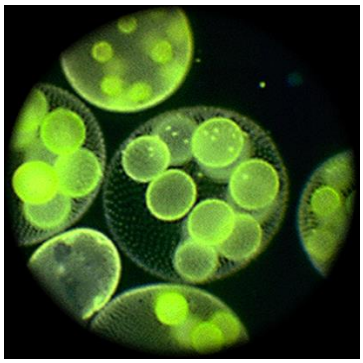
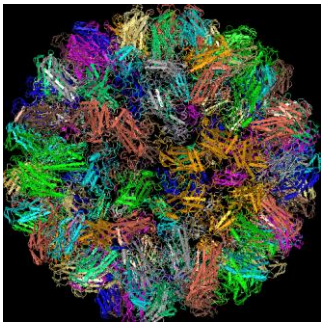
A Level Biology – Bridging Booklet





Name:

Due Date:

How the use this Bridging Booklet

Hello!

It is great that you are considering A Level Biology. It is a great course covering lots of fundamental knowledge and skills that are essential for University study in a number of areas. For example, A Level Biology provides essential knowledge if you are considering a career in Medicine and lots of other scientific areas. Plus the skills developed in A Level Biology are highly prized in other career areas. A Level Biology fits nicely alongside lots of other subjects such as Chemistry, Physics, Maths, Psychology, Geography and PE.

There are a variety of tasks throughout the booklet, which cover some fundamentals of Biology, plus some numerical and scientific skills, that you need to feel confident with before starting the A Level Biology course. There are some video links to watch and some information to read. You can complete the tasks in the space provided.

Answers will also be shared so that you can check your work.

At the end of the booklet there are some links to some videos and other websites with information about the A Level Chemistry course. It would be a really good idea for you to start to explore the course and even start pre-learning some material so that you can make a really positive start to A Level Chemistry.

Enjoy!

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

Sometimes, there are units that are used that are not combinations of SI units and prefixes.

These are often multiples of units that are helpful to use. For example, one litre is 0.001 m^3, or one day is 86 400 seconds.

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.

Standard form

Biology often uses numbers that are too large to be written down conveniently. Standard form is a short hand way for writing large or small values.

Instead of 1400 m standard form would be 1.4×10^3 m

This is the same as saying 1.4 x 10 x 10 x 10. If you work this out, it is the same as 1400 m. You can use 1.4km which is the same thing, but as you will see below, it is good practice to get used to using standard form. Notice that the first value will be a number between 1 and 9, so that:

1450 m is 1.49×10^3 m

Another way to think about it is by moving the digits along, so:

1.49×10^3m move the digits 3 places to the left of the decimal point:

			1	.	4	9
1	4	9	0	.	0	0

However, you will be much more likely to come across small values is biology. In standard form, a minus sign is used, so that:

0.003m is 3×10^{-3} m

This time, you move the digits 3 places to the right of the decimal point:

3	.				
0	.	0	0	3	

It gets easier when you start to recognise the relationship between standard form and the prefixes:

Standard form	**Same as**	
$x10^3$	kilo	x1000
$x10^{-3}$	milli	÷10000
$x10^{-6}$	micro	÷1,000,000
$x10^{-9}$	nano	÷1,000,000,000

Notes.

Gramme is the English variant of gram, but you will commonly see gram used.

There is a space between the number and the unit e.g. 3 m, not 3m. This also applies to % sign. The exception is degrees ^{o} which does not require a space.

Spaces can be used instead of commas for large numbers e.g. 10 000 000 rather than 10,000,000

Quiz Units, measurements and standard form quiz

1 Rewrite the following using prefixes:

12000 g
0.005 m
0.000087 V

2 What do the following units represent?

gcm^{-3}
Jkg^{-1}
$mm^{3}s^{-1}$
$kgm^{-2}y^{-1}$

3 Rewrite the following in standard form:

1942 kg
0.007 m
0.000002 A
0.034 s

14.5 MJ
178846 km
440 mm

4 Find values for:

Wavelength of red light
Diameter of a nucleus
Mass of the earth
Energy in 1g sugar

Some Useful Definitions for Practical Work

Limitations
Factors that have not been controlled or taken into account in the design of an experiment or procedure can be referred to as limitations. These can be described as design faults and will affect each run and replicate equally throughout the investigation as they are inherent in the apparatus and procedure used.

Errors
An error is not a design fault of the procedure but a single or ‘one-off' incident or event (caused by the person carrying out the experiment or by faulty apparatus) that makes the data inaccurate.

