Sixth Form
A-level Biology
Bridging Work Booklet

Name: _____

KAA Biology AS/A Level Bridging Work

Welcome to KAA Biology!

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

Why do bridging work?

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 a minimum of 1 years study. All of these are essential in the understanding of the foundations of biology.

We want you to be successful at A-level Biology and what this takes at GCSE is different to what is required at A-level. 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.

Bridging 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 the bridging work assessed?

Yes. In September, your subject teacher will ask you for your bridging work and it will be assessed. Teachers can diagnose your strengths and weaknesses and begin to support you in a more targeted way.

Biology A-level

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.

Anyone not completing the work or producing that of a poor quality will be spoken to and asked to re-consider if this is the correct course for you. Please use resources such as the internet, library and your Biology GCSE notes to help you complete this booklet.

As part of your AS/A-Level studies you will have six 55 minute lessons each week in your timetable. In these lessons you will cover all the theory and practical work required for the course. You are also expected to spend at least five and a half hours a week on your Biology work outside of lessons. This will include homework tasks, pre-reading, independent study tasks, making additional notes, reviewing lesson materials and reading around the subject. To allow you to make a start on this, a suggested reading list has been included at the end of this pack.

Your AS Level Biology Qualification will cover the following 4 units:

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

You will sit two examination papers at the end of year 12:

Paper 1	Paper 2
What's assessed • Any content from topics 1-4, including relevant practical skills	**What's assessed** • Any content from topics 1-4, including relevant practical skills
Assessment • Written exam: 1 hour 30 minutes • 75 marks • 50% of AS	**Assessment** • Written exam: 1 hour 30 minutes • 75 marks • 50% of AS
Questions • 65 marks: short answer questions • 10 marks: comprehension question	**Questions** • 65 marks: short answer questions • 10 marks: comprehension question

You should bring this bridging work with you to your first year 12 Biology lesson in September.

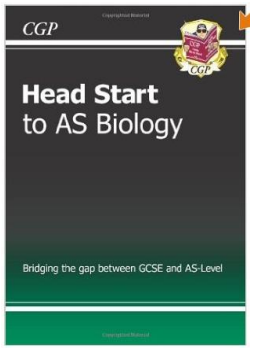
Above and beyond work: bring a journal article about something interesting you have read or researched over the summer.

If you need to do more preparation……

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. Other support includes drop-in support classes outside of school hours, a MedSoc (for those wishing to study medicine after A levels) and further Biology enrichment options to help support your studies.

Additional texts will be available in the school library and a full copy of the specification, past papers etc. can be accessed through the AQA website: http://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402

- Try '**Head Start**' to AS Biology
- Buy on line at: https://www.cgpbooks.co.uk/
- ISBN 978 -1847621177
- Only £4.95!



- 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.

Useful information and activities

There are a number of activities throughout this resource. The answers to some of the activities are available on our secure website, e-AQA. Your teacher will be able to provide you with these answers.

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
luminous intensity	(not used at A-level)	candela	cd

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.

There is a wide range of prefixes. The majority of quantities in scientific contexts will be quoted using the prefixes that are multiples of 1000. For example, a distance of 33 000 m would be quoted as 33 km.

The most common prefixes you will encounter are:

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

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

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.

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.

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	

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.

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
Diffusion	Drinking a sports drink after exercise
Active transport	Gas exchange in the lungs
Changing surface area or length	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

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.

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 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: Analysing tables (continued)

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

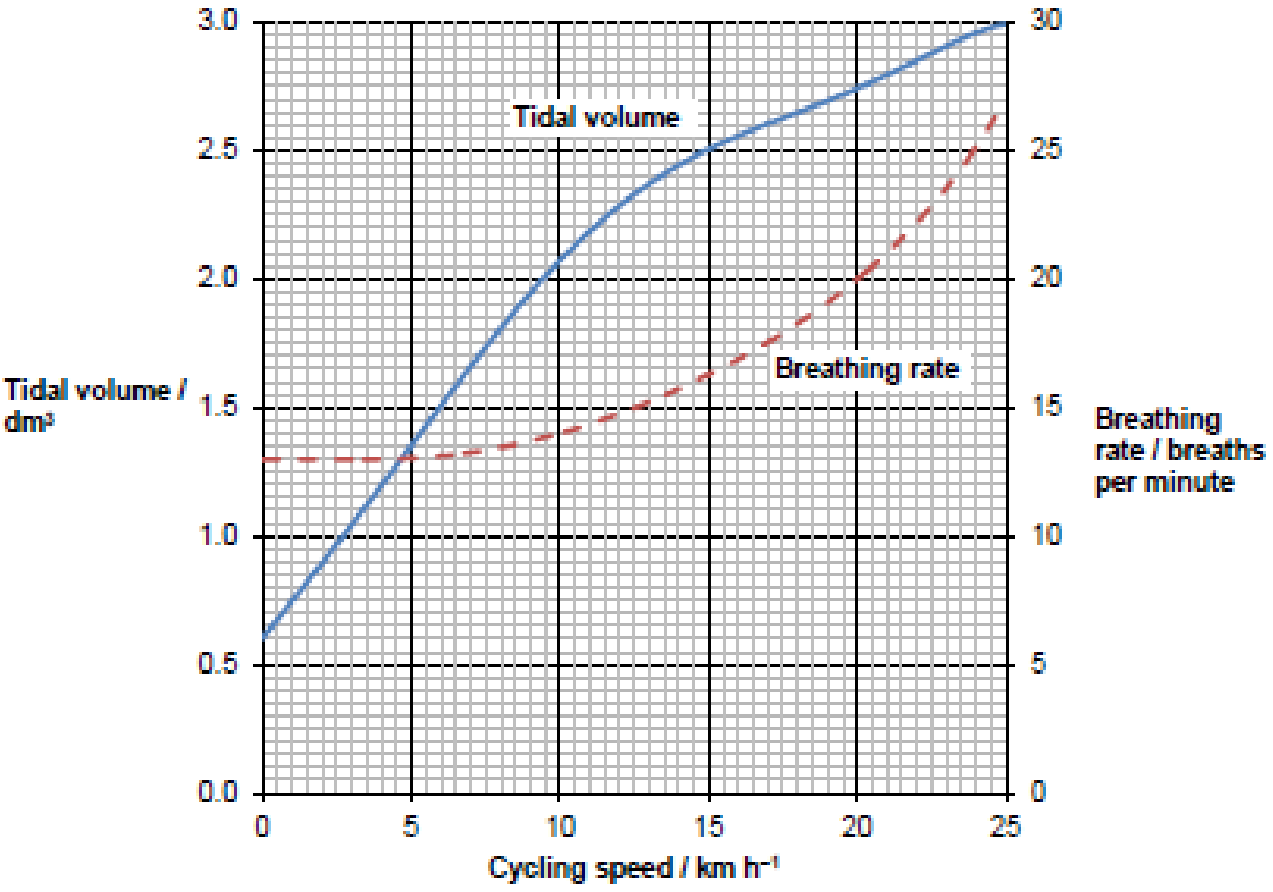
2. What percentage of deaths from chronic bronchitis in women happened to women aged 65–74?

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 $y=mx + c$