

Transition into A Level Biology

2022

A guide into the essential information you require to study AQA A Level Biology –where to find information, what you will need to purchase before September and a series of activities that you will need to complete ready for your first lesson after the summer.

AQA Specification at a glance

AS and first year of A-level

- 1 Biological molecules.
- 2 Cells.
- 3 Organisms exchange substances with their environment.
- 4 Genetic information, variation and relationships between organisms.

A-level only

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

The assessment for the A-level consists of three exams

Paper 1	+	Paper 2	+	Paper 3
What's assessed <ul style="list-style-type: none"> Any content from topics 1–4, including relevant practical skills 		What's assessed <ul style="list-style-type: none"> Any content from topics 5–8, including relevant practical skills 		What's assessed <ul style="list-style-type: none"> Any content from topics 1–8, including relevant practical skills
Assessed <ul style="list-style-type: none"> written exam: 2 hours 91 marks 35% of A-level 		Assessed <ul style="list-style-type: none"> written exam: 2 hours 91 marks 35% of A-level 		Assessed <ul style="list-style-type: none"> written exam: 2 hours 78 marks 30% of A-level
Questions <ul style="list-style-type: none"> 76 marks: a mixture of short and long answer questions 15 marks: extended response questions 		Questions <ul style="list-style-type: none"> 76 marks: a mixture of short and long answer questions 15 marks: comprehension question 		Questions <ul style="list-style-type: none"> 38 marks: structured questions, including practical techniques 15 marks: critical analysis of given experimental data 25 marks: one essay from a choice of two titles

Places to go for help

www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402

Aimed at teachers, but you will find it useful too.
Information includes:

- ☑ The specification – this explains exactly what you need to learn for your exams. **Download 'Cells' and 'Biological molecules' ready for September- put into your file(*)**.
- ☑ 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 won't 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 students if you're stuck with your homework. Just be very careful not to share any details about your assessments, there are serious consequences if you're caught cheating. Visit thestudentroom.co.uk

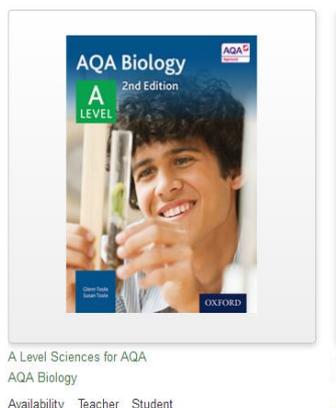
4. Study wise

Revision notes, worksheets, quizzes, exam papers, links to other useful websites.

<https://studywise.co.uk/a-level-revision/biology/>

5. Textbook- Oxford uni press- purchase via Amazon prior to starting the course in September

The full A level book (1 year course book is approx. £30-checked June 22, 2 year £40.99).



You will be writing your notes on file paper- purchase before the course starts :

*a *folder*

A4 file paper

Dividers

Plastic wallets

You will need to have very organised notes.

SI units

Every measurement must have a size (eg 2.7) and a unit (eg metres or °C). Sometimes, there are different units available for the same type of measurement. For example, ounces, pounds, kilograms and tonnes are all used as units for mass.

To reduce confusion, and to help with conversion between different units, there is a standard system of units called the SI units which are used for most scientific purposes.

These units have all been defined by experiment so that the size of, say, a metre in the UK is the same as a metre in China.

The seven SI base units are:

Physical quantity	Usual quantity symbol	Unit	Abbreviation
mass	m	kilogram	kg
length	l or x	metre	m
time	t	second	s
electric current	I	ampere	A
temperature	T	kelvin	K
amount of substance	N	mole	mol

All other units can be derived from the SI base units. For example, area is measured in square metres (written as m^2) and speed is measured in metres per second (written as ms^{-1}).

It is not always appropriate to use a full unit. For example, measuring the width of a hair or the distance from Manchester to London in metres would cause the numbers to be difficult to work with. Prefixes are used to multiply each of the units. You will be familiar with centi (meaning 1/100), kilo (1000) and milli (1/1000) from centimetres, kilometres and millimetres.

