Year 11 - 12 Bridging the Gap

GCSE → A Level

A Level Biology

Course Breakdown

OCR Biology A

Content Overview	Assessment Overview	
Content is split into six teaching modules: • Module 1 – Development of practical skills in biology • Module 2 – Foundations in biology • Module 3 – Exchange and transport • Module 4 – Biodiversity, evolution and disease • Module 5 – Communication, homeostasis and energy • Module 6 – Genetics, evolution and ecosystems Component 01 assesses content from modules 1, 2, 3 and 5. Component 02 assesses content from modules 1, 2, 4 and 6. Component 03 assesses content from all modules (1 to 6).	Biological processes (01) 100 marks 2 hour 15 minutes written paper	**37%** of total A level
	Biological diversity (02) 100 marks 2 hour 15 minutes written paper	**37%** of total A level
	Unified biology (03) 70 marks 1 hour 30 minutes written paper	**26%** of total A level
	Practical Endorsement in biology (04) (non exam assessment)	**Reported separately** (see section 5f)

Year 1

Module 1: Development of practical skills in biology

Module 2: Foundations in biology

Module 3: Exchange and transport

Module 4: Biodiversity, evolution and disease

Year 2

Module 1: Development of practical skills in biology

Module 5: Communication, homeostasis and energy

Module 6: Genetics, evolution and ecosystems

Recommended Reading

USEFUL RESOURCES

1. The **OCR website** is a great place to start finding out more about the course. It is aimed at teachers but includes lots of useful documents which will support you in your studies:
   - The specification – this explains exactly what you need to learn for your exams.
   - Practice exam papers
   - Lists of command words and subject specific vocabulary – so you understand the words to use in exams.
   - Practical handbooks explain the practical work you need to know.
   - Past papers and mark schemes from the old specifications. Some questions will not be relevant to the new AS and A-level, so please check with your teacher.
   - Maths skills support.
2. **Royal Society of Biology** "A single unified voice for biology". They work with everyone from government policy makers to students, as well as universities and researchers studying biology. Their website includes a dedicated student section. Have a look at **rsb.org.uk**
3. **The student room.** Join the A-level Biology forums and share thoughts and ideas with other. Visit thestudentroom.co.uk.
4. **Textbooks** will be provided to you at the start of the course.
5. **Revision guides** A-Level Biology: OCR A Year 1 & 2 Complete Revision & Practice with Online Edition | CGP Books. These are great if you want a quick overview of the course when you are revising for your exams. Remember to use other tools as well, as these are not detailed enough on their own.
6. **Magazines Focus.** New Scientist or Philip Allan updates can help you put the biology you are learning in context. **The magazine Biological Sciences Review is specially written for A-Level Biology students. Big picture is a magazine written for post 16 Biology students.**
7. **Physics and Maths Tutor.** Website with revision materials and exam questions separated into the modules of the course. https://www.physicsandmathstutor.com/

BOOKS (Optional)

1. *'Bad Science'*, Ben Goldacre. Looking objectively at popular science reporting.
2. If you are interested in Evolution: 'The Red Queen: Sex and the Evolution of Human Nature by Matt Ridley or Richard Dawkins 'The Selfish Gene'.'
3. If you are studying history and biology: 'The Immortal Life of Henrietta Lacks by Rebecca Skloot'.
4. 'Life Ascending: The Ten Greatest Inventions of Evolution by Nick Lane'.
5. Fascinating subject going beyond DNA, and one of my past research interests. 'The Epigenetics Revolution' by Nessa Carey.
6. *'The Incredible Unlikeliness of Being'*, Alice Roberts. Alice Roberts combines embryology, genetics, anatomy, evolution and zoology to tell the incredible story of the human body.

Channels

Science Podcasts | Science | AAAS (sciencemag.org)

https://www.ted.com/topics/biology

https://www.youtube.com/user/AmoebaSisters

https://www.youtube.com/user/khanacademy

https://www.youtube.com/user/crashcourse

https://www.youtube.com/user/MoofUniversity

https://www.youtube.com/user/TheFunsuman/featured

https://www.youtube.com/user/ibioseminars/videos

https://www.youtube.com/channel/UCEBb1b_L6zDS3xTUrIALZOw

TASK 1 – Maths for Biologists

Prefixes are used to modify units. Prefixes that are commonly used are listed below - you are most likely to be asked to convert between the ones highlighted:

Prefix	Symbol	Multiplier	Example
mega	M	$x10^{6}$ (or x 1,000,000)	Mb (megabyte)
kilo	K	$x10^{3}$ (or x 1,000)	kJ (kiloJoule)
no prefix	-	$x10^{0}$ (or x 1)	N (Newton)
deci	d	$x10^{-1}$ (or x 0.1)	dm^3 (cubic decimetre *or litre*)
centi	c	$x10^{-2}$ (or x 0.01)	cm (centimetre)
milli	m	$x10^{-3}$ (or x 0.001)	mg (milligram)
micro	µ	$x10^{-6}$ (or x 0.000001)	µm (micrometre)
nano	n	$x\ 10^{-9}$ (or x 0.000000001)	nm (nanometre)
pico	p	$x10^{-12}$ (or x 0.000000000001)	pg (picogram)

1. Which SI unit and prefix would you use for the following quantities?
    a. The time between heart beats
    b. The length of a leaf
    c. The distance that a migratory bird travelled each year
    d. The width of a cheek cell
    e. The mass of a rabbit
    f. The mass of iron in the body
    g. The volume of the trunk of a large tree

Standard Form

Numbers with many zeros can be difficult to follow, so we express these in standard form – it acts as a kind of numerical abbreviation.

