive	A huge Viking army, led by the Dane Sven Forkbeard and the Norweigan Olaf Tryggvason, arrived at Folkestone in a fleet of over 90 ships.
991	Battle of Maldon	The Vikings defeat the English. Aethelred paid them to leave and the taxes raised to pay for this became known as Danegeld. This cost a fortune- £1.8 million in today's money. The increase in taxes angered the English.

Date	Event	Detail
1002	Normandy	The Vikings had been sheltering in Normandy (northern France) as the Normans were descendants of Vikings who had settled in Normandy a 100 year before. Aethelred made a deal with the Duke of Normandy who did not want the Vikings in his land. The agreed to support each other against the Vikings- common enemy. This agreement would stop the Vikings using Normandy as a base to attack England. Aethelred sealed the agreement by marry the Duke of Normandy's sister, Emma of Normandy.
Nov 1002	St Brice's Day Massacre	Aethelred carried out a mass killing of all Viking men, women and children that he found south of the Danelaw.
1013	Forkbeard's revenge	Forkbeard wanted revenge as his sister, Gunhilda was murdered in the massacre; so he summons and army and conquers England. Aethelred flees.

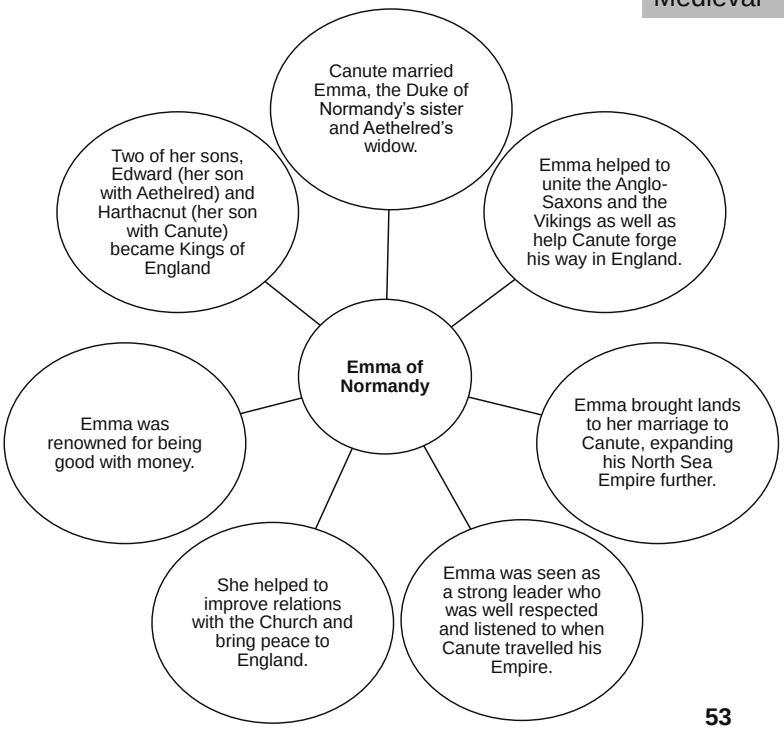
King Canute's North Sea Empire

Date	Event	Detail
1014	Forkbeard dies	When Forkbeard dies, his young son, Canute, succeeds him. Aethelred returns to England and forces Canute back to Denmark. Aethelred reclaims the throne and his position as King.
1014-16	Rebellion	Canute's supporters in England rebel against Aethelred; even Aethelred's son joins the rebels.
April 1016	Aethelred's death	Aethelred dies and his son, Edmund, becomes King.
Dec 1016	Battle of Assandun	Canute beats Edmund at the Battle of Assandun. Canute and Edmund reach an agreement: -Wessex will belong to Edmund -the rest of the country will be run by Canute -when one of them dies, the other will inherit the land About a month later, Edmund died and Canute became King of all of England.

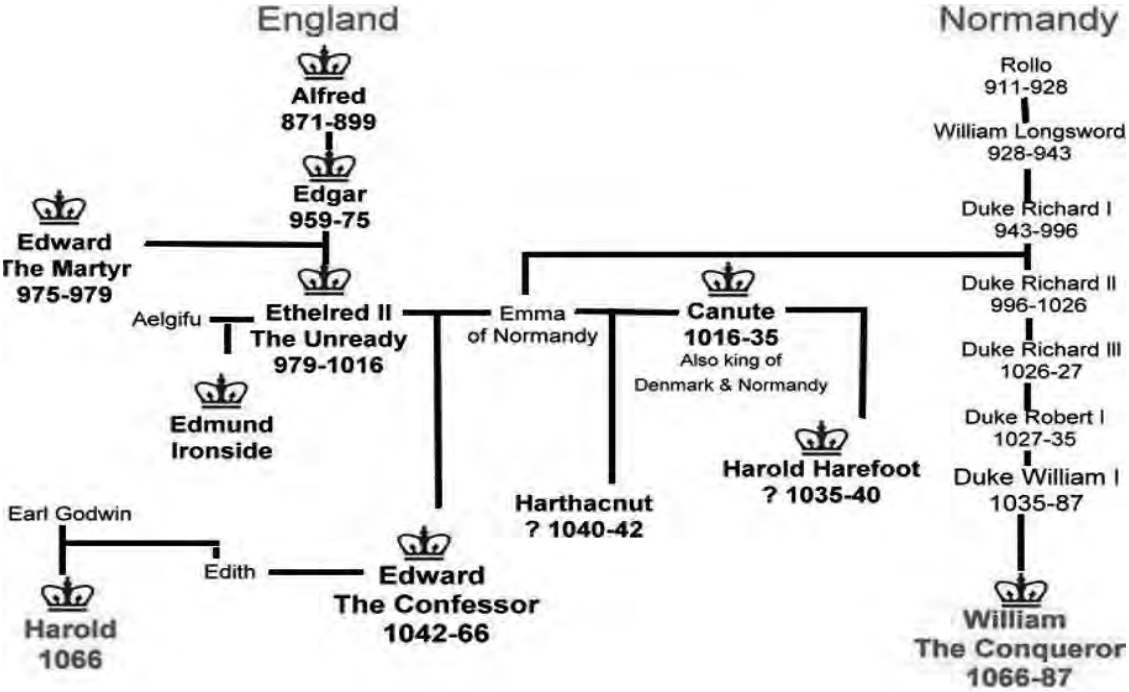
Britain became Canute's main domain as it was his richest kingdom.
He also inherited the kingdoms of Denmark, Norway and parts of Sweden too.

Canute's Britain

Positives	Negatives
Trustworthy English nobles were left to rule their own areas.	Hostile takeover at the start of his reign with a lot of violence.
Peaceful time and free from Viking raids.	He was tough with those Anglo-Saxons he thought might rebel against him.
Brought back the popular and peaceful laws of Edgar the Peaceful.	Ordered the execution of many powerful Anglo-Saxons.
Saw Britain as his main domain rather than a Danish colony.	Transferred riches back to Denmark and gave Danish nobles the best land.



England and Normandy family tree



Edward The Confessor

Date	Event	Detail
1035	Canute dies	Harold becomes King when his father, Canute dies. He was Canute's son from his first marriage. He was not well liked.
1040	Harthacnut becomes King	After 5 years on the throne, Harold dies. Harthacnut, the son of Canute and Emma, becomes King. He is not well liked and died 2 years later.
1042	Edward The Confessor	After the death of his half-brother, Edward (the son of Aethelred and Emma) becomes King of England. He had lived in Normandy for a large part of his life, He was accepted by the Anglo-Saxon people but seemed to prefer his Norman friends. He was a very religious man and earned the nickname the Confessor, as this was a name given to someone who led a very holy life.

Edward the Confessor died in 1066 without an heir. This led to 3 men claiming the right to rule England...

Contenders to the throne in 1066

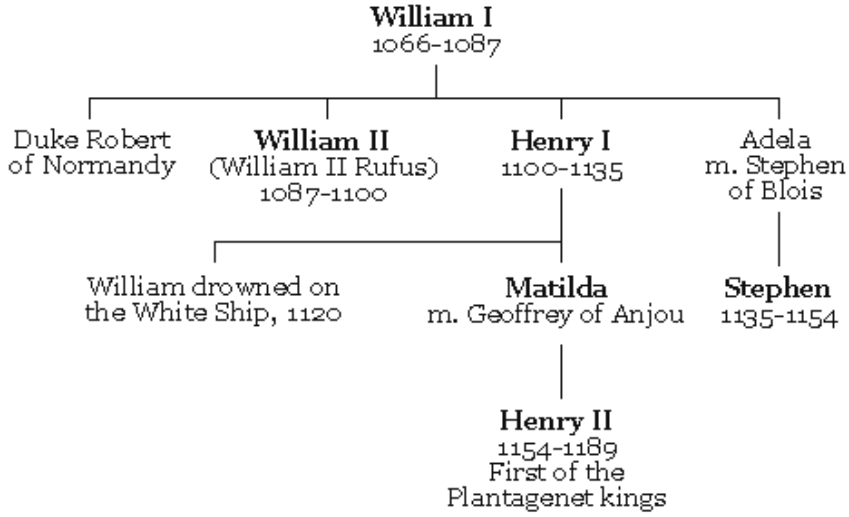
- **William of Normandy:** claimed both Edward and Harold Godwinson had agreed he should take the throne.
- **Harold Godwinson:** the most powerful man in England, the Witan (a group of powerful nobles and bishops) supported his claim to the throne.
- **Harald Hardrada:** Viking ruler of Denmark; stated that as Vikings had conquered England for many years he should be King.

Events of 1066

Date	Event	Detail
Jan 1066	Edward dies	The day after Edward's death, the Witan elect Harold Godwinson, Earl of Wessex and brother-in-law to Edward, King of England. He became King Harold II of England.
Sept 1066	Battle of Stamford Bridge	Harald Hardarda was defeated by Harold Godwinson at the Battle of Stamford Bridge in York.
Oct 1066	Battle of Hastings	Godwinson was defeated by William of Normandy at the Battle of Hastings.
Dec 1066	William the Conqueror	William is crowned King of England on Christmas day and becomes King William I of England.