Prefix	Symbol	Multiplication factor		
Tera	T	10^{12}	1 000 000 000 000	
Giga	G	10^9	1 000 000 000	
Mega	M	10^6	1 000 000	
kilo	k	10^3	1000	
deci	d	10^{-1}	0.1	1/10
centi	c	10^{-2}	0.01	1/100
milli	m	10^{-3}	0.001	1/1000
micro	μ	10^{-6}	0.000 001	1/1 000 000
nano	n	10^{-9}	0.000 000 001	1/1 000 000 000
pico	p	10^{-12}	0.000 000 000 001	1/1 000 000 000 000
femto	f	10^{-15}	0.000 000 000 000 001	1/1 000 000 000 000 000

Please complete the following activities from pg 2-11 and bring these with you when you start lessons in September

Activity 1

Which SI unit and prefix would you use for the following quantities?

1. The time between heart beats
2. The length of a leaf
3. The distance that a migratory bird travelled each year
4. The width of a cheek cell
5. The mass of a rabbit
6. The mass of iron in the body
7. The volume of the trunk of a large tree

Activity 2

Choose the most appropriate unit, and estimate the size of each of the following.

1. The mass of an elephant
2. The mass of an earthworm
3. The volume of water in a teardrop
4. The volume of water in a pond
5. The time taken for a sunflower to grow
6. The temperature difference between the blood in the heart and in the ear on a cold day
7. The width of a hair
8. The length that your fingernails grow each day
9. The total length of each of the hairs on your head

Activity 3

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.

Activity 4

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.

Photosynthesis and respiration

Two of the most important reactions that take place in living things are photosynthesis and respiration. They both involve transfer of energy.

Activity 6

Complete the table.

	Photosynthesis	Aerobic respiration
Which organisms carry out this process?		
Where in the organisms does the process take place?		
Energy store at the beginning of the process	Sun	
Energy store at the end of the process		In cells
Reactants needed for the process		
Products of the process		
Overall word equation		
Balanced symbol equation for the overall process		

Which of the answers for aerobic respiration would be different for anaerobic respiration? Add these answers to the table in a different colour.

Cells

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

Activity 5

Complete the table.

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

Principles of moving across boundaries

In biology, many processes involve moving substances across boundaries.

Activity 7

Match the examples to the principle(s) involved. For each, give a brief description of why it is relevant.

Osmosis

Examples

Drinking a sports drink after exercise

Gas exchange in the lungs

Absorbing nutrients from food into the body

Moving ions into cells

The effect of salt on slugs

Penguins huddling together to keep warm

Potato pieces get heavier when put in pure water

Potato pieces get lighter when put in very salty water

Cacti do not have thin, large leaves

Diffusion

Active transport

Changing surface area or length

Activity 8

Huntington's disease is an example of a disease where the mutation causing the disease is dominant.

h: normal (recessive)

H: mutation (dominant)

		Paternal alleles	
		H	h
Maternal alleles	h		
	h		

Cystic fibrosis is an example of a disease where the mutation causing the disease is recessive.

F: normal (recessive)

f: mutation (dominant)

		Paternal alleles	
		F	f
Maternal alleles	F		
	f		

For each of the Punnett squares:

1. Complete the diagrams to show the alleles for each child.
2. State which parent and child is:
 - healthy
 - has the disease
 - a carrier.

Each of the following statements is false. Re-write each one so that it becomes true.

1. The first Punnett square shows that one in every four children from this couple will have Huntington's disease.
2. The second Punnett square shows that there is a one in three chance that a child born to this couple will have cystic fibrosis.
3. All children of the second couple will either be carriers or suffer from cystic fibrosis.
4. The percentage of children who are sufferers on the diagram is the same as the percentage of children each couple will have who are sufferers.
5. Having one child who is born with cystic fibrosis means that the next three children will not have the disease.
6. A 50:50 chance is the same as a 0.25 probability.

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.