Example:

The herpes virus has 156,000 bases in its DNA. So how do we express the number 156,000 in standard form?

- Find the decimal point: 156,000.0
- Move the decimal point to give a number between 1 and 10: 1.56000
- Multiply the number by 10 raised to the power *x*
- *x* is the number of jumps that you made to the left
- Answer = 1.56×10^5

Sometimes the decimal point may move the other way.

Standard Form Questions

Write down the following measures in standard form:

(a) 750 g (b) 500 ml (c) 0.275 J (d) 0.0095 N (e) 10,000 KJ (f) 0.0033 mm

Percentage Change

Method

$$\% \text{ change} = \frac{\text{final value - original value}}{\text{original value}} \times 100$$

Percentage Change Questions:

2) A piece of potato, weighing 3g increases in mass to 7g when placed in a sucrose solution. What is its percentage change?

3) Another piece of potato increases from 4g to 5g - what is its percentage increase?

4) Another piece of potato loses mass as it changes from 6 g to 5.5g, what is its percentage change?

Scaling

$$\text{Magnification} = \frac{\text{Image size}}{\text{Actual size}}$$

To convert mm to µm x1000 µm to mm divide by 1000

Microscope Questions:

5) An image with a magnification of x50 shows an ant's head to be 40mm long. Calculate the actual length in µm.

6) A photograph shows the width of a human egg to be 700mm. Its actual size is 0.1 mm. What is the magnification?

7) A cell measures 20mm - what is the image's magnification if the cell is actually 500µm in length?

6) Put the following in order of size:

Height of an elephant, length of DNA strand, width of a hair, height of a tree, width of a sodium ion, length of a nerve cell, length of a heart, width of a red blood cell, size of a virus, length of a finger, length of a mosquito, length of a human digestive system, width of a field, length of a water molecule.

TASK 2

Important vocabulary for practical work

You will have come across most of the words used in practical work in your GCSE studies. It is important that you use the right definition for each word.

Join the boxes to link the word to its definition.

Accurate	A statement suggesting what may happen in the future.
Data	An experiment that gives the same results when a different person carries it out, or a different set of equipment or technique is used.
Precise	A measurement that is close to the true value.
Prediction	An experiment that gives the same results when the same experimenter uses the same method and equipment.
Range	Physical, chemical or biological quantities or characteristics.
Repeatable	A variable that is kept constant during an experiment.
Reproducible	A variable that is measured as the outcome of an experiment.
Resolution	This is the smallest change in the quantity being measured (input) of a measuring instrument that gives a perceptible change in the reading.
Uncertainty	The interval within the true value can be expected to lie.
Variable	The spread of data, showing the maximum and minimum values of the data.
Control variable	Measurements where repeated measurements show very little spread.
Dependent variable	Information, in any form, that has been collected.

TASK 3

Cells

All life on Earth exists as cells. These have basic features in common.

Complete the table.

Structure	Function
Cell-surface membrane	
Chloroplast	
Cell vacuole	
Mitochondria	
Nucleus	
Cell wall	
Chromosomes	
Ribosomes	

Draw the structure of a plant cell and an animal cell.

On each cell, add labels showing each of the structures in the table, if they exist.

TASK 4

Analysing data

Biological investigations often result in large amounts of data being collected. It is important to be able to analyse this data carefully in order to pick out trends.

A student investigated an area of moorland where succession was occurring. She used quadrats to measure the area covered by different plant species, bare ground and surface water every 10 metres along a transect. She also recorded the depth of soil at each quadrat. Her results are shown in the table.