Norman Family Tree

Medieval



Norman England

Medieval

Government

Once again England was ruled by a foreign power.

William spent half of his time in France to secure control over Normandy, leaving England to be looked after by barons and lords.

Taxes

Much of the English lost land to the Normans.

Taxes were paid to the Normans.

Control

William encouraged Norman barons in England to build castles all around the country to help control the English.

The first type of castle built was the Motte and Bailey which only took a fortnight to build. Over 500 castles were built.

How did William rule England?

Language and culture

French customs were introduced.

French became the language of those in power.

Harrying of the North

Some northern English rebelled against William.

William crushed the rebels so harshly many sold themselves into slavery to escape.

Domesday Book

William ordered a census of all the land and wealth of England.

All the information was collected in what became known as the Domesday Book which heled his son when he became King.

Henry II

1087

After William I died he split his land between his 2 eldest sons.

Robert got Normandy and William II got England.

William II dies childless.

His younger brother, Henry I becomes King.

1100

1106

Henry I defeats his eldest brother Robert.

Henry becomes Duke of Normandy too.

Henry I dies and wants his daughter, Matilda to become Queen.

Stephen, Henry's nephew, seizes the throne.

1135

1152

Matilda's son, Henry married Eleanor of Aquitaine.

Aquitaine was large territory.

After 19 years of fighting between Matilda and Stephen, they reach an agreement.

They agreed that Matilda's son would become King after Stephen's death.

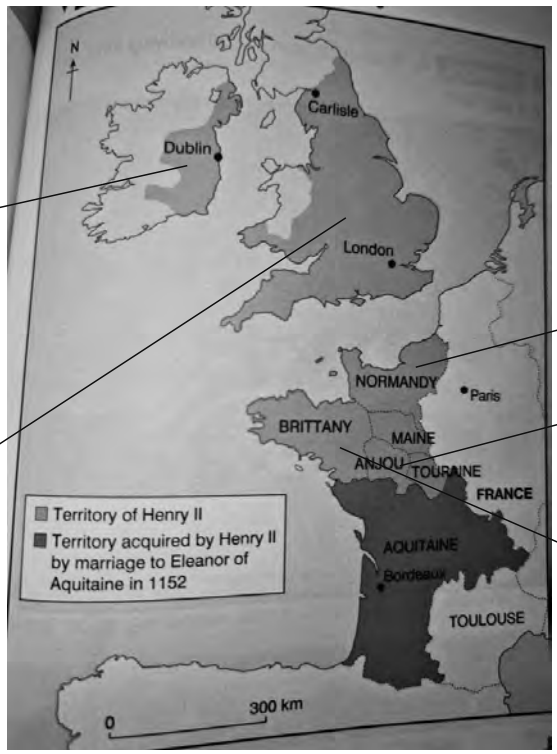
1153

1154- Stephen dies and Henry II becomes King.

The Angevin Empire- Henry II

IRELAND
When 'King' Dermot of Leinster asked Henry II for help to fight another Irish King, Henry sent an army led by the Earl of Pembroke.
When Dermot died, the English took over so much land they controlled more than the Irish.
When Henry II visited Ireland in 1171, he was recognised as the overlord.

ENGLAND
Inherited when King Stephen died in 1154.
Henry II's grandfather had been King of England.



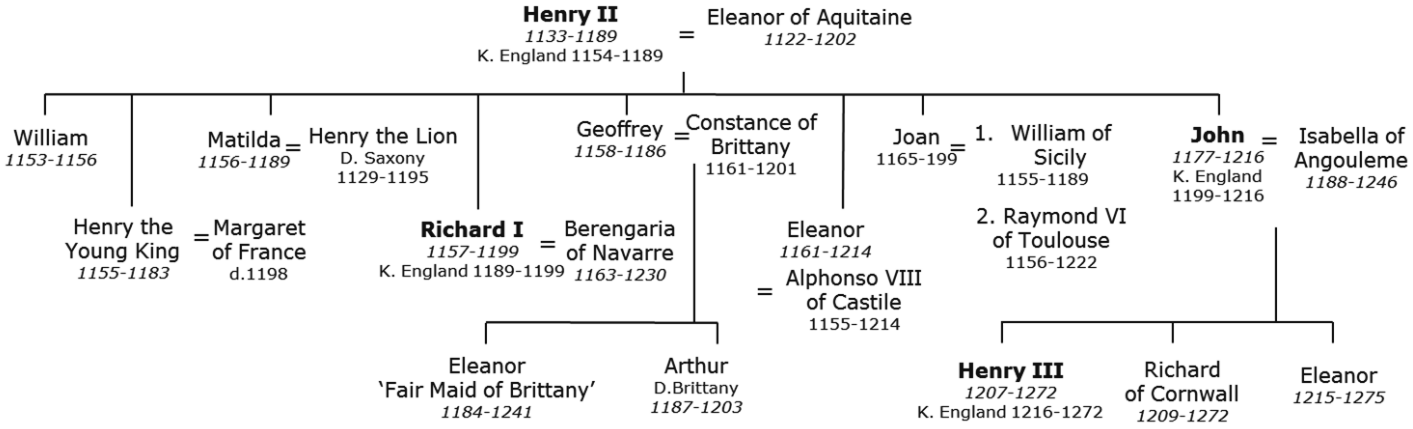
NORMANDY
Inherited from his mother, Matilda,

ANJOU, MAINE & TOURAINE
Inherited from his father, Geoffrey of Anjou.

BRITTANY
Acquired when Henry II invaded and then married one of his sons off to the Duchess of Brittany.