Activity 9: Mean, media, mode and scatter graphs

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

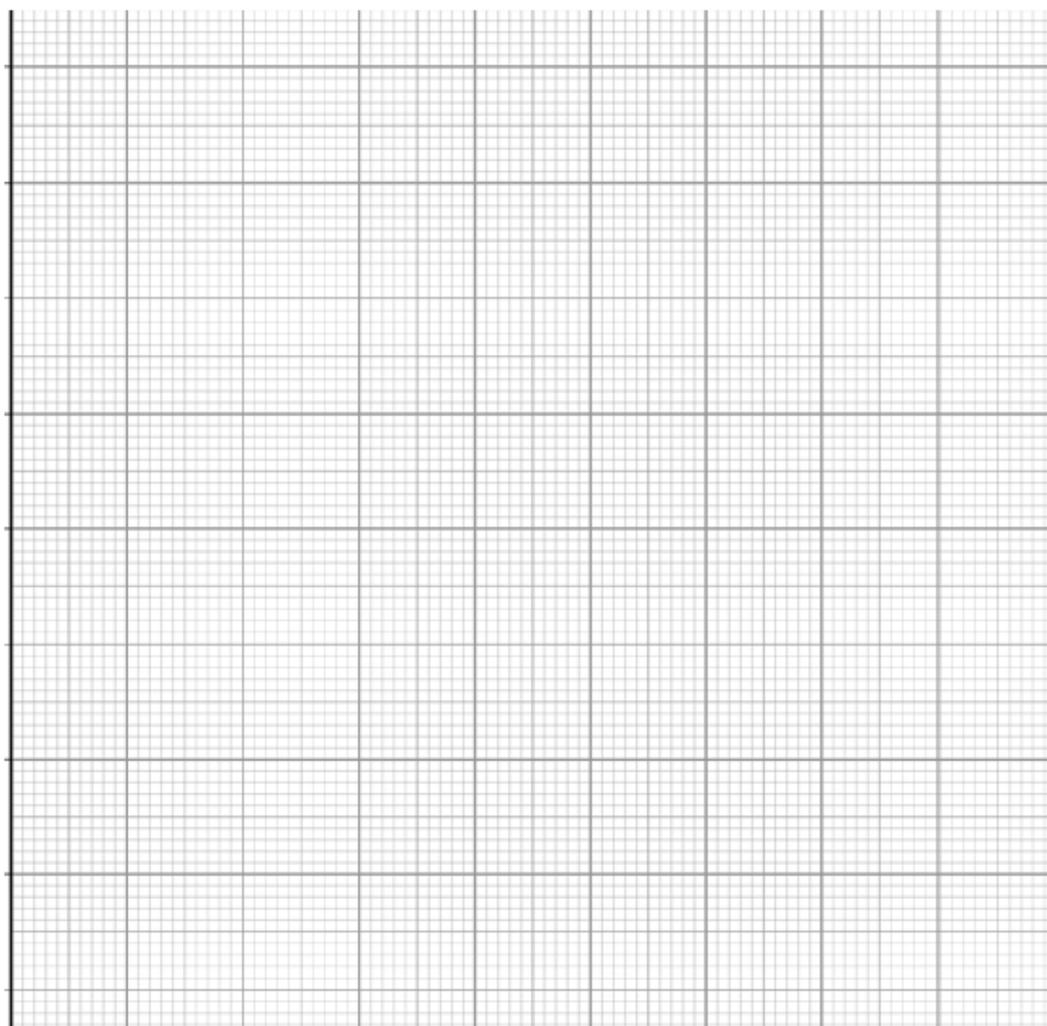
– indicates zero cover.

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.

Activity 9: Mean, media, mode and scatter graphs (continued)

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?