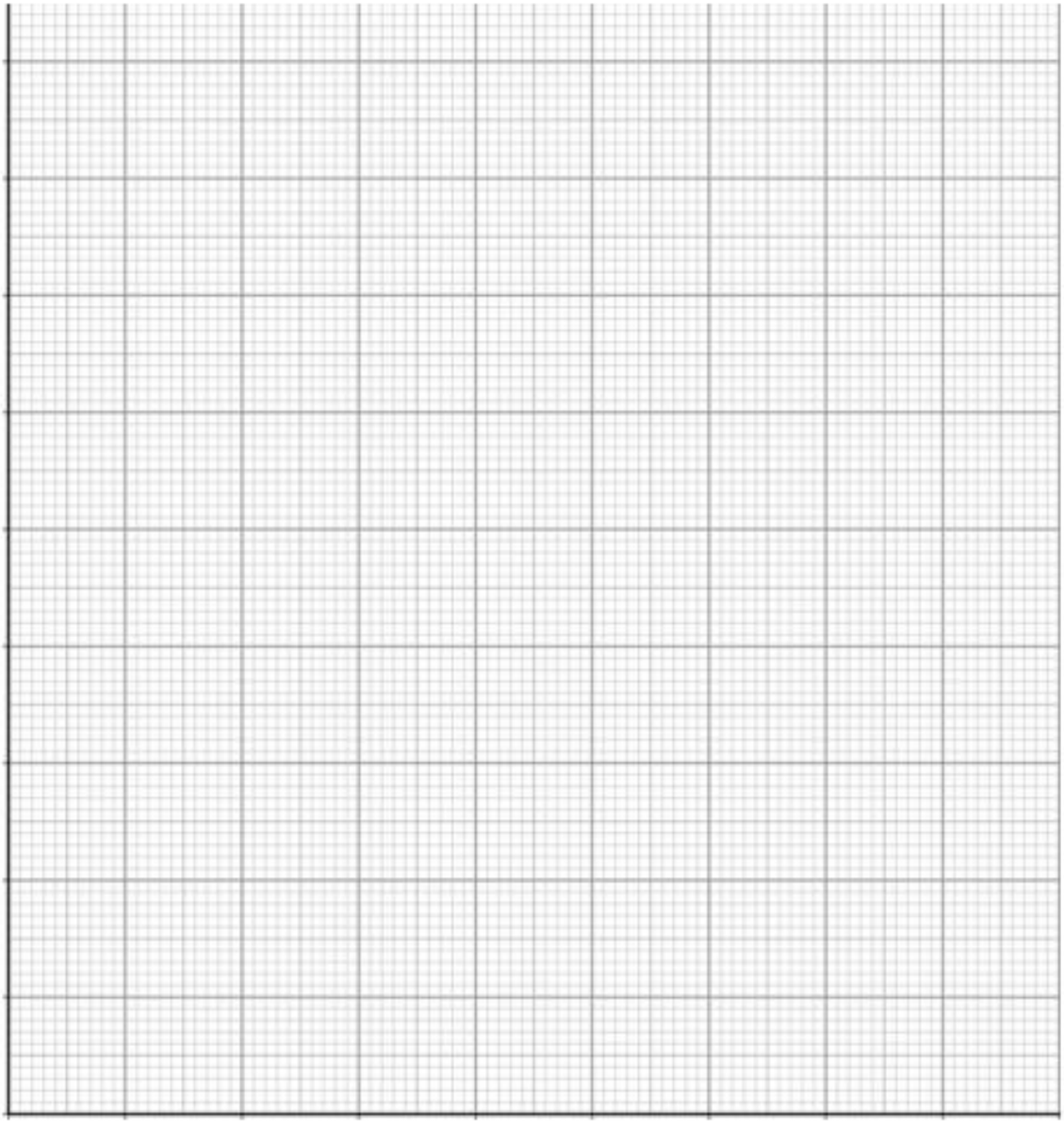
	Area covered in each quadrat A to E in cm^2				
	A	B	C	D	E
Bog moss	55	40	10	–	–
Bell heather	–	–	–	15	10
Sundew	10	5	–	–	–
Ling	–	–	–	15	20
Bilberry	–	–	–	15	25
Heath grass	–	–	30	10	5
Soft rush	–	30	20	5	5
Sheep's fescue	–	–	25	35	30
Bare ground	20	15	10	5	5
Surface water	15	10	5	–	–
Soil depth / cm	3.2	4.7	8.2	11.5	14.8

– indicates zero cover.

Calculate:

1. the mode area of soft rush in the sample
2. the mean soil depth
3. the median amount of bare ground in the sample.

Use the data from the table to plot a scatter graph of soil depth against the area covered by bare ground, soft rush and bog moss (use different colours or markers for each).



4. What conclusions does your graph suggest?

5. How confident are you in these conclusions?

Lung cancer, chronic bronchitis and coronary heart disease (CHD) are associated with smoking. Tables 1 and 2 give the total numbers of deaths from these diseases in the UK in 1974.

Table 1 Men

Age/years	Number of deaths (in thousands)		
	lung cancer	chronic bronchitis	coronary heart disease
35-64	11.5	4.2	31.7
65-74	12.6	8.5	33.3
75+	5.8	8.1	29.1
Total (35-75+)	29.9	20.8	94.1

Table 2 Women

Age/years	Number of deaths (in thousands)		
	lung cancer	chronic bronchitis	coronary heart disease
35–64	3.2	1.3	8.4
65–74	2.6	1.9	18.2
75+	1.8	3.5	42.3
Total (35–75+)	7.6	6.7	68.9

1. Of the men who died aged 35-64 from one of these three causes, what percentage of them died of lung cancer?

2. What percentage of deaths from chronic bronchitis in women happened to women aged 65-74?

3. Deaths from lung cancer drop as people get older. Is there a bigger percentage difference for men or women from 35-64 to 75+?

4. What fraction of coronary heart disease deaths of men over 34 are in the 75+ bracket? What about for women?