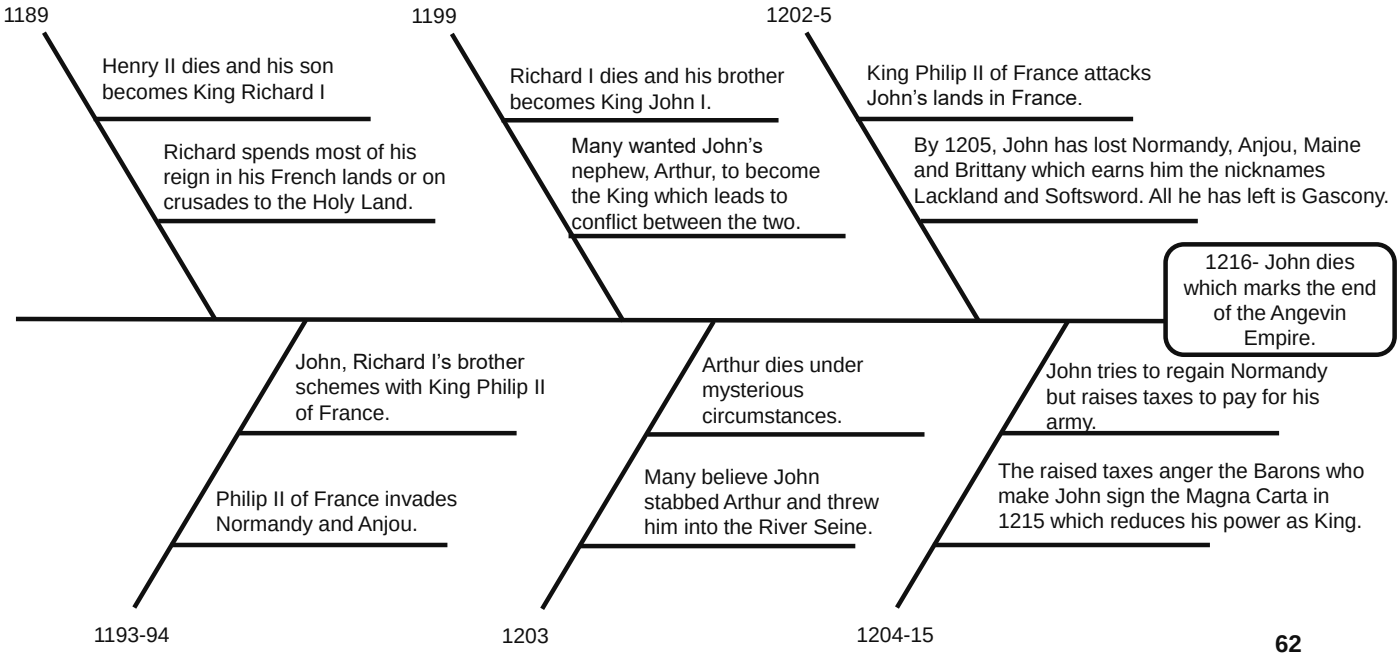
Angevin Family Tree

Medieval

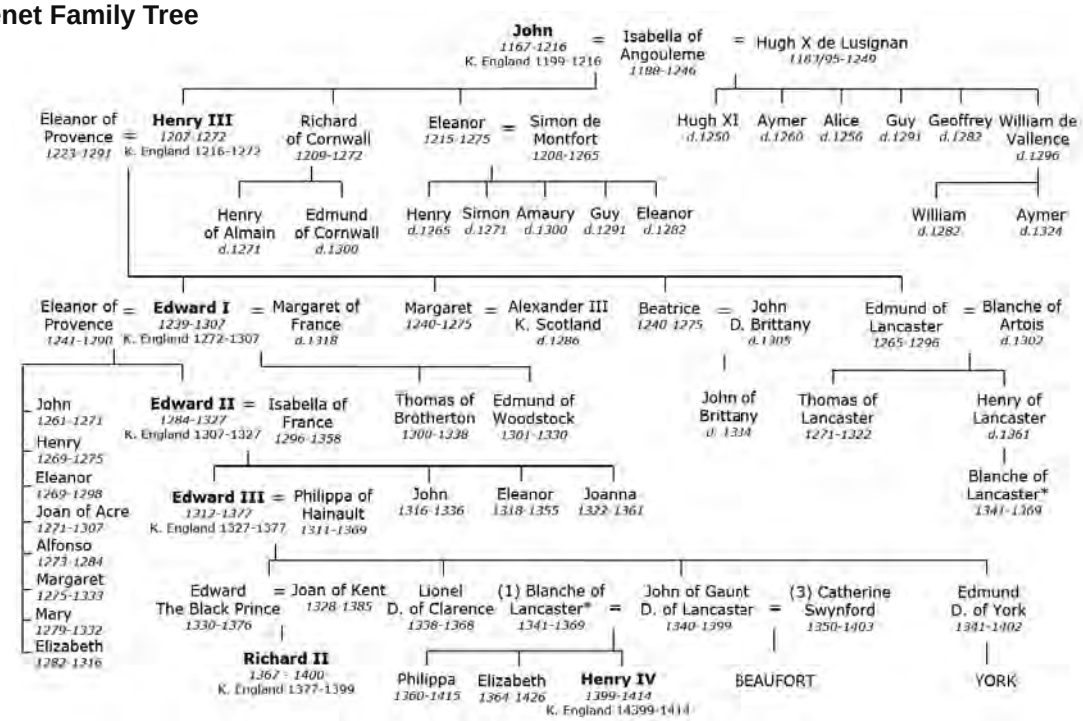


Angevin Empire crumbles

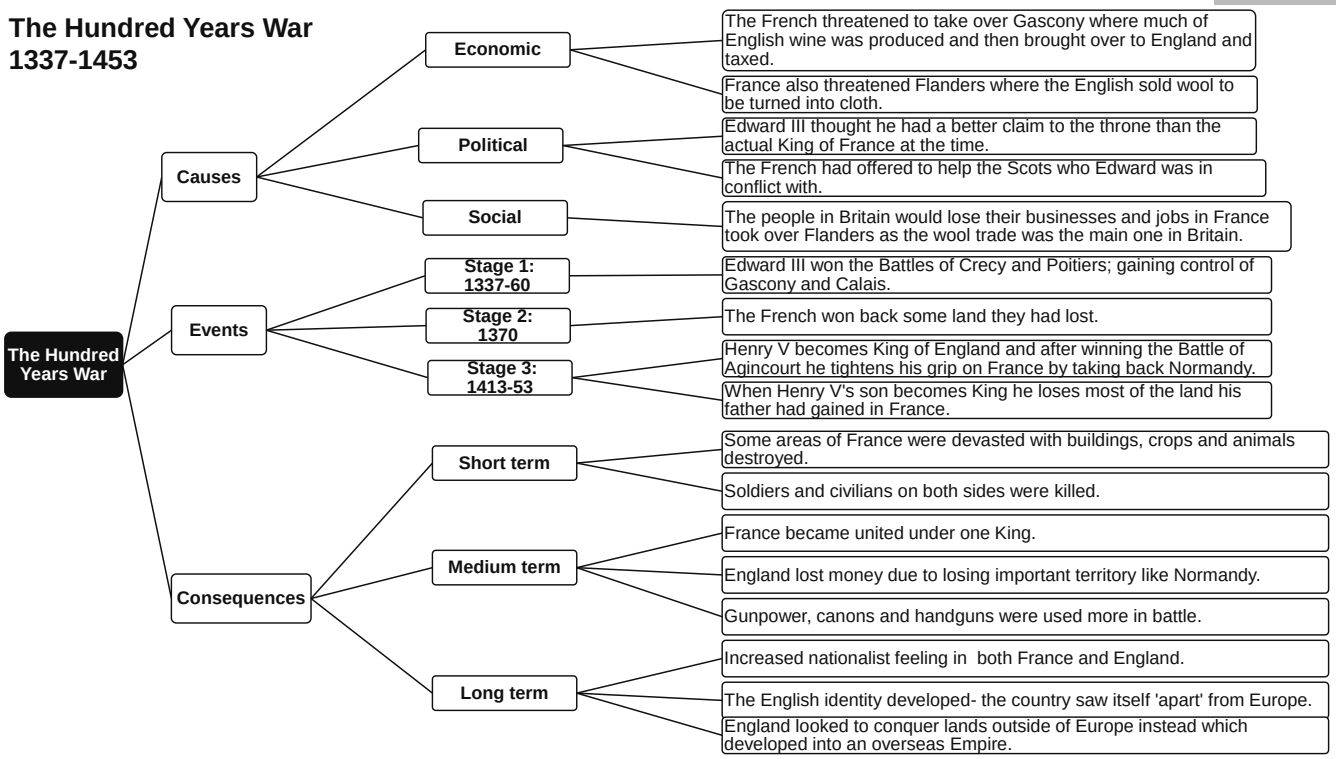
Medieval



Plantagenet Family Tree



The Hundred Years War 1337-1453



Maps of the Hundred Years War
1337-1453

Year 9 History

Assessment question structures

4 marks = 5 minutes = 1 paragraph

1. Year 9 History: Assessment questions structures

PEEL- How to explain

Point What is your opinion?	**E**vidence Which examples link to your opinion?	**E**xplain What does your evidence show?	**L**ink How does your opinion link or compare to others?
• I think... • One way... • A consequence was... • The importance of... • The main cause was...	• For example… • This can be seen through • This is demonstrated by…. • A prime example of this is… • We can see evidence of this when we look at the… • This is reflected in… • This links to the fact...	• This shows us that… • This demonstrates how… • From this we can assume that… • This is significant because… • This embodies/ epitomises/reflects the importance of… • As a result of this… • If this did not happen then… • Therefore, this shows... • This suggests...	• In contrast… • Although this was important, it was less important than… because… • However… • Alternatively… • Even though… • This links to...

2. Year 9 History: Assessment questions structures

Source Analysis

How to analyse a source	Sentence starters
1. What can you see?/What does it say? • Describe what you can see if it is an image based source. • Pick out words/phrases from the source which help you work out what it says	In the source I can see… In the source it says…
2. What does it mean? • Explain the main message/meaning of the source. • If it is an image based source, explain what the imagery in the source means/symbolises.	This means… Therefore, this suggests…
3. What do I know? • Explain how the message/meaning of the source links to your own knowledge.	This links to the fact… I know this to be true because…

3. Year 9 History: Assessment questions structures

Interpretation Analysis

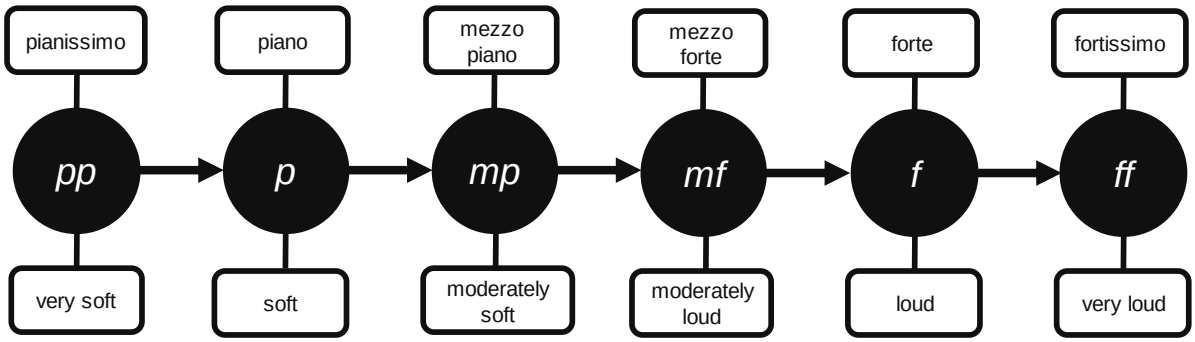
How to analyse an interpretation	Sentence starters
1. Summarise the interpretation into 1 sentence of your own words.	The interpretation says…
2. Link back to your own knowledge	This links to the fact… I know this to be true because…

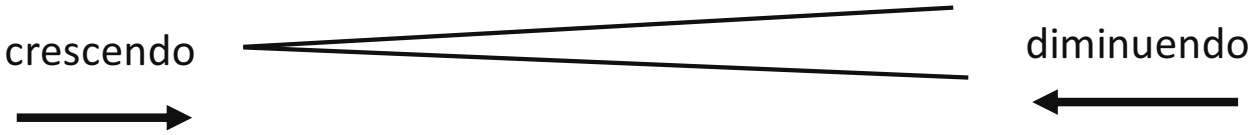
Y9 Music Knowledge Organiser

Musical Elements

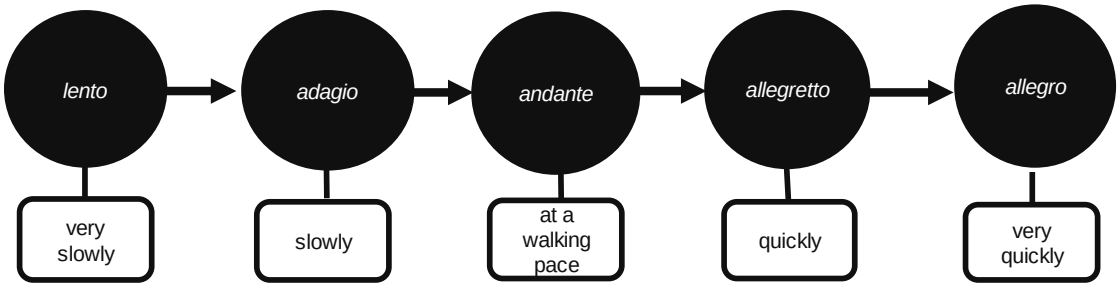
Keyword	Definition	Example
Pulse	The beat of the music. Every piece of music has a heartbeat. It doesn't need to be played by drums - you can 'feel' the beat.	"the pulse of the music is steady"
Tempo	The speed of the music. Music can change tempo within a piece. We often describe it using Italian words	"the tempo is fast"
Pitch	How high or how low a sound is.	"the music is high"
Dynamics	The Volume of the Music. Music can change dynamics within a piece. We often describe it using Italian words	"the music is quiet and then gets louder"
Structure	Music is divided into sections. The order of these sections create structure. For example verse and chorus/ Binary/Ternary	"the music starts with an 'A' section"
Texture	How the different musical layers combine. A single melody creates a thin sound. Adding more parts/layers creates a thicker sound.	"there are lots of instruments playing lots of different melodies"
Timbre	Each instrument has a unique sound – this individual sound is its timbre. When describing sound first try to describe the instrument and then how it is played	" the flute has a warm timbre when played low down"
Rhythm	Each note can have a long or short duration. Putting different notes together creates a rhythm	"there are lots of crotchet rhythms in this piece"
Melody	The 'tune' of the music – the part we sing along to	" the melody of this song is made up of lots of repeated sections"