Accuracy
Accuracy is an assessment of how close an observed value is to the true value. This can be achieved either by: the calculation of (or commenting on) the percentage error; commenting on the accuracy of the apparatus; or commenting on how the trend line compares to the theoretical trend line/predicted line/line of best fit.

Reliability
Reliability considers the spread of the data from the mean. This can be assessed by considering the standard deviation of the data or by the concurrence of the replicates. One way to improve reliability is by performing more repeats, as this will reduce the effect of any anomalous results on the mean. A reliable procedure is one that produces concurrent replicate results (close to the true value).

Precision
Precision refers to how small the units of measurements are, i.e. the number of decimal places to which any measurement can be recorded, as determined by the apparatus used.
(For example, a 1 cm^3 graduated pipette has the smallest measuring unit of 0.01 cm^3, so the precision is limited to 0.005 cm^3, half the smallest unit.)

Validity
Validity is the confidence that can be placed in the conclusion, given the level of accuracy and reliability and sources of error and limitations within the strategy. Confidence limits/calculated values of a statistical test can be used to assess the confidence that can be placed in a conclusion.

Range bars
Range bars plot the highest and lowest results in each data set. Range bars typically extend *different* distances away from the mean.

Error bars
Error bars may be plotted using the standard deviation, standard error or other statistical method. Error bars typically extend *the same* distance either side of a mean.

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.

Cell Structure and Function

Watch this video: https://www.youtube.com/watch?v=woIrTR-PaAs

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	

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.

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.

Diffusion, Osmosis and Active Transport – Movement across a plasma membrane

Watch this video: https://www.youtube.com/watch?v=_l3h9eqBqkA

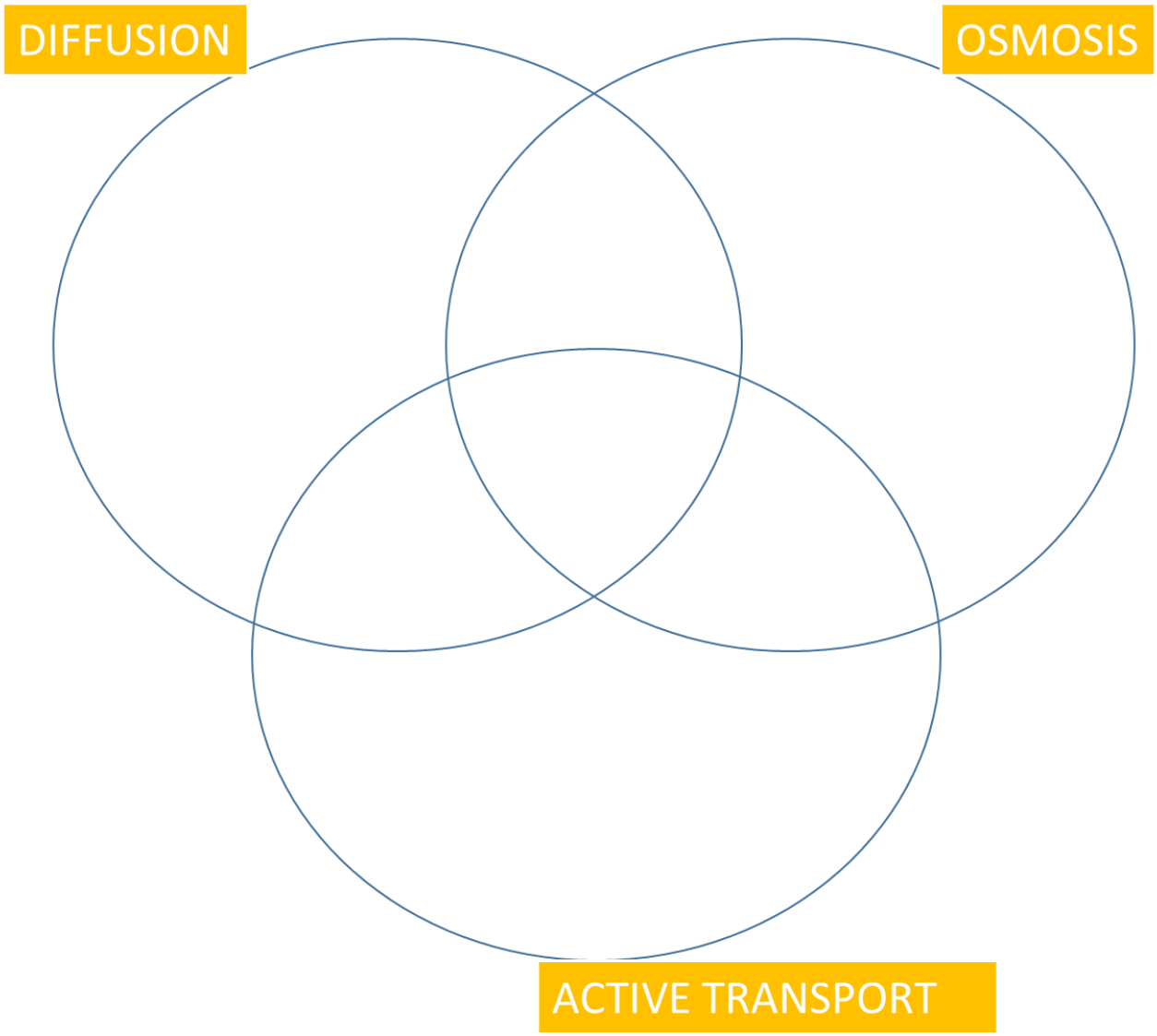
Answer these questions:

1. What is diffusion?

2. What is osmosis?

3. What is active transport?

Complete the Venn diagram. The list of phrases at the bottom are things you can include in the Venn diagram.



Involves water only	Needs a semi-permeable membrane	How minerals get into root hair cells
Requires energy	High to low concentration	How oxygen leaves a leaf
Is passive	Against a concentration gradient	How water keeps plant cells turgid
Movement of particles	Occurs in nature	Involves transport of solutes

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

Diffusion

Active transport

Changing surface area or length

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

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.

Activity 8 (continued)

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

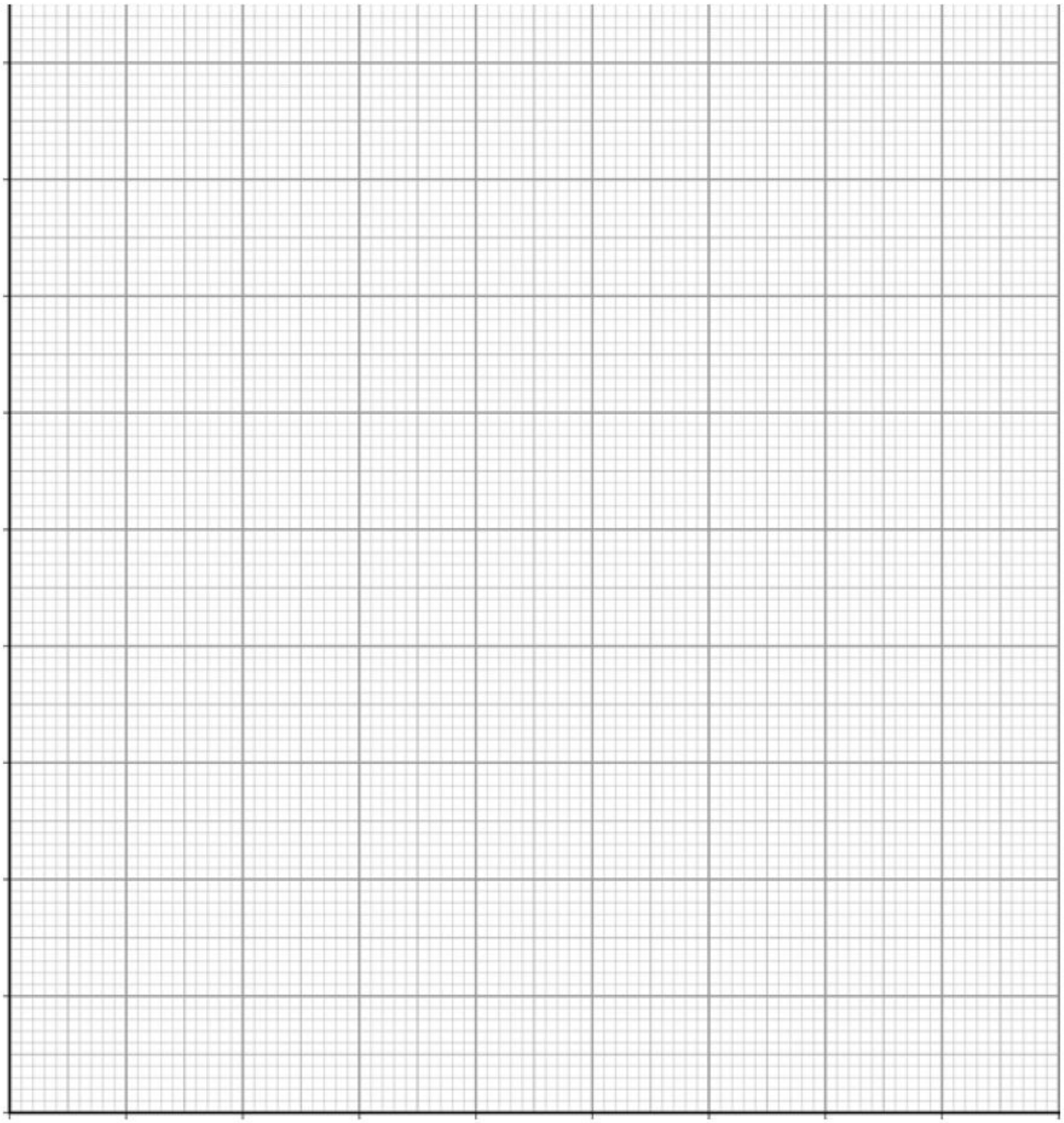
– indicates zero cover.