Activity 10: Analysing tables

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

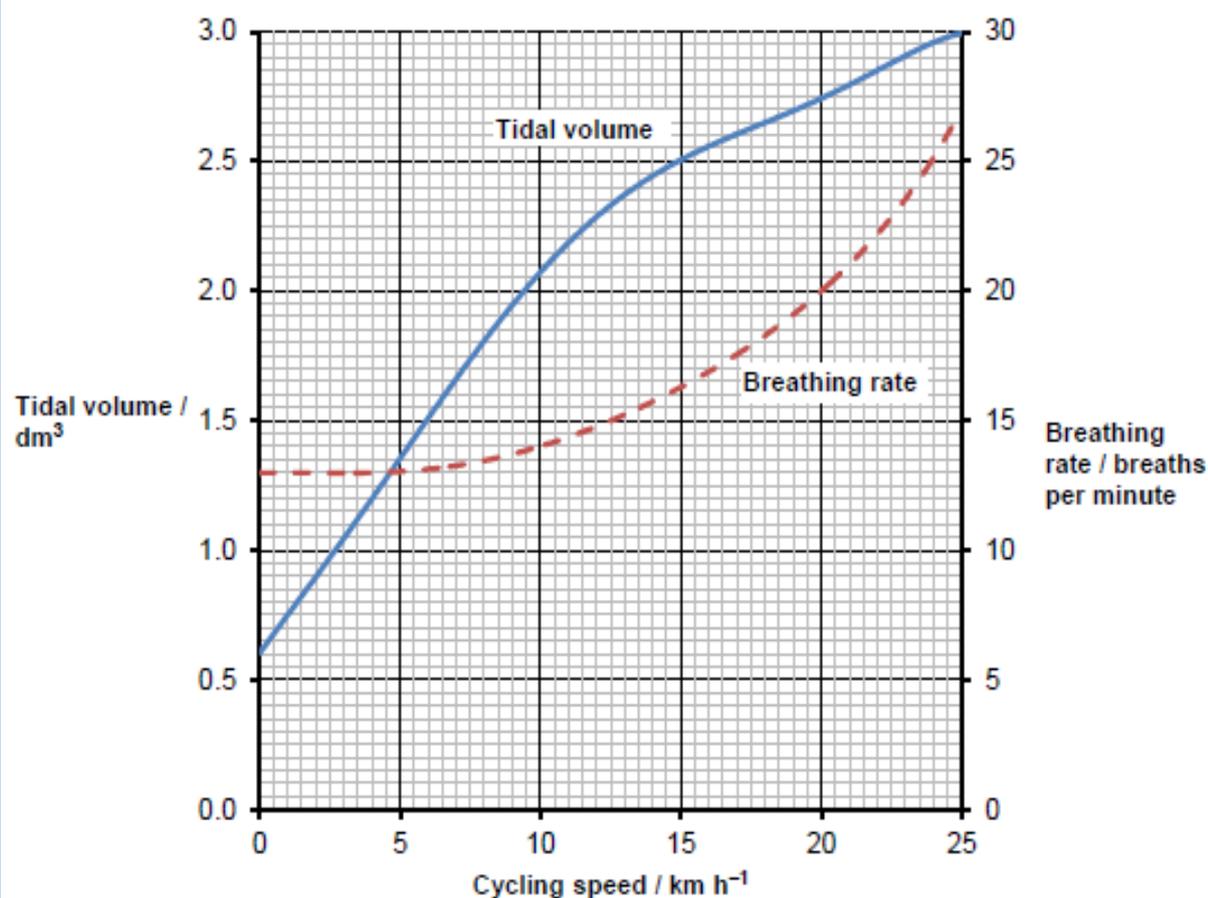
Age/years	Number of deaths (in thousands)		
	lung cancer	chronic bronchitis	coronary heart disease
35-64	3.2	1.3	8.4
65-74	2.6	1.9	18.2
75+	1.8	3.5	42.3
Total (35-75+)	7.6	6.7	68.9

Activity 10

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?

Activity 11: Analysing complex graphs

The volume of air breathed in and out of the lungs during each breath is called the tidal volume. The breathing rate and tidal volume were measured for a cyclist pedaling at different speeds. The graph shows the results.



1. What was the tidal volume when the cycling speed was 17 km h⁻¹?
2. What was the breathing rate when the cycling speed was 8 km h⁻¹?
3. What was the change in breathing rate when the cyclist changed from 10 to 20 km h⁻¹? Express this as a percentage.
4. At what speed did the breathing rate start to increase?
5. The tidal volume increased linearly with cycling speed up to about 10 km h⁻¹. Calculate the increase in volume for each increase in speed of 1 km h⁻¹.
6. For this initial linear section, what is the equation of the tidal volume line?

Hint: use $y=mx+c$