Dynamics - volume





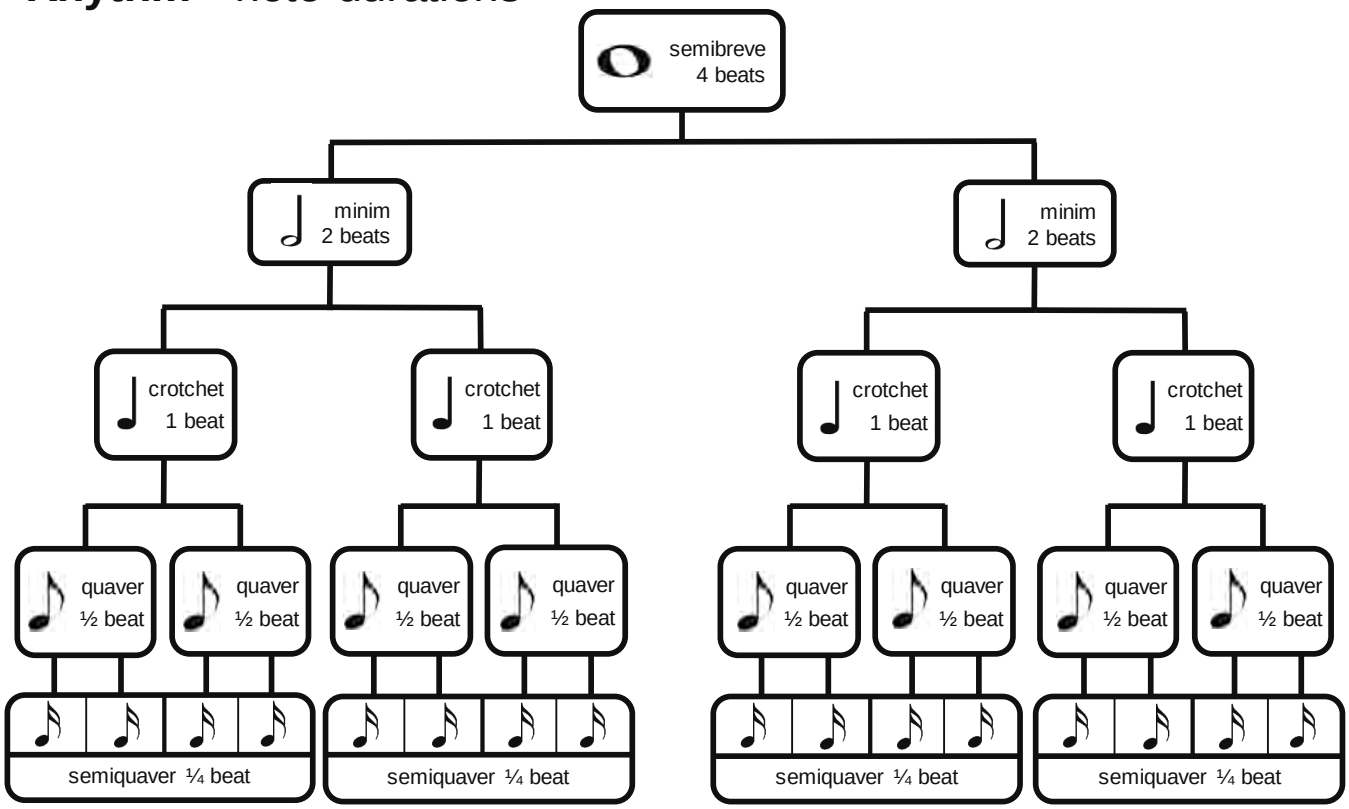
Tempo - speed



accelerando : getting faster

rallentando: getting slower

Rhythm - note durations

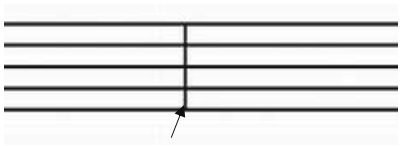


Rhythm

Dotted Minim: 3 Beats

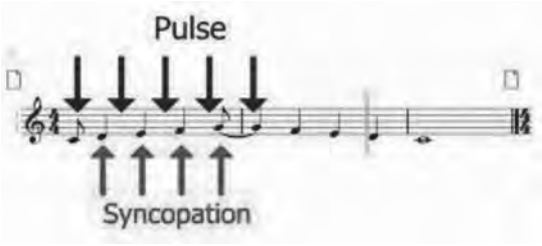
4 Beats in a bar

3 Beats in a bar

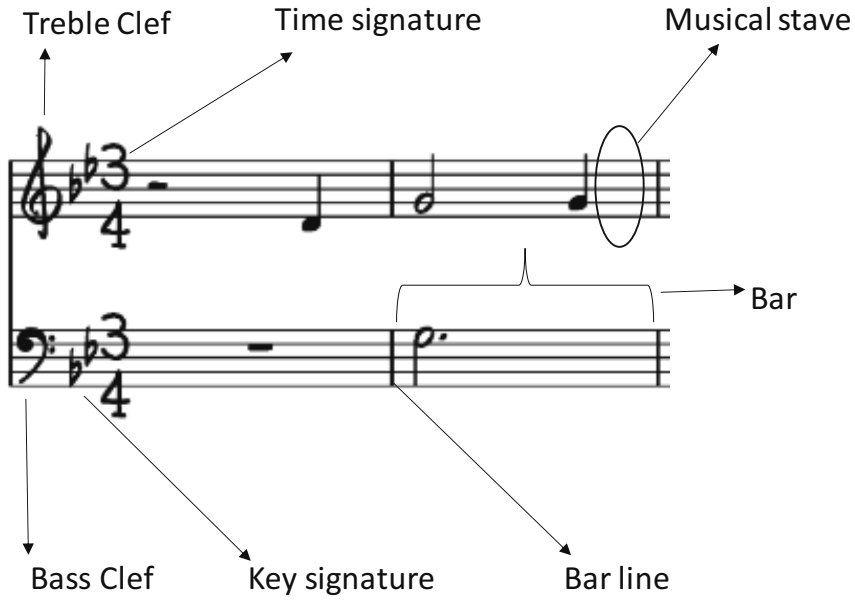


Bar line – this divides up the music: You are allowed so many beats in each bar.

Syncopated Rhythm: playing on the weak beats of the bar (like the offbeat)

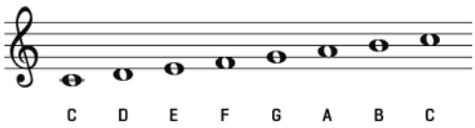


Musical Notation



Pitch – how high or low a note is

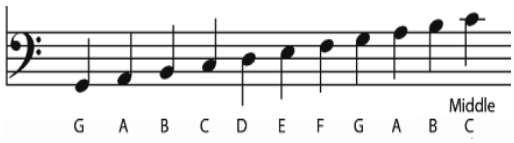
Treble Clef Notes



Notes on the line: Every Green Bus Drives Fast

Notes in the space: FACE

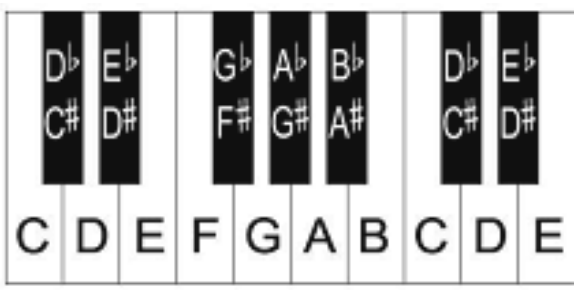
Bass Clef Notes



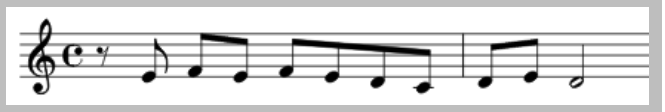
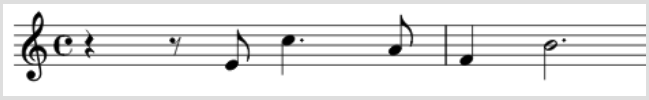
Notes on the line Good Burritos Don't Fall Apart

Notes in the space All Cows Eat Grass

Sharp	A sharp makes the note higher
Flat	A flat makes the note lower
Natural	A natural cancels out any sharps or flats
Chromatic	Notes that are sharp and flat – but they were not in the key signature – they just appear in the music



Melody

Keyword	Definition	Example
Conjunct	The notes of the melody move in a step-wise motion. They are next door to each other.	
Disjunct	The notes of the melody have large gaps between them. They move in jumps and leaps.	