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).



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

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: 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?

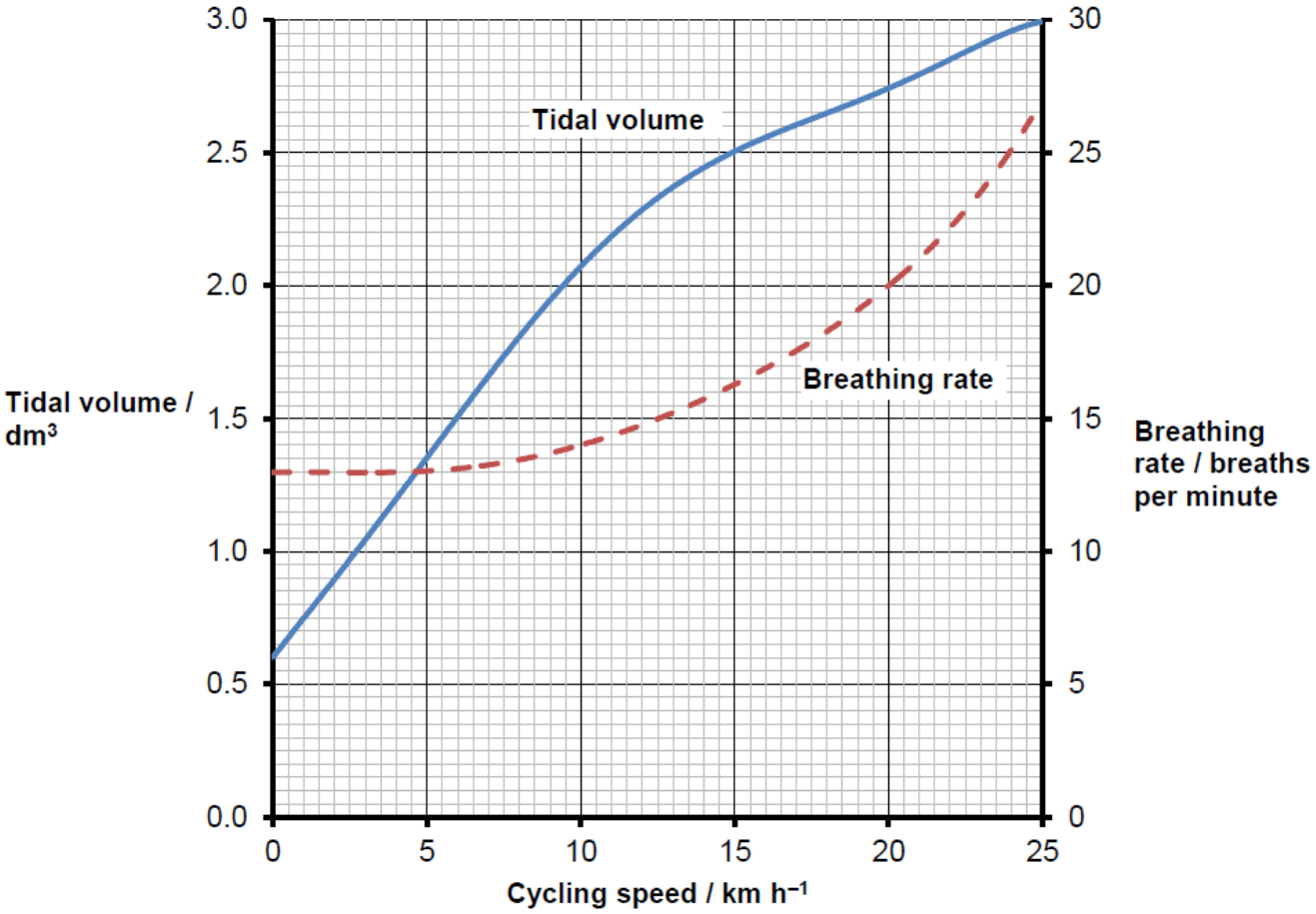
2. What percentage of deaths from chronic bronchitis in women happened to women aged 65-74?

