Saint Benedict
Catholic Voluntary Academy

2026

BE PREPARED

Biology

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Catholic Multi Academy Trust

Welcome to Biology!

This work is designed to help you to bridge the gap between your GCSE Science studies and the AS/A Level Biology course.

Preparation is crucial for studying A Level Biology. After completing these exercises you will need to highlight any areas that you really had trouble understanding. We are expecting you to put 100% effort into these tasks to show your commitment to studying biology.
All of these are essential in the understanding of the foundations of biology.

We want you to be successful at A-level Biology and some students find the change from GCSE quite a challenge. Although you have fewer subjects, there are different skills post-16 and the volume of work is greater due to the increased demand of depth and detail.
This work should help you to gauge your current understanding of the subject and introduce you to the depth of understanding that is required for study at post-16.

Is this work assessed?

You will be asked to bring your bridging work to your interview for sixth form, and to your first biology lesson. Please keep all the work you complete in a folder until then. Once this has been checked you will be given a mark scheme to mark your work. You can then assess areas you must focus your revision on.

Biology A-level

We study **OCR Biology A Level** and your Year 12 Biology Qualification will cover the following 4 units:

1- Practical skills – studied within topics and as part of the PAG's (Practical assessed tasks)
2- Foundations of Biology
3 -Exchange and Transport
4- Biodiversity, Evolution and Disease.

If you would like to find out more about the course content, you can find the specification on the OCR website: OCR A Level Biology A (H420) Specification

Studying biology (or, in fact any subject) at A-level will require you to be highly organised and effective with your own independent work. Not only will you have to balance the workload of this subject and the other subjects you have chosen, you will also be required to commit to the subject and do the very best that you can.

If you feel you want or need to do more preparation…

You could try '**Head Start**' to A-Level Biology. It is available from Amazon and other places at £4.95
https://www.amazon.co.uk/Head-Start-level-Biology-Level/dp/1782942793

It recaps all the tricky topics from GCSE that AS builds on. It is ideal preparation for September no matter what GCSE option you have followed. It will also be useful for reference throughout the course.

Please don't think you have to buy this book. To support your learning, you will be provided with a textbook for the current AS/A-Level course, this will be in exchange for a deposit, which will be returned once you give your book back in good condition. Your teachers are, of course, an excellent source of support, both in and out of lessons.

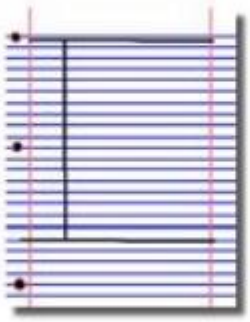
You could also try the Seneca Learning Course "Biology: OCR A Level Preparation – Summer 2020"

https://app.senecalearning.com/classroom/course/76917ca0-ac10- 43c9-8742-e49b861417b2

Research Tasks – Independent study.

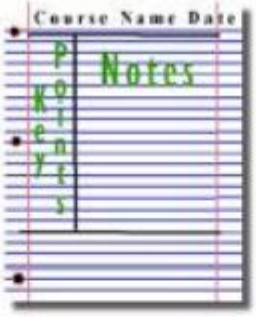
Research, reading and note making are essential skills for A level Biology study. For the following task you are going to produce 'Cornell Notes' to summarise your reading.

1. Divide your page into three sections like this

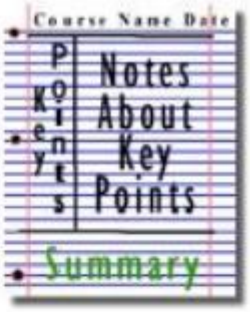


2. Write the name, date and topic at the top of the page

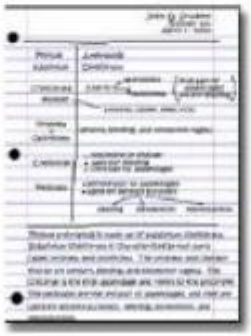
3. Use the large box to make notes. Leave a space between separate idea. Abbreviate where possible.



4. Review and identify the key points in the left hand box

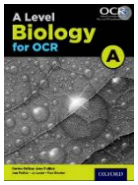


5. Write a summary of the main ideas in the bottom space



What resources do I need?

Textbook Oxford University Press (including Nelson Thornes) The book covers the 1st year of the course and then there is another version for year 2. This will be provided for you.