Articulation

Keyword	Definition	Example
Staccato	The notes are played in a detached way (very short) Shown by a dot over or under the note head	
Legato	The notes are played in a very smooth way. Shown by a curved line over or under the note head	

Tonality

Keyword	Definition
Major	The music has a 'happy' feel to it.
Minor	The music as a 'sad' feel to it
Atonal	The music is not in any key

Harmony

Keyword	Definition
Diatonic	The music has no extra sharps and flats in it – the music sounds 'normal'
Chromatic	There are lots of extra sharps and flats in the music

Key Signature	Major Key	Minor Key
No Sharps or flats	C Major	A Minor
1 Sharp 	G Major	E Minor
2 Sharps 	D Major	B Minor
1 Flat 	F Major	D Minor
2 Flats 	Bb Major	G Minor

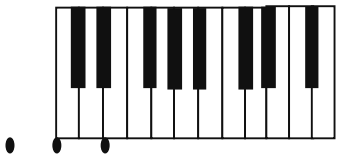
Composing

Try to choose chords from the same key: Below are chords in C major and A minor

Chords in A Major	Chords in Aminor
C: CEG	Am: ACE
Dm: DFA	Bm: BDF
F: FAC	Dm: DFA
G: GBD	Em: EGB or E: EG#B
Am: ACE	F: FAC

Whatever notes you use in the chord then try to use these for the melody

E.g. C Chord uses C, E, G – so when creating a melody make C, E or G your most important notes



Include Passing Notes to make it more interesting (these are notes that do not belong to the chord but that help you pass from one to the next e.g. C **D** E **F** G

Musical Structures

Keyword	Definition
Structure	The way different sections of music are put together
Binary	Two contrasting sections of music which are not repeated later on in the piece: AB
Ternary	Two contrasting sections of music, where the first section is repeated later on: ABA#
32 Bar song form	Type of structure used in musicals AABA – each section is 8 bars long
Verse Chorus form	Type of structure in a pop song: Introduction, Verse, Chorus, Middle 8, Pre Chorus, Outro
12 Bar Blues	Type of structure found in Blues Music: 12 bars long, Using chords 1,4 and 5. Lyrics are structured as 3 lines: A A B

Instruments of the Orchestra

Keyword	Definition
Instrument	An object that makes a musical sound
String Family	Violin, Viola, Cello, Double Bass, Harp
Woodwind Family	Flute, Clarinet, Oboe, Saxophone, Bassoon
Percussion Family	Anything you hit or shake: Drum, Glockenspiel, Triangle, Tambourine
Brass Family	Trumpet, Trombone, French Horn, Tuba
Conductor	The person in charge of the Orchestra – leading them from the front
Orchestra	A group of musicians playing together – containing woodwind, strings, brass and percussion

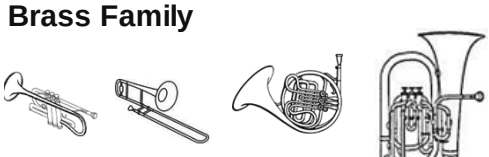
String Family

Violin Viola Cello Double Bass

Woodwind Family

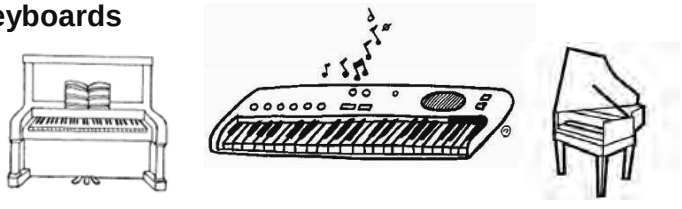
Flute Clarinet Oboe Bassoon Saxophone

Brass Family



Trumpet Trombone French Horn Tuba

Keyboards



Piano Keyboard Harpsichord

Percussion Family

Timpani Glockenspiel (metal) Xylophone (wooden) Triangle Snare Drum Bass Drum Tambourine

Blues 1: Keywords

Keyword	Definition
Scat	Using your voice as an instrument in order to sing without lyrics
Syncopation	Off-beat rhythm
Improvisation	Making music up on the spot
Blues Scale	A particular scale (pattern) of notes used in Blues music
Blue Note	A flattened note on the 3rd or 7th of the scale
12 Bar Blues	The chord structure used in Blues music
Chord	Two or more notes played at the same time in one part
Walking Bass	A Bassline that moves at a moderate pace usually stepwise up or down the scale
Call and Response	A song style in which the leader sings a call and the rest of the group responds

Keyword	Definition
Work Song	A song that was sung by slaves in order to promote faster work
Spirituals	Songs sung by slaves with themes of yearning for freedom, to be lifted out of suffering and the belief that a higher power will help a person persevere in tough times.
Ostinato	A repeated pattern – usually a rhythm or bassline
Slave	Someone 'owned' by someone else: often forced to work against their will for little/no money
Swing Rhythm	The first bit of the beat is longer as it steals time from the second bit to give the music a swinging feel.

Blues 2

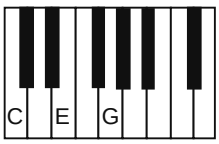
12 Bar Blues Chord Sequence in C

C	C	C	C
F	F	C	C
G	F	C	C

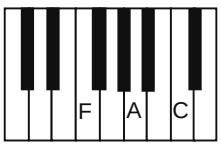
I	I	I	I
IV	IV	I	I
V	IV	I	I

I	Chord 1
IV	Chord 4
V	Chord 5

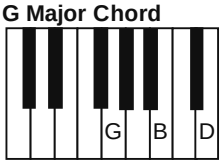
C Major Chord



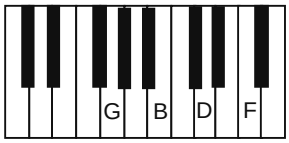
F Major Chord



G Major Chord



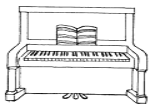
G7 Chord



Instruments in the Blues

Violin

Piano



Trumpet

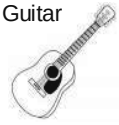
Double Bass

Saxophone

Banjo

Electric Guitar

Acoustic Guitar



Harmonica

Bass Guitar

The Classical Era: 1750-1810

Keyword	Definition
Concerto	Solo instrument plus an orchestra
Symphony	Played by a full orchestra
Sonata	Piece for solo instrument (either solo piano or solo instrument with piano accompaniment)
Cadence	Mark the end of a phrase
Perfect Cadence	The music sounds 'finished': Chord V – Chord I
Imperfect Cadence	The music doesn't sound quite 'finished': The phrase ends on chord V
Interrupted Cadence	The music sounds definitely not finished – like its been stopped midway – Ends on chord VI
Diatonic Harmony	Harmony (chords) that belong to the key
Chromatic Notes	Notes that do not belong to the Key

Keyword	Definition
Major	A more 'happy' sounding key
Minor	A more 'sad' sounding key
Phrase	Short section of music where the melody seems naturally to fall. Sometimes this is 4 bars, but shorter and longer phrases occur. Sometimes a phrase may be contained within one breath
Homophonic Texture	A type of texture: Where all the parts move in block chords
Homophonic Texture: Melody plus accompaniment	A type of texture: Where there is one melody with a simple accompaniment
Polyphonic Texture	A type of texture where there are lots of interweaving melodies

The Classical Era: 1750-1810

Family	Instruments
String Family	Violin, Viola, Cello, Double Bass, Harp
Woodwind Family	Flute, Oboe, Bassoon,
Percussion Family	Timpani, Triangle, Bass Drum, Snare Drum
Brass Family	Trumpet, Trombone, French Horn, Tuba
Conductor	The person in charge of the Orchestra – leading them from the front

Facts
Important Composers: **Beethoven, Mozart, Haydn**
Classical melodies have a **clear and simple structure** – often with **balanced phrases**
Balanced Phrases are where the music sounds like there is a question and then an answer
Classical **texture is often homophonic** – melody plus accompaniment
Tempo in classical music will rarely change – **one speed throughout**
Harmony in classical music is normally diatonic (this means there are not too many surprising notes and chords)

Programme Music: From the Romantic era 1810 - 1900

Keyword	Definition
Programme Music	Music that that is intended to evoke images or convey the impression of events
Motif	A recurring theme or idea
Pedal Note	A note that is held down or repeated over and over again
Cluster Chord	Several notes played together as a chord deliberately designed to make a "clashing" dissonant sound
Ascending Melody	Notes get higher in pitch
Descending Melody	Notes get lower in pitch
Conjunct Melody	Melody moves in step
Disjunct Melody	Melody jumps around – does not move in step
Major Tonality	The music sounds 'happy'

Keyword	Definition
Minor Tonality	The Music sounds 'sad'
Chromatic	Notes that are sharpened or flattened and do not belong to the key- often used for expressive purposes
Thick Texture	The music sounds 'big' and 'busy' – lots of instruments playing different things
Thin Texture	There is only one thing happening in the music - even if there are lots of instruments playing
Important Composers	Chopin, Saens Sans, Rachmaninov, Tchaikovsky

New instruments were added in this era

Glockenspiel (metal) Xylophone (wooden)

Clarinet

Piccolo

Popular Song

Keyword	Definition
Verse	A part of the song that tells the story and has different words but the same melody each time it is heard
Chorus	A part of the song that is repeated with the same words and melody each time it is heard
Middle 8	A section in the middle of the song that is usually 8 or 16 bars long and introduces a different melody. It can also be instrumental.
Introduction	A short section of music which opens the song and sets the tone and speed which are to follow
Outro	The section of the song that allows it to fade or end in style
Pre-Chorus/Bridge	A short section which connects the verse and the chorus
Hook	A short riff or passage near the beginning of the song designed to capture the ear of the listener

Keyword	Definition
Lyricist	The person responsible for writing the lyrics (words) to the song
Chord Sequence	The repeated chords that you find in a song – lots of songs use the same 4 chords over and over again
Loops	A pre recorded sample that can be repeated over and over again
Sample	A piece of pre-recorded sound used in a song
Cover	Taking an existing song and making it your own – doing it your way
Acapella	Singing with no accompaniment