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 $y=mx+c$

Nucleic Acids

DNA and RNA are found in all cells. They share two important features:

- they are both polymers
- they are both used to carry information.

Structure of DNA and RNA

Both DNA and RNA are polymers of nucleotides. The nucleotides have three components.

Figure 1 shows the structure of a nucleotide.

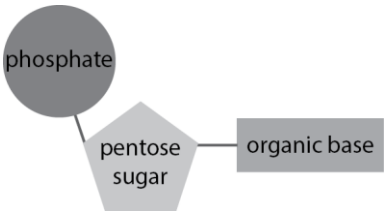


Figure 1 *The structure of a nucleotide*

The nucleotide in Figure 1 is a general structure. The phosphate group is the same in all nucleotides, but the other two components can be different.DNA contains a pentose called deoxyribose (where the “D” in DNA comes from), whilst RNA contains ribose (hence the “R” in RNA).

The nitrogen-containing base is different:

- DNA has four different bases called adenine, cytosine, guanine, and thymine
- RNA also has four different bases: adenine, cytosine, guanine, and uracil.

In both DNA and RNA the nucleotides join up to form a polymer by forming a covalent bond between the phosphate group of one nucleotide and the pentose of the next. They are both called polynucleotides.

RNA is a single stranded polynucleotide.

DNA is a double stranded polynucleotide because two strands exist side by side. The strands are said to be anti-parallel because one polymer strand appears to be upside-down compared to the other.

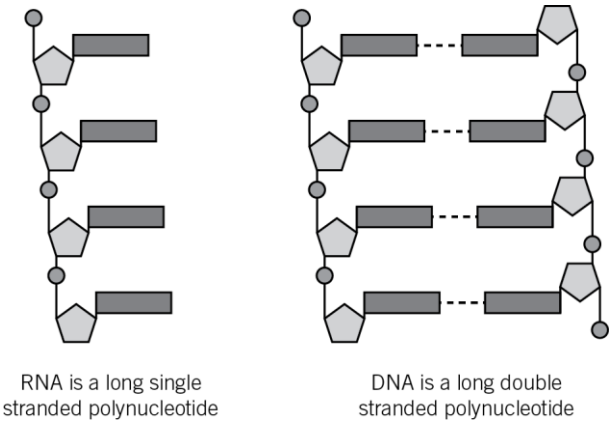


Figure 2 *The structures of RNA and DNA*

The two strands of DNA twist together to form a structure called a double helix.The two strands are held together by hydrogen bonds between the nitrogen-containing bases. These are shown as the dashed lines in Figure 2.

Hydrogen bonds can only form between complementary base pairs. These are:

- adenine and thymine – held together by two hydrogen bonds
- cytosine and guanine – held together by three hydrogen bonds
- when making RNA, uracil is complementary to adenine (no thymine in RNA).

Hydrogen bonds are weaker than covalent bonds and can be easily broken and re-formed. This feature is important in DNA replication.

DNA as the molecule of heredity

DNA is found in the nucleus of eukaryotic cells and in the cytoplasm of prokaryotic cells. Its job is to carry the genetic instructions for the characteristics and behaviour of the cell. In order to do this, it must have two important features:

- it must have some way of carrying or coding the instructions
- it must have the ability to be copied, precisely, over and over again.

The instructions are coded by the sequence of bases on one of the strands (called the sense strand). The genetic code is the “language” of the base sequence and is the same in all known organisms and viruses. This provides some evidence that all organisms may have evolved from a common ancestor. DNA replication is the process during which DNA is copied.

DNA replication

DNA replication is called semi-conservative replication because half of the molecule (one strand) is used to make one completely new strand. DNA replication occurs in the nucleus of eukaryotic cells and in the cytoplasm of prokaryotic cells.

Besides the old DNA molecule, other molecules are needed for its replication:

- DNA helicase – the enzyme that unwinds the double helix
- DNA polymerase – the enzyme that joins the new nucleotides
- a supply of free nucleotides with each of the four bases.

The stages in DNA replication that you need to learn are:

1 DNA helicase unwinds the DNA double helix starting from from one end and also breaks the weak hydrogen bonds between the bases.
2 Each old strand acts as a template for the synthesis of a new strand.
3 Free nucleotides with complementary bases form hydrogen bonds with those bases exposed on the template strands (adenine with thymine and guanine with cytosine).
4 DNA polymerase catalyses the condensation reaction between the pentose and the phosphate of each new nucleotide.
5 The process continues along the entire DNA molecule until two new double strands are completed.

