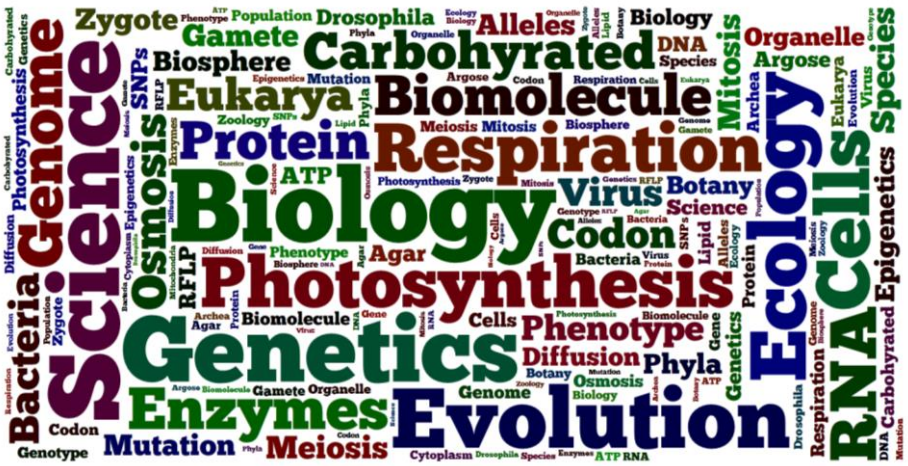
Alleyne's Sixth Form

A-level Biology

Bridging Work Booklet



Name: _____

Welcome to Alleyne's Academy Biology!

This bridging work is designed to help you to bridge the gap between your GCSE Science studies and the 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 studying biology. All of these are essential in the understanding of the foundations of biology.

We want you to be successful at A-level Biology and some students find the change from GCSE quite a challenge. 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?
You will be asked to bring your bridging work to your first biology lesson. Please keep all the work you complete in a folder until then.

Biology A-level
We study **AQA Biology A Level** and your Year 12 Biology curriculum 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

If you would like to find out more about the course content, you can find the specification on the AQA website: AQA | Biology | A-Level | A-level Biology

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.

If you cannot remember the answers to these tasks from your GCSE learning, please use the internet (we have suggested relevant links for each topic) and your GCSE notes or revision guides to help you complete the booklet. We do not expect to see blank pages! You may also choose to keep evidence of notes you take from the internet and other resources in the file with your answers to the tasks.
As part of your A-Level studies you will have nine hours each fortnight on 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 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.

This bridging work has 2 sections:

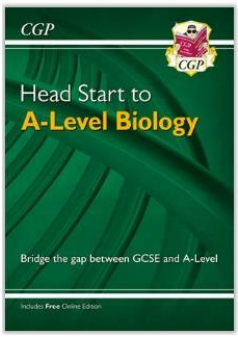
Section A contains tasks based on 12 important topics that you covered at GCSE and need a good understanding of to build upon these at A-Level. Each topic has some suggested links to help you revise them, and some questions to test your knowledge and understanding. The links we have sent are to the AQA Combined Science sections of Bitesize and to the Seneca Learning course Combined Science Biology: AQA GCSE Higher. We recommend you create a free Seneca account if you don't already have one. It will allow you to keep track of your progress. You can also use other sites. **You must complete all this section.**

1. Cells
2. Microscopes and magnification
3. The cell cycle and mitosis
4. Diffusion, osmosis and active transport
5. Monomers and polymers
6. DNA
7. Genetics
8. Enzymes
9. Photosynthesis and respiration
10. Vocabulary for practical work
11. Units for biology
12. Analysing data in tables and graphs

Section B contains a mixture of research tasks, and extension and enrichment activities. **You should choose at least one research task to complete from this section.** You may like to read some of the suggested books or watch some of the films that have a biology basis.

If you feel you want or need to do more preparation…

You could try '**Head Start**' to A-Level Biology. It is available from Amazon and other places at £4.95Head Start to A-Level Biology (with Online Edition): bridging the gap between GCSE and A-Level (CGP Head Start to A-Level): Amazon.co.uk: CGP Books, CGP Books: 9781782942795: Books



It recaps all the tricky topics from GCSE that A Level 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.

Section A – complete all tasks in this section

Topic 1 Cells Revise the parts and functions of eukaryotic and prokaryotic cells and then complete the tasks below:

https://www.bbc.co.uk/bitesize/guides/zg9mk2p/revision/1

Seneca Learning 1.1.1 Eukaryotes and 1.1.2 Prokaryotes, 1.1.3 Animal, 1.1.4 Plant and 1.1.5 Bacteria Cells

https://app.senecalearning.com/classroom/course/681e2220-1d4e-11e8-b373-d7e35435fc8a

Complete the table to describe the function of these cell parts. Tick/cross to show whether the part is present in each type of cell (you may want to indicate if it is only present in some cells)

Cell part	Function	Eukaryotic		Prokaryotic
		animal	plant	bacteria
cell-surface membrane				
cell wall				
nucleus				
cytoplasm				
chloroplasts				
mitochondria				
flagellum				
ribosomes				
plasmid				
vacuole				
circular DNA				
slime capsule				

Draw the structure of a typical animal, plant and bacterial cell. Label the parts that are present in the cells.