EACH LESSON IT IS EXPECTED THAT YOU BRING THE FOLLOWING:

- A4 ring binder – one of your choice to bring to lessons.
- Dividers to go in the ring binder.
- Lever arch folder to keep all your biology notes in once topics are finished.
- A4 lined paper.
- Calculator.
- Ruler, pens, pencils.

This booklet contains information on the first lessons you will have in Yr 12 Biology.
You must complete ALL the tasks in the booklet.

Pre-Knowledge task 1

A level Biology will use your knowledge from GCSE and build on this to help you understand new and more demanding ideas. Recap the content for each of the topics using the information in the boxes and the links to videos and websites to make sure your knowledge is up to date and you are ready to start studying. Answer the relevant questions linking to each topic.

DNA and the Genetic Code

In living organisms nucleic acids (DNA and RNA have important roles and functions related to their properties. The sequence of bases in the DNA molecule determines the structure of proteins, including enzymes.

The double helix and its four bases store the information that is passed from generation to generation. The sequence of the base pairs adenine, thymine, cytosine and guanine tell ribosomes in the cytoplasm how to construct amino acids into polypeptides and produce every characteristic we see. DNA can mutate leading to diseases including cancer and sometimes anomalies in the genetic code are passed from parents to babies in disease such as cystic fibrosis, or can be developed in unborn foetuses such as Downs Syndrome.

Read the information on these websites (you could make more Cornell notes if you wish):

http://www.bbc.co.uk/education/guides/z36mmp3/revision

http://www.s-cool.co.uk/a-level/biology/dna-and-genetic-code And take a look at these videos:

http://ed.ted.com/lessons/the-twisting-tale-of-dna-judith-hauck http://ed.ted.com/lessons/where-do-genes-come-from-carl-zimmer **Task:**

Define gene, chromosome, DNA and base pair

Biodiversity

The variety of life, both past and present, is extensive, but the biochemical basis of life is similar for all living things. Biodiversity refers to the variety and complexity of life and may be considered at different levels. Biodiversity can be measured, for example within a habitat or at the genetic level. Classification is a means of organising the variety of life based on relationships between organisms and is built around the concept of species. Originally classification systems were based on observable features but more recent approaches draw on a wider range of evidence to clarify relationships between organisms. Adaptations of organisms to their environments can be behavioural, physiological and anatomical.

Adaptation and selection are major factors in evolution and make a significant contribution to the diversity of living organisms.

Read the information on these websites (you could make more Cornell notes if you wish): http://www.s-cool.co.uk/a-level/biology/ecological-concepts http://www.s-cool.co.uk/a-level/biology/classification And take a look at these videos:
http://ed.ted.com/lessons/why-is-biodiversity-so-important-kim-preshoff
http://ed.ted.com/lessons/can-wildlife-adapt-to-climate-change-erin-eastwood **Task:**

Define what is meant by species and classification

Cells

The cell is a unifying concept in biology, you will come across it many times during your two years of A level study. Prokaryotic and eukaryotic cells can be distinguished on the basis of their structure and ultrastructure. In complex multicellular organisms cells are organised into tissues, tissues into organs and organs into systems. During the cell cycle genetic information is copied and passed to daughter cells. Daughter cells formed during mitosis have identical copies of genes while cells formed during meiosis are not genetically identical

Read the information on these websites (you could make more Cornell notes if you wish): http://www.s-cool.co.uk/a-level/biology/cells-and-organelles http://www.bbc.co.uk/education/guides/zvjycdm/revision

And take a look at these videos:
https://www.youtube.com/watch?v=gcTuQpuJyD8 https://www.youtube.com/watch?v=L0k-enzoeOM
https://www.youtube.com/watch?v=qCLmR9-

Biological Molecules

Biological molecules are often polymers and are based on a small number of chemical elements. In living organisms carbohydrates, proteins, lipids, inorganic ions and water all have important roles and functions related to their properties. DNA determines the structure of proteins, including enzymes. Enzymes catalyse the reactions that determine structures and functions from cellular to whole-organism level. Enzymes are proteins with a mechanism of action and other properties determined by their tertiary structure. ATP provides the immediate source of energy for biological processes.