Film Music

Keyword	Definition
Ostinato	A repeated pattern
Pedal note	A repeated note – normally in the bass – either repeated or held down
Leitmotif	Musical theme which is used to represent a specific character
Dissonant	Harmony that is not pleasing to the ear – notes clash " the harmony is dissonant"
Underscore	The music in a film that you do not always notice – it builds up the atmosphere.
Diegetic sound	Sound or Music that belongs in the scene: e.g. someone turns on a radio and you hear music.
Non-Diegetic sound	The music is in a scene and the characters can't hear it – it doesn't belong – you can't see it being played
Through Composed	A song structure that is composed from beginning to end without any particular repetition of sections
Cluster Chord	Several notes played together as a chord deliberately designed to make a "clashing" dissonant sound
Thick Texture	Lots of instruments playing lots of different things – very busy
Thin Texture	It doesn't matter how many instruments are playing – they are all playing the same thing
Monophonic Texture	Only one thing is being played – one sound
Polyphonic Texture	Lots of interweaving melodies
Ascending melody	The melody gets higher in pitch
Descending Melody	The melody gets lower in pitch

Musical Theatre

Keyword	Definition
Solo	One person singing a song by themselves (accompanied by the band/orchestra)
Duet	Two people singing a song (accompanied by the band or orchestra)
Chorus	A large group of the cast singing together
Recitative	Rhythmically free piece of singing that mirrors speech – normally not very melodic (on one or two notes) you wouldn't class it as a 'song' – it moved the musical on – normally in sung through musicals
32 Bar Song	A type of structure – AABA – each section is 8 bars long
Verse chorus structure	A type of structure a bit like a pop song with verses and choruses
Sung through	A type of musical where there is no spoken dialogue
Word Painting	When the music matches what the words are singing about
Syllabic	One Syllable per musical note
Key Composers	Rodgers and Hammerstein, Bernstein, Lin Manuel Miranda, Kander and Ebb, Andrew Lloyd Webber
Overture	Piece of music at the start of the musical – normally plays through the key melodies you will hear in the musical

20th Century Music and Minimalism

Keyword	Definition
Ostinato	A repeated pattern
Sample	A recording of music/sounds which is used in another piece of music
Loops	Music is made up of loops – repeated sections of music
Additive Melody	Notes are gradually added to the loop each time it is repeated.
Metamorphosis	Tiny changes are made to a note or one bit of the rhythm each time it is repeated
Phase Shifting	Two or more performers start with the same pattern. On each repeat of the loop one of the performers adds or takes away a rest or a note – this changes the length of their loop so they go out of sync with each other.
Polyrhythm	More than one rhythm at a time
Aleatoric Music	Music that happens by chance
Graphic Score	Shapes and images tell the performer what to play
Experimental Music	Composers explored how music could be made in different ways – e.g. new ways of playing instruments
Diatonic Harmony	Harmony that belongs to the key it doesn't sound strange!
Steve Reich	Composer – born in 1936 – influenced by Gamelan and African Music. Wrote 'Different Trains' – reaction to the Holocaust using samples of people talking about train journeys Wrote Clapping Music

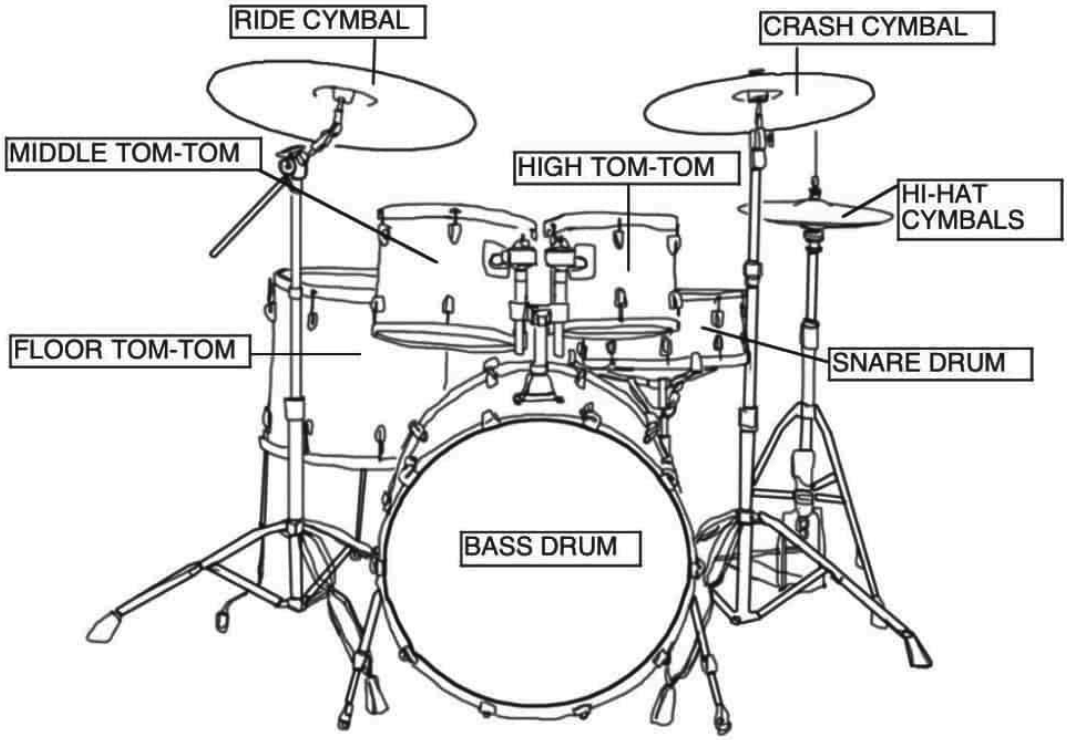
Musical Fusion: Reggae

Keyword	Definition
Mento	Jamaican folk music that emerged in the 1940s and 1950s. Characterised by the fusion of European and African traits, with origins in enslaved work songs – created with guitar, rumba box, bongo and banjo, Mento mixed this with satirical lyrics of everyday life and verse repetition, creating a foundation from which reggae would blossom.
Ska	Fast dance music that emerged in the 1950's fusing American R&B with Mento rhythms and featuring Electric Guitars, Jazzy Horn Sections and characteristic Offbeat Rhythms.
Rocksteady	A more vocal style of dance music which used riffs, simple harmonies, offbeat rhythms and a strong bass line.
Offbeat	Emphasising beats 2 and 4 rather than beats 1 and 3
Pentatonic scale	5 Note scale
Rastafarian	Type of religion that influenced Reggae. Lyrics of reggae songs are strongly influenced by Rastafarianism and are often political including themes such as love, brotherhood, peace, poverty, antiracism, optimism and freedom.
Slow Tempo	Slow speed – characteristic of reggae
Syncopated bass riff	Bass guitar plays a short section of music – which repeats throughout
Call and response	Similar to a "Question and Answer" often the call sung by the lead singer and answered by the backing singers or instruments (the response) – musical dialogue.
Key instruments	Lead singer, Backing singers, Electric Guitars, Drum kit, Bass guitar, Brass section (trumpets and trombones) Saxophones
Key performers	Bob Marley,