DNA can also form the basis of a simple calculation question. Due to the complementary base pairing, you can easily calculate the percentage of each base in the DNA structure.

- Adenine and thymine always pair together, so the percentages of each of these should be equal to each other.
- The remainder of the bases will be guanine and cytosine.
- The percentages of guanine and cytosine will also be equal to each other.

Worked example

In a maize plant, the percentage of the DNA which contains cytosine is 23%.

Calculate the percentage of the other three bases in the maize plant's DNA.

Method

- As cytosine = 23%, then guanine must also be 23%.
- Together, cytosine and guanine make up 23 + 23 = 46%.
- The remainder of the DNA, 100 – 46 = 54%, will be adenine and thymine.
- The percentage of adenine and thymine will be equal, so the percentage of each will be 54 ÷ 2 = 27%.
- Answer: guanine = 23%
  adenine = 27%
  thymine = 27%.

Relating DNA structure to function

- The four different nitrogen-containing bases give the ability to code information. In fact, the repeating structure of DNA was originally thought to be too simple to carry this code!
- Complementary base pairing gives the ability to replicate DNA exactly.
- The weak hydrogen bonds between the complementary bases allow the strands to be separated for replication.
- Each strand can act as a template for replication at the same time.

What about RNA?

RNA makes up the structure of ribosomes along with protein. RNA is made from a DNA template, so RNA is found in both the nucleus and cytoplasm of eukaryotic cells.

Questions

1 **a** Name:

i the pentose found in a DNA nucleotide (*1 mark*)

ii the four bases found in DNA. (*1 mark*)

b Complete the sentence:

Three out of the four bases found in RNA are the same as those in DNA.
The base which is different is …… in RNA and …….. in DNA. (*2 marks*)

c Name the type of bond formed between:

i the phosphate and pentose in a nucleic acid (*1 mark*)

ii the complementary bases in DNA. (*1 mark*)

2 **a** Put ticks (✓) in the boxes to show where DNA and RNA can be found in a eukaryotic cell.

	nucleus	**cytoplasm**
DNA	☐	☐
RNA	☐	☐

(*2 marks*)

b Complete the table to show differences between the structures of DNA and RNA.

DNA	**RNA**

(*3 marks*)

c Describe the process of DNA replication. (*5 marks*)

3 **a** Complete the table using ticks (✓) in the boxes to show whether each statement applies to DNA, RNA, or both.

statement	DNA	RNA
hydrogen bonds hold the structure together		
formed from nucleotides		
contains ribose		

(*3 marks*)

b RNA is made from a DNA template.

Write down the RNA sequence that would be made from this sequence of DNA:

C C G T A G T A C

(*1 mark*)

c The table shows the ratio of bases in the DNA from two sources. One is from a virus and the other is from an animal.

source of DNA	ratio of C : G	ratio of A : T
Animal	1 : 1	1 : 1
Virus	0.72 : 1	1.20 : 1

i Explain the ratios from the animal DNA. (*2 marks*)

ii Suggest why the ratios from the virus DNA are different. (*1 mark*)

4 **a** Name two enzymes involved in DNA replication. (*2 marks*)

b The DNA from a species of grasshopper was found to contain 29% adenine.

Calculate the percentage composition of the other three bases. (*2 marks*)

c Describe how the structure of DNA enables it to replicate semi-conservatively. (*3 marks*)

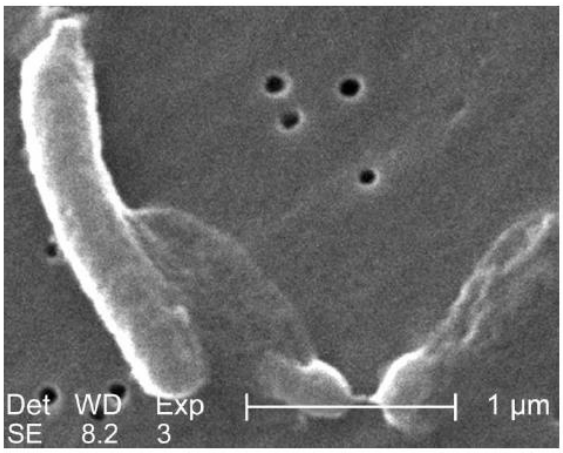
Maths Skills for A Level Biology

Visit http://www.mathsmadeeasy.co.uk/ for more fantastic resources.