Read the information on these websites (you could make more Cornell notes if you wish): http://www.s-cool.co.uk/a-level/biology/biological-molecules-and-enzymes http://www.bbc.co.uk/education/guides/zb739j6/revision

And take a look at these videos:
https://www.youtube.com/watch?v=H8WJ2KENlK0
http://ed.ted.com/lessons/activation-energy-kickstarting-chemical-reactions-vance-kite

Task:

Scientific and Investigative Skills

As part of your A level you will complete a practical assessment. This will require you to carry out a series of practical activities as well as planning how to do them, analysing the results and evaluating the methods. This will require you to: use appropriate apparatus to record a range of quantitative measurements (to include mass, time, volume, temperature, length and pH); use appropriate instrumentation to record quantitative measurements, such as a colorimeter or photometer; use laboratory glassware apparatus for a variety of experimental techniques, including serial dilutions; use of light microscopes at high power and low power, including use of a graticule; produce scientific drawing from observation with annotations; use qualitative reagents to identify biological molecules; separate biological compounds using thin layer/paper chromatography or electrophoresis; safely and ethically use organisms; use microbiological aseptic techniques, including the use of agar plates and broth; safely use instruments for dissection of an animal organ, or plant organ; and use sampling techniques in fieldwork.

Task:

Produce a glossary for the following key words:

accuracy, precision, anomaly, calibration, control group, control variable, dependent variable, independent

Maths Skills Task 2

1.1 Units and prefixes

A key criterion for success in biological maths lies in the use of correct units and the management of numbers. The units scientists use are from the *Système Internationale* – the SI units. In biology, the most commonly used SI base units are metre (m), kilogram (kg), second (s), and mole (mol). Biologists also use SI derived units, such as square metre (m^2), cubic metre (m^3), degree Celsius (°C), and litre (l).

To accommodate the huge range of dimensions in our measurements they may be further modified using appropriate prefixes. For example, one thousandth of a second is a millisecond (ms). Some of these prefixes are illustrated in the table below.

Multiplication factor	Prefix	Symbol
10^9	giga	G
10^6	mega	M
10^3	kilo	k
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n

Practice questions

1 A burger contains 4 500 000 J of energy. Write this in:
a kilojoules b megajoules.

2 HIV is a virus with a diameter of between 9.0×10^{-8} m and 1.20×10^{-7} m.
Write this range in nanometres.

1.3 Converting units

When doing calculations, it is important to express your answer using sensible numbers. For example, an answer of 6230 µm would have been more meaningful expressed as 6.2 mm.

If you convert between units and round numbers properly, it allows quoted measurements to be understood within the scale of the observations.

To convert 488 889 m into km:

A kilo is 10^3 so you need to divide by this number, or move the decimal point three places to the left.

488 889 ÷ 10^3 = 488.889 km

However, suppose you are converting from mm to km: you need to go from 10^3 to 10^{-3}, or move the decimal point six places to the left.

333 mm is 0.000 333 km

Alternatively, if you want to convert from 333 mm to nm, you would have to go from 10^{-9} to 10^{-3}, or move the decimal point six places to the right.

333 mm is 333 000 000 nm

Practice questions

5 Calculate the following conversions:

a 0.004 m into mm **b** 130 000 ms into s

c 31.3 ml into µl **d** 104 ng into mg

6 Give the following values in a different unit so they make more sense to the reader. Choose the final units yourself. (Hint: make the final number as close in magnitude to zero as you can. For example, you would convert 1000 m into 1 km.)

a 0.000 057 m **b** 8 600 000 µl **c** 68 000 ms **d** 0.009 cm

2.2 Standard form

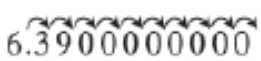
Sometimes biologists need to work with numbers that are very small, such as dimensions of organelles, or very large, such as populations of bacteria. In such cases, the use of scientific notation or standard form is very useful, because it allows the numbers to be written easily.

Standard form is expressing numbers in powers of ten, for example, 1.5×10^7 microorganisms.

Look at this worked example. The number of cells in the human body is approximately 37 200 000 000 000. To write this in standard form, follow these steps:

Step 1: Write down the smallest number between 1 and 10 that can be derived from the number to be converted. In this case it would be 3.72

Step 2: Write the number of times the decimal place will have to shift to expand this to the original number as powers of ten. On paper this can be done by hopping the decimal over each number like this:



until the end of the number is reached.