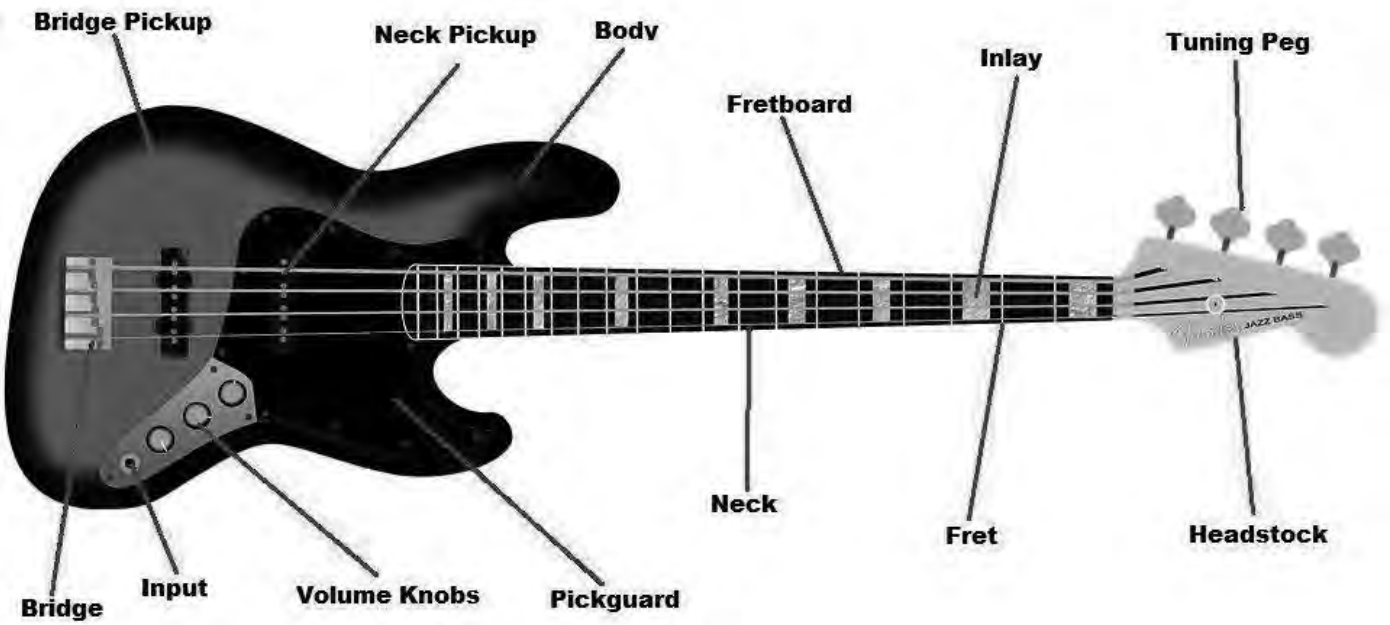
Popular Music

Keyword	Definition
Genre	The term we give to a particular style of music e.g., Rock 'n' Roll or Motown
Power Trio	A combination of three musicians – drums, electric bass and electric guitar. The guitarist will often be the singer too.
Sample	A piece of pre-recorded sound used in a song
Rock 'n' Roll	Up-tempo music that started in the 1950s (Elvis Presley, Buddy Holly, Chuck Berry) and spread mainly by radio and vinyl recordings
Motown	Upbeat, often pop-influenced style of rhythm and blues associated with black vocalist since 1959, characterised by compact danceable arrangements.
Rock	Electric guitar based music stemming from Rock 'n' Roll and The Blues. There are many sub genres.
Disco	A style of pop music intended for dancing to. Typically soul influenced and melodic, with a 4 to the floor drum beat and often a driving and intricate bass line
EDM	Popular music intended for dancing to in clubs typically having a 4 to the floor beat. All electronic.
Hip Hop and Rap	Hip-hop, cultural movement that attained widespread popularity in the 1980s and '90s; also, the backing music for rap, the musical style incorporating rhythmic and/or rhyming speech that became the movement's most lasting and influential art form.
Grunge	Grunge is an alternative rock genre and subculture that emerged during the mid-1980s. Grunge fuses elements of punk rock and heavy metal, but without punk's structure and speed. The genre featured the distorted electric guitar
Brit Pop	Britpop, movement of British rock bands in the 1990s that drew consciously on the tradition of melodic, guitar-based British pop music established by the Beatles.

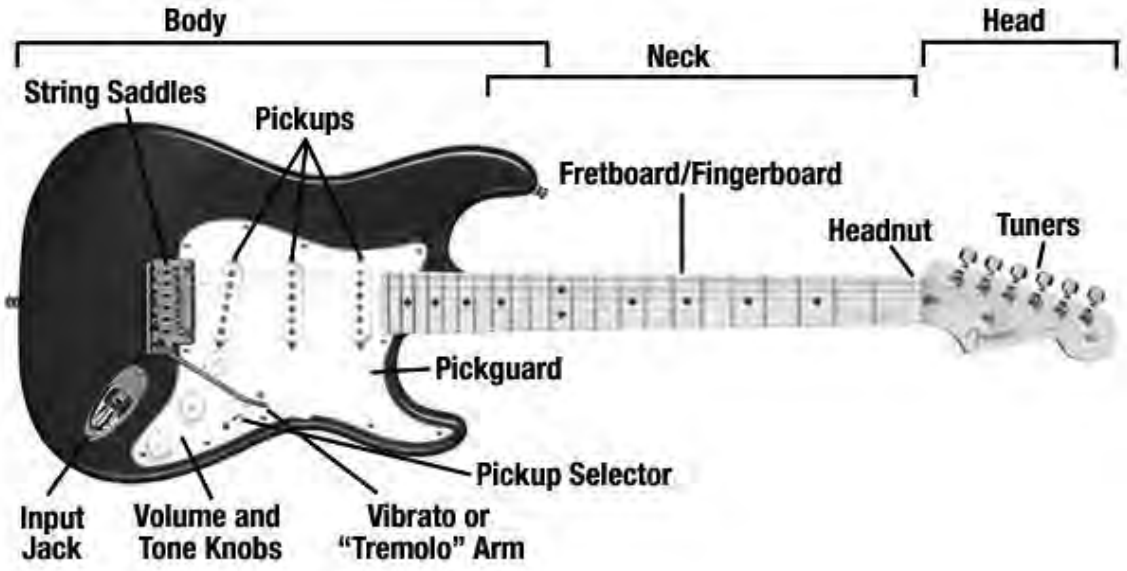
The Drum Kit



Bass Guitar



Electric Guitar



Physical Education

Year 9

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Year 7

Warm up – 4 Stages

1. Pulse Raiser	Raising the heart rate through running, jogging or swimming
2. Mobility	Moving your joint through a full range of movement (circling arms)
3. Dynamic stretching	Stretching whilst moving e.g. lunges, open the gate or close gate at hip joint
4. Skill Rehearsal	Practise a skill to be used in the activity e.g. passing a ball

Benefits of a warm up

Warm up muscles – makes them ready for exercise

Increase body temperature – helps with oxygen transfer

Increase heart rate – increases blood flow to deliver oxygen

Increase flexibility of muscles and joints – increases range of movement

Increase pliability of ligaments and tendons – increases movement

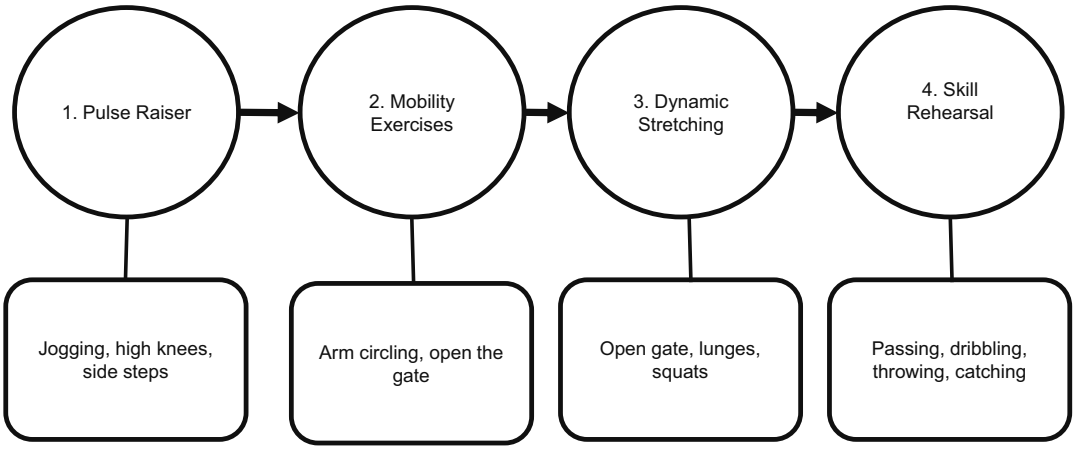
Increase blood flow and oxygen – to help supply working muscles with oxygen

Increase muscle speed contractions – help to improve performance

Year 7

Stages of the warm up with examples

The 4 stages of the warm up showing examples of what you might do at each stage.



Year 9

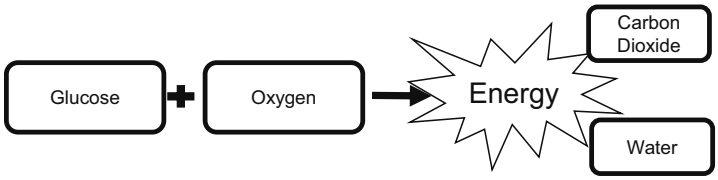
Components of fitness

Components of fitness	Definition/Explanation	Sporting examples
1. Strength	Muscles working against a resistance	A Rugby player holding position in a scrum, pushing back against the resistance.
2. Power	Performing any skill which requires strength at speed Speed x strength	A Sprinter exploding out of the blocks with speed and strength to get the best possible start to the race.
3. Agility	Ability to move and change direction quickly under control	The Rugby player changing direction by side stepping to avoid being tackled.
4. Balance	Ability to maintain an upright or stable position	The Gymnast holding the handstand in a stable position on the beam.
5. Flexibility	Ability to move joints through a range of movement	The Goalkeeper diving to stretch and save the ball in the corner of the goal.
6. Muscular Endurance	Ability to keep the muscles working repeatedly	The long distance runner who can keep their muscles working at a high intensity at the end of a race.
7. Cardiovascular Endurance	Ability of the heart, lungs and the blood vessels to get oxygen to the muscles	The Cyclist who can supply the oxygen needed to work at a high intensity for a long period of time.

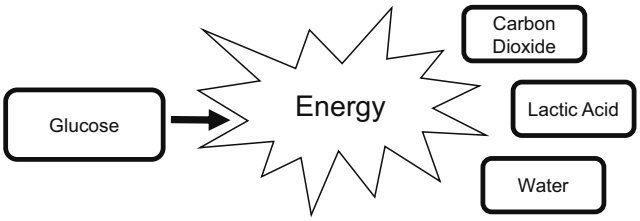
Year 9

Aerobic and Anaerobic

Aerobic	Using oxygen to perform exercise at a low steady rate For example working at low intensity jogging, cycling, swimming, rowing
Anaerobic	Performing physical activity without oxygen at a high intensity and usually for less than 60 seconds For example sprinting, lifting heavy weights
Maximum heart rate	Calculated by 220 - age For example a 14 year old would be 220-14 = 206bpm



