

A Level Biology Transition Booklet



This pack contains information about A Level Biology and a programme of activities and resources to prepare you to start an A Level in Biology in September. Please use this during the summer term and the summer holidays to prepare for your A Level course.



Please note the compulsory summer work which starts on page 3

About the course: The specification we teach is produced by AQA. The unit code is 7401 (A level Biology) and a full copy of this specification and other useful information is available at:

<https://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402/specification-at-a-glance>

In year 12 you will study:

1. Biological Molecules
2. Cells
3. How organisms exchange substances with their environment
4. Genetic information and variation

In year 13 you will study:

5. Energy transfers in and between organisms
6. Organisms respond to changes in the internal and external environments
7. Genetics, populations, evolution and ecosystems
8. The control of gene expression

These topics will be taught through a variety of theoretical and practical lessons, and your progress will be assessed at regular intervals, providing you with feedback on your current level of attainment and how to improve your grade.

Practical work

Practical work will be carried out throughout the year. You will be required to keep a lab book, and this will form part of the evidence for the Practical assessment.

You will be awarded a pass or fail for your practical work, which will appear as a separate grade when you receive your A-level results.

15% of the questions on the final written exam papers will also be about practical work!

There are six required practicals in year 12 and 6 in year 13. However, you will complete far more than this.

Maths also makes up approximately 10% of marks in the final exams. Some tasks involving key maths skills form part of this transition pack.

Examination:

All assessments are at the end of Year 13 (Upper Sixth):

Paper 1 – 2 hours, 91 marks, 35% of A-Level, covering topics 1-4 including relevant practical skills.

Paper 2 – 2 hours, 91 marks, 35% of A-Level, covering topics 5-8 including relevant practical skills.

Paper 3 – 2 hours, 78 marks, 30% of A-Level, covering topics 1-8 including relevant practical skills.

Compulsory Summer Work

1) 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 bases 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 during gamete formation such as Downs Syndrome.

Read the information on these websites:

<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:

Produce a wall display to put up in your classroom in September. You might make a poster or do this using PowerPoint or similar. Your display should use images, keywords and simple explanations to:

- **Define** gene, chromosome, DNA and base pair
- **Describe** the structure and function of DNA and RNA
- **Explain** how DNA is copied in the body
- **Outline** some of the problems that occur with DNA replication and what the consequences of this might be

2) Evolution

Transfer of genetic information from one generation to the next can ensure continuity of species or can lead to variation within a species and possible formation of new species.

Reproductive isolation can lead to accumulation of different genetic information in populations potentially leading to formation of new species (speciation).

Sequencing projects have read the genomes of organisms ranging from microbes and plants to humans. This allows the sequences of the proteins that derive from the genetic code to be predicted. Gene technologies allow study and alteration of gene function in order to better understand organism function and to design new industrial and medical processes.

Read the information on these websites:

<http://www.bbc.co.uk/education/guides/z237hyc/revision/4>

<http://www.s-cool.co.uk/a-level/biology/evolution>

And take a look at these videos:

<http://ed.ted.com/lessons/how-to-sequence-the-human-genome-mark-j-kiel>

<http://ed.ted.com/lessons/the-race-to-sequence-the-human-genome-tien-nguyen>

Task:

Produce a one page revision guide for an AS Biology student that recaps the key words and concepts in this topic.

Your revision guide should:

- Describe speciation.
- Explain what a genome is.
- Give examples of how this information has already been used to develop new treatments and technologies.

3) 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:

<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-YY7o>

Task:

Produce a one page revision guide to share with your class in September summarising one of the following topics:

Cells and Cell Ultrastructure, Prokaryotes and Eukaryotes, or Mitosis and Meiosis.

Whichever topic you choose, your revision guide should include:

- Key words and definitions.
- Clearly labelled diagrams.
- Short explanations of key ideas or processes.

4) 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 to include serial dilutions, use of light microscope 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, use sampling techniques in fieldwork.

Task:

Produce a glossary for the following key words:

accuracy, anomaly, calibration, causal link, chance, control experiment, control group, control variable, correlation, dependent variable, errors, evidence, hypothesis, independent variable, null hypothesis, precision, probability, random distribution, random error, raw data, reliability, systematic error, true value, validity, zero error

5) Mathematical Skills

Like it or loathe it maths forms a significant part of your A level. This will require you to use a scientific calculator, convert units, calculate magnification using scale bars, apply formulas to statistical data, extrapolate information from graphs, and perform calculations on graph and tabulated data.

Task:

Produce a reference table for the following formula:

Surface area, volume, intercepts, rate, standard deviation, magnification

Produce a glossary for the following key words: Standard units, significant figures, standard form, ratios, mean, mode, median, correlation, gradients

Suggested Reading List

Below are the links to the Biology A-level textbooks. We will direct you in the taster lesson as to which are best to buy.