In this example that requires 13 shifts, so the standard form should be written as 3.72×10^{13}.

For very small numbers the same rules apply, except that the decimal point has to hop backwards. For example, 0.000 000 45 would be written as 4.5×10^{-7}.

Practice questions

3 Change the following values to standard form.

a 3060 kJ **b** 140 000 kg **c** 0.000 18 m **d** 0.000 004 m

4 Give the following numbers in standard form.

a 100 **b** 10 000 **c** 0.01 **d** 21 000 000

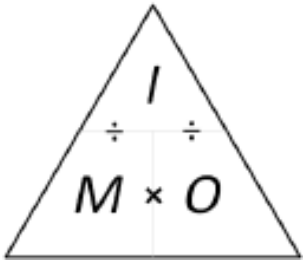
5 Give the following as decimals.

a 10^6 b 4.7×10^9 c 1.2×10^{12} d 7.96×10^{-4}

3.2 Rearranging formulae

Sometimes you will need to rearrange an equation to calculate the answer to a question. For example, the relationship between magnification, image size, and actual size of specimens in micrographs usually uses the equation $M = \frac{I}{O}$, where M is magnification, I is size of the image, and O = actual size of the object.

You can use the algebra you have learnt in Maths to rearrange equations, or you can use a triangle like the one shown.



Cover the quantity you want to find. This leaves you with either a fraction or a multiplication:

$M = I \div O$ $O = I \div M$ $I = M \times O$

Practice questions

6 A fat cell is 0.1 mm in diameter. Calculate the size of the diameter seen through a microscope with a magnification of ×50.

7 A Petri dish shows a circular colony of bacteria with a cross-sectional area of 5.3 cm^2. Calculate the radius of this area.

8 In a photograph, a red blood cell is 14.5 mm in diameter. The magnification stated on the image is ×2000. Calculate the real diameter of the red blood cell.

9 Rearrange the equation $34 = 2a/135 \times 100$ and find the value of a.

10 The cardiac output of a patient was found to be 2.5 $dm^3\,min^{-1}$ and their heart rate was 77 bpm. Calculate the stroke volume of the patient.

Use the equation: cardiac output = stroke volume × heart rate.

11 In a food chain, efficiency = $\frac{\text{biomass transferred}}{\text{biomass taken in}} \times 100$

A farmer fed 25 kg of grain to his chicken. The chicken gained weight with an efficiency of 0.84. Calculate the weight gained by the chicken.

5.1 Calculating percentages as proportions

To work out a percentage, you must identify or calculate the total number using the equation:

$$\text{percentage} = \frac{\text{number you want as a percentage of total number}}{\text{total number}} \times 100\%$$

For example, in a population, the number of people who have brown hair was counted.

The results showed that in the total population of 4600 people, 1800 people had brown hair.

The percentage of people with brown hair is found by calculating:

$$\frac{\text{number of people with brown hair}}{\text{total number of people}} \times 100$$

$$= \frac{1800}{4600} \times 100 = 39.1\%$$

Practice questions

1 The table below shows some data about energy absorbed by a tree in a year and how some of it is transferred.

Energy absorbed by the tree in a year	3 600 000 kJ/m^2
Energy transferred to primary consumers	2240 kJ/m^2
Energy transferred to secondary consumers	480 kJ/m^2

Calculate the percentage of energy absorbed by the tree that is transferred to

a primary consumers **b** secondary consumers.

2 One in 17 people in the UK has diabetes.

Calculate the percentage of the UK population that have diabetes.

5.2 Calculating the percentage change

When you work out an increase or a decrease as a percentage change, you must identify, or calculate, the total original amount:

$$\% \text{ increase} = \frac{\text{increase}}{\text{original amount}} \times 100$$

$$\% \text{ decrease} = \frac{\text{decrease}}{\text{original amount}} \times 100$$

Remember: When you calculate a percentage change, use the total *before* the increase or decrease, not the final total.

Practice questions

3 Convert the following mass changes as percentage changes.

Sucrose conc. / mol dm^{-3}	Initial mass / g	Final mass / g	Mass change / g	Percentage change in mass
0.9	1.79	1.06		
0.7	1.86	1.30		
0.5	1.95	1.70		
0.3	1.63	1.76		
0.1	1.82	2.55		