Aerobic Training zone = 60%-80% of Maximum heart rate



Anaerobic Training zone = 80%-95% of Maximum heart rate

Year 9

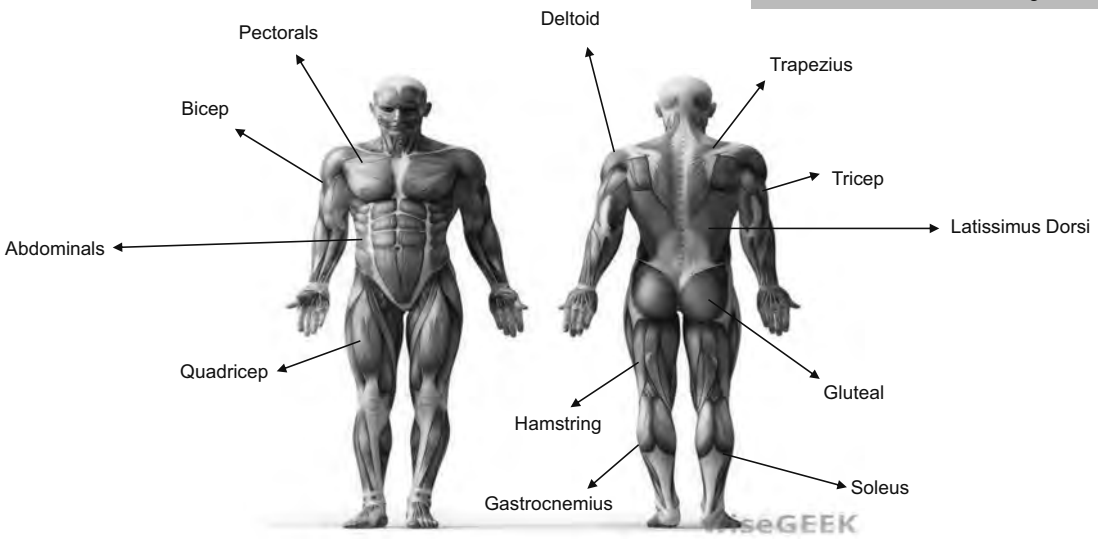
Training methods

Training Method	Explanation	How is used by the athlete.
1. Continuous training	Exercising the entire body for at least 20 mins could be jogging, swimming or cycling without taking a break.	Used by endurance based athletes wanting to improve their ability to work for longer.
2. Fartlek training	Running at different speeds over a set route e.g. run, sprint, jog , walk	Used by games players as this replicated the game conditions.
3. Interval training (Long or short)	Working for periods and resting for periods	Can be aerobic or anaerobic depending on long or short. Used by athletes wanting to improve their speed over short or long distances.
4. Plyometric training	Doing activities that involve repeated exercise that include bounding, jumping and hoping	Used by athletes wanting to improve Power – for example it is good for Basketball players to improve their jumping.
5. Circuit training	Doing set exercising at stations with periods of work and periods of rest. E.g. press ups, step ups, skipping	Can be set up to work on many different aspects of fitness so a very versatile method used by anyone.

Year 9

Antagonistic Pairs	Muscles work together to produce movement. Whilst one muscle contracts (agonist), the other muscle relaxes (antagonist) to allow the movement e.g Hamstring and Quadricep

Muscle location and antagonistic pairs



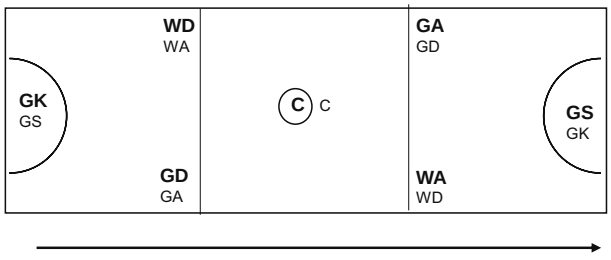
Year 9

Netball

Rules

1. The centre pass must be caught in the centre third
2. You cannot make physical contact with another player if you do a penalty pass is awarded
3. You have to be a metre away from the player when defending the ball
4. No part of your foot should be on or over the line when taking back line and side-line passes

Playing Positions



Year 9

Basketball

Rules

1. You can only dribble using one hand
2. You cannot dribble the ball pick it up and then dribble the ball again (double dribble)
3. You have 24 seconds to shoot before the ball is handed over to the opposition.
4. You have 8 seconds to get the ball over half-way
5. Cannot stand in the key for more 3 seconds

Key Terms

Three point line	Any shot scored from behind the three point line is awarded 3 points
Full court press	Marking the ball and all players high up court
Half court defence	Dropping off and marking in your own half
Screen	An offensive player stands still in front of a defender to create space for a team mate.

Year 9

Trampolining

Key Terms

Seat landing	Landing on your bum on the bed
Back landing	Landing on your back on the bed
Front landing	Landing on your front on the bed
Swivel Hips	Landing on your bum twisting your hips and landing on your bum again facing the opposite way

Front somersault	Rotating forwards performing a forward roll in the air and landing on your feet
Back somersault	Rotating backwards performing a backward roll in the air and landing on your feet
Cradle	A back landing rotate 180° and back land
Turn table	A front landing rotating 180° and front landing

Year 9

Dodgeball

Rules

1. You can hit someone below the neck
2. The ball must hit them without bouncing of the floor or wall
3. You can catch the ball to get the person who threw the ball out and bring in a team mate who was out
4. You can use a ball to block other balls being thrown at you
5. Winning team is the team who gets everyone out on the opposition

Key Terms

Dodge	Moving out the way of the ball to avoid being hit
Face shot	Being hit in the face so it does not count as an elimination (being out)
Block	Using a ball to block another ball being thrown at you to avoid being hit
Buddy up	Pairing up with a team mate to target a player on the other team

Year 9

Hockey

Rules

1. You cannot use the back of your stick (the rounded part)
2. A free pass can be taken to yourself or passed
3. A short corner is awarded for a foul inside the D
4. You must back away 5 yards from the ball when a free pass is taken
5. The ball cannot be played straight into the D from a free pass in the attacking 25 it must move 5 yards first

Key terms

Free Pass	Awarded when a foul has been committed in open play
Stick Tackle	A tackle made where the stick is hit before the ball
16 yard hit	A free hit taken level with top of the D and in line where it went off the back line – defending team ball
Long corner	When the ball is hit out by defender off the back line a long corner is awarded
Short corner	Awarded to attacking team if the defending team commit a foul in the D

Year 9

Football

Key Terms

Foul	When the rules are broken and the other team gain possession
Indirect freekick	You cannot shoot at goal, the ball must be touched by another player before it enters the goal
Drive pass/shot	The action of kicking the ball low so it travels along the ground towards a teammate or goal.
Cover and balance	When defending and a player moves forward on one side, the players shuffle across to that side to provide cover for the defender and balance to the defensive line

Rules

1. If the ball hits the referee and goes to the opposition team, a drop ball will take place.
2. If you accidently handball the ball and score, the goal will not count.
3. When an attacking team have a free kick, no attacking players are allowed within one yard of the wall
4. You cannot score a goal directly from a throw in
5. When taking a penalty you can pass the ball forward to a teammate to kick as long as your teammate was outside the penalty area when the penalty kicker first kicked the ball.

Year 9

Gaelic Football

Key Terms

Hook kicking	The act of kicking the ball across your body out of your hands.
Crouch lift	The skill used to regain possession of the ball from the ground by kicking it into your hands.
A free	A free is a free kick awarded for the opposition team breaking one of the rules
Man-to-man marking	The most common way to mark an opponent in Gaelic football, similar to netball where you stick with one player and mark them throughout the game.

Rules

1. You cannot bounce the ball twice in a row unless you have not caught the ball.

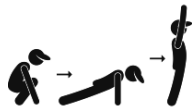
2. You must lift the ball from the ground using a crouch lift using your foot to move the ball into your hands.

3. You cannot charge someone in the front or back when they are attempting to catch the ball

4. If you have one foot on the ground you can shoulder-to-shoulder charge someone unless they are kicking the ball.

5. The goal posts are H shaped, you get one point for scoring above the cross bar and three points for scoring in the goal below.

Year 9



Fitness

Key Terms

Heart rate	How many times your heart beats per minute (BPM)
Working heart rate	Your heart rate when you are exercising or immediately fast exercise
Recovery heart rate	Your heart rate after you have stopped exercising usually taken every minute after exercise for 5 minutes
Speed	How fast you move a body part of yourself

Burpee	An exercise done by being in your hands and feet jumping in and out then jumping upward on your feet
Squat	Feet shoulders width apart and using you gluteal to lower you body down through bending your knees approx. chair height
Press up	Body weight on your hands and feet lying horizontal. Lifting your body weight up and down through bending you arms and keeping body flat

Year 9

Volleyball

Rules

1. Maximum of 3 hits per side
2. The same player cannot hit it twice in a row
3. You cannot hold, catch or throw the ball
4. Balls may be played off the net, apart from the serve
5. Serve must be played from behind the back line

Key Terms

Volley / Set	A shot played above the head using two hands
Dig	A shot played underarm to give the ball height
Serve	A shot played to start the game either underarm or overarm
Smash / spike	A shot played after a set to put the ball hard and fast over the net in a downwards motion

Year 9

Handball

Rules

1. You are only allowed to take 3 steps with the ball
2. You can only dribble the ball with one hand at a time
3. You can only block the ball not take it off an opponent.
4. When defending you must be square in front of the attacker
5. You can land in the area when you shoot as long as you release the ball outside of the shooting D

Key Terms

Court player	A player who plays on the court – does not include the goalkeeper
Free throw	A free pass where the defender must be 3 metres away from where the foul occurred
Penalty throw	A direct shot at goal 7 metres from the goal
Corner throw	When attackers throw the ball in from the corner of the pitch if the defending team have knocked the ball off the back line.

Year 9

Athletics

Key Terms

Sprint Start	You start sprint events e.g. 100m , 200m, 400m, and 4x100m relay in a crouched position
Foul Jump	When your foot is over the line when you take off in long jump, so the jump is not measured
Foul throw in Javelin	If any part of your body touches or goes over the line when you are throwing If the javelin does not land tip first The throw is not measured
Foul throw in shot putt	If you walk out of the front of the circle after throwing or if any part of your body comes out of the throwing circle during your throw
Foul in High Jump	If you take off two footed or knock the bar off whilst you are on the matt
Track events	100m, 200m, 400m 1500m, 800m, hurdles, steeple chase any event ran around the track
Field events	Shot putt, javelin, discus, high jump, long jump, pole vault, hammer throw. Any event that is not running around the track

Year 9

Rounders

Rules

1.The ball must be bowled above the knee and below the head and must not be wide or at the body

2.½ a rounder is scored if you hit the ball and make it to the second post

3.1 rounder is scored if you hit the ball and make it around all bases ensuring you touch fourth post as you pass it

4.If you hit the ball behind the battling line you have to wait at first post until the ball travels back over the line