Maths for A Level Biology

1. The micrograph below shows a bacterial colony. Calculate the magnification of the microscope used?

(2 marks)



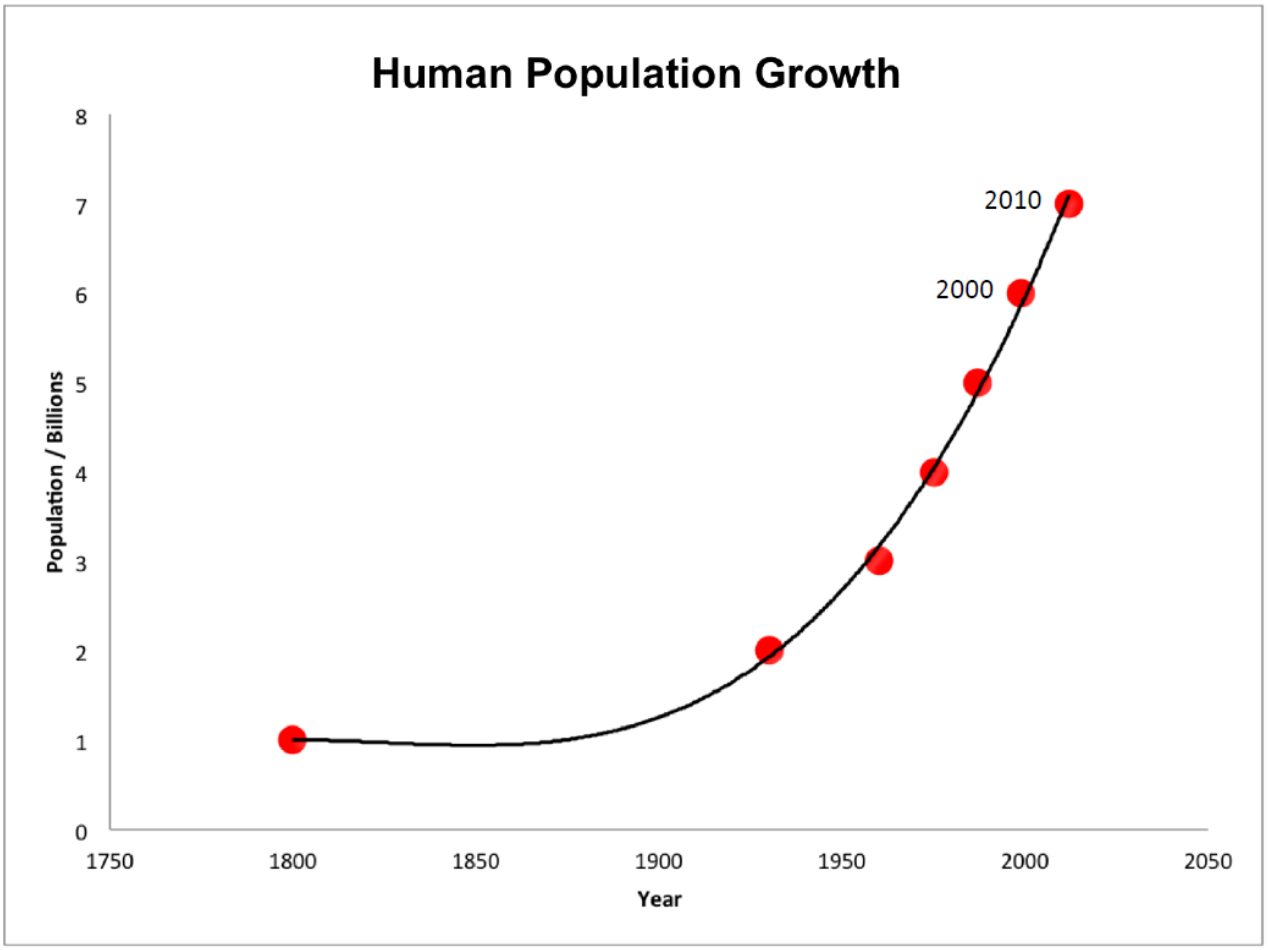
2. An experiment is conducted to understand the effect of osmosis. A potato chip is placed in a strong solution of sugar for different time intervals and its mass is recorded at each time interval.

Time in Solution (Minutes)	Mass (Grams)
0	5
5	7.5
10	10
15	12.5

Estimate the percentage increase in mass of the potato chip after 12.5 minutes

(3 marks)

3. The graph below shows the human population growth.



a. Calculate the average yearly rate of increase in the population between the year 2000 and 2010, which are represented by the last two red dots in the graph above.

(2 Marks)

b. Use the graph above to calculate the rate of population growth in 1900?