Publisher	Link
Oxford University Press	AQA A-level Biology Website link AQA A-level Biology Year 1 and AS Website link AQA A-level Biology Year 2 Website link
Hodder	AQA A-level Biology 1 Website link AQA A-level Biology 2 Website link
Collins	AQA A-level Biology Year 1 and AS Student Book Website link AQA A-level Biology Year 2 Student Book Website link
Revision guide	AQA Year 1 & 2 Complete Revision & Practice (CGP) Website link AQA A Level Biology Revision Guide (Oxford University Press) Website link

Journals and magazines are a good way of keeping up to date. You can subscribe for a year or buy individual editions. We recommend:

- The Big Picture Magazine <https://www.stem.org.uk/big-picture/resource-collection> free online.
- BioNet subscription at £5 per year. Members receive the recommended “The Biologist Magazine.” [BioNet \(rsb.org.uk\)](http://rsb.org.uk)
- Follow the science section of a news website e.g.
[Science & Environment - BBC News](#)
[Biology | Science | The Guardian](#)



There are many relevant films and documentaries, here are a small selection:

- Gorillas in the mist, 1988
- Lorenzos oil, 1992
- Inherit the wind, 1960
- Blue Planet, 2009
- Life, 2009
- Bigger, stronger, faster, 2008
- Before the flood, 2016
- The ivory game, 2016
- The Human element, 2019
- Artifishal, 2017
- Chasing Coral, 2017
- David Attenborough: A life on our planet, 2020
- My octopus teacher, 2020

TED talks:

If you have 30 minutes to spare, here are some great presentations (and free!) from world leading scientists and researchers on a variety of topics. They provide some interesting answers and ask some thought-provoking questions.

www.ted.com/topics/biology

Books

- The Incredible Unlikelihood of Being; Alice Roberts. (This combines embryology, genetics, anatomy, evolution and zoology to tell the incredible story of the human body)
- Genome; Matt Ridley (23 human chromosomes in 23 chapters.)
- The Immortal Life of Henrietta Lacks; Rebecca Skloot.
- Junk DNA; Nessa Carey.
- The Single Helix; Steve Jones
- The 'X' in sex; David Bainbridge
- A Short History of Nearly Everything; Bill Bryson.
- River out of Eden: A Darwinian view of life; Richard Dawkins
- In the Shadow of Man; Jane Goodall (Her research into Chimpanzee behaviour)
- The Private life of the Brain; Sue Greenfield
- Y: The Descent of men; Professor Steve Jones
- Gaia: A new look at life on Earth; James Lovelock.
- The seven daughters of Eve; Brian Sykes. (About mitochondrial DNA and human evolution).



- The Double Helix; James Watson (his own story of the discovery of the structure of DNA)
- Dr Tatiana's Sex Advice to All Creation; Olivia Judson. (The definitive guide to the evolutionary biology of sex).
- Elephants on Acid and other Bizzare Experiments; Alex Boese
- Does Anything Eat Wasps? New Scientist.
- The Origin of Species; Charles Darwin. (Not the most riveting read but an important book).
- The Mould in Dr Floreys coat - discovery and development of penicillin into the first really effective antibiotic.
- Inferior - The true power of women and the science that shows it.
- A life decoded; Craig Venter. (He played a key role in one of the greatest scientific achievements of our time – the deciphering of the human genetic code).

Possible summer activities and trips

Remember there are also lots of zoos, wildlife and safari parks across the country, here are some you may not have heard of or considered: Twycross Zoo, Cotswold Wildlife Park, Banham Zoo (Norfolk), Tropical Birdland (Leicestershire), Peak Wildlife Park, International Centre for Birds of Prey (York), Beale Park (Reading), Woburn Safari Park, ZSL Whipsnade Zoo.

There are also hundreds of nature reserves (some of which are free) located all over the country including: RSPB sites and Wildlife Trust Reserves.

Many organisations also have opportunities for people to volunteer over the summer months, this might include working in a shop/café/visitor centre, helping with site maintenance or taking part in biological surveys. Not only is this great experience, it looks great on a job or UCAS application.

Expectations and Workload

We are delighted you have chosen to study Biology. You can expect well-planned and resourced lessons delivered by teachers who genuinely want to see you achieve your potential. In return we expect you to arrive promptly and properly equipped to all lessons. You will also be expected to use your private study time in an organised and effective way to supplement and reinforce what you have learnt in class. **Simply turning up to most of the lessons will not be enough to secure your target grade.** The work you do outside of your lessons will have a very significant impact on your results. Above all else, we expect you to display *enthusiasm* and *passion* for Biology.