(3 marks)

4. The replication rates of two bacteria were analysed. Bacterial strain A was found to replicate every 20 minutes whereas bacterial strain B replicates every 50 minutes.

a. After 1 hour 40 minutes what will the ratio of A to B be, given that both strains started dividing with the same number of bacteria?

(2 marks)

b. Out of the 250 bacteria in culture A, 15 of them were antibiotic resistant. What percentage was not antibiotic resistant?

(2 marks)

5. An investigation into cancerous cells was Carrie out. An infected tissue contains 8×10^5 cells. If 2×10^2 of the cells are cancerous.

a. Calculate the percentage of healthy cells in the tissue sample? Give your answer to 4 significant figures.

(3 marks)

b. The size of the infected tissue was measured to be 15mm correct to the nearest mm. Calculate the percentage error in the measurement correct to one decimal place.

(2 marks)

6. Answer the following questions regarding Standard deviation.

a. Calculate the standard deviation of the data set highlighted in the table below. (4 marks)

Item	Mass (g)
A	170
B	600
C	470
D	300
E	430

Standard Deviation Formula:

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

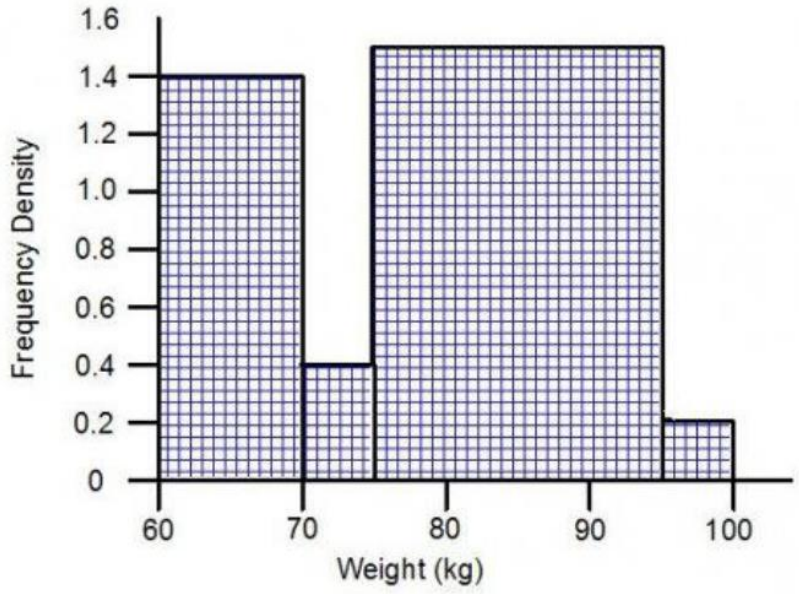
b. Define standard deviation in the context of this question? (2 marks)

7. Answer the following questions regarding conversions of units.

a. A beaker contained $5cm^3$ of a solution. Convert the unit to mm^3.

(1 mark)

b. The histogram below shows the weights of 47 people.



Use the histogram to determine how many people weighed less than 75 kilograms.

(3 marks)

8. Cystic Fibrosis is a genetic condition inherited in an autosomal recessive manner, the average probability of inheriting Cystic Fibrosis is 0.0015.

   a. How many people would you expect to have the disease in a population of 100,000?

(1 mark)

   b. A new drug has been developed to treat Cystic Fibrosis. This drug is delivered in a spherical vector called a liposome. If the Liposomes have a diameter of 500nm, calculate their volume. Give your answer correct to the nearest μm.

(3 marks)

Exploring the A Level Biology Course

At Whickham we study the AQA A Level Biology course. You can find information about the course here:

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

https://filestore.aqa.org.uk/resources/biology/specifications/AQA-7401-7402-SP-2015.PDF

There are some excellent online resources for the course. It would be a really good idea for you to start to explore the course and even start pre-learning some material so that you can make a really positive start to A Level Biology.

Take a look at these:

- Crash Course YouTube (Videos covering A Level Biology content and beyond): https://www.youtube.com/playlist?list=PLNQL82WAcoJXP6HP0irylS_E5JhL4ks0f

- SnapRevise YouTube (Videos covering A Level Biology course content):

https://www.youtube.com/watch?v=eaNeyq4iEkw&list=PLkocNW0BSuEEMyVUCyaRPVj_cahCvjxAr

- Physics and Maths tutor (Website includes notes, flashcards and questions by topic for A Level Biology)

https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/

- Maths Made Easy (Website with lots of resources and questions/answers for A Level Biology)

https://mathsmadeeasy.co.uk/a-level-biology-revision/