Topic 6 Microscopes and magnification Microscopes have led to huge advances in biology and a number of the required practical activities use microscopes.

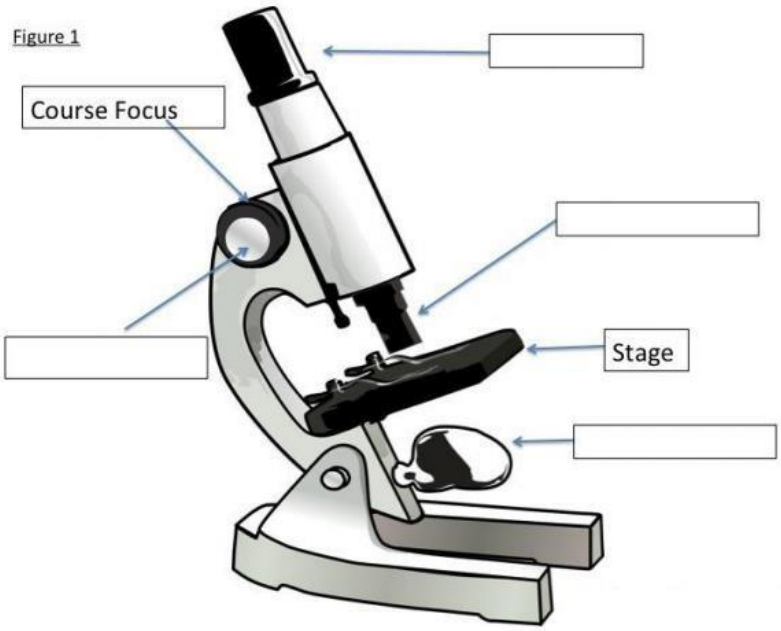
https://www.bbc.co.uk/bitesize/guides/zg9mk2p/revision/5

Seneca Learning 1.1.9 Microscopy and 1.1.10 Magnification
https://app.senecalearning.com/classroom/course/14a5e0a0-1e12-11e8-82e4-c9ec1e8bc494

What key terms are being described below?

	How much bigger something appears than its actual size
	The smallest distance between two points where they can still be seen as separate
	A dye used to colour parts of a specimen to make the easier to see
	The part of the microscope you look down
	The part of the microscope that is closest to the specimen

Label the parts of the optical (light) microscope:



How do you calculate the total magnification of an optical microscope?	
What would be the total magnification if a 10x eyepiece lens and a 20x objective lens where being used?	
How do you calculate the actual size of an object viewed under a microscope?	
Calculate the actual size of an onion cell if it measures 20mm using a 1000X magnification.	

Topic 7 The cell cycle and mitosis Revise the cell cycle and mitosis and then complete the tasks below:

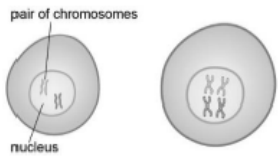
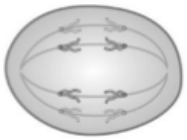
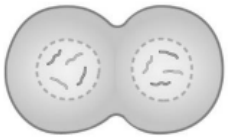
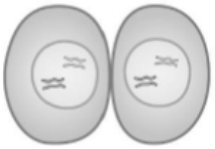
https://www.bbc.co.uk/bitesize/guides/zpkx8mn/revision/2

Seneca Learning 2.1.1 Mitosis
https://app.senecalearning.com/classroom/course/681e2220-1d4e-11e8-b373-d7e35435fc8a/section/cb3462b01d4f-11e8-b373-d7e35435fc8a/session

True or false?

Mitosis is another name for the cell cycle	
Mitosis produces genetically identical cells	
Mitosis is important for growth, repair and sexual reproduction	
Mitosis produces haploid cells	
Mitosis produced two daughter cells	

Complete the table below to name the stages of the cell cycle and describe what happens in each stage:

Diagram	Stage	What happens
		
		
		
		

Topic 4 Diffusion, osmosis and active transport Revise transport in cells and then complete the tasks below:

https://www.bbc.co.uk/bitesize/guides/z9myxfr/revision/1

Seneca Learning 1.3.1 Diffusion, 1.3.4 Osmosis, 1.3.7 Active Transport
https://app.senecalearning.com/classroom/course/681e2220-1d4e-11e8-b373-d7e35435fc8a/section/bfd4b4101d4f-11e8-b373-d7e35435fc8a/session

Complete the definitions of the three processes:

diffusion	The _____ movement of _____ from an area of _____ concentration to an area of _____ concentration (_____ the concentration gradient).
osmosis	The _____ movement of _____ from an area of _____ concentration to an area of _____ concentration, through a _____ permeable membrane.
active transport	The movement of _____ from an area of _____ concentration to an area of _____ concentration (_____ the concentration gradient). It requires _____ from respiration and _____ in the cell membrane.

Match the examples to the principles involved (write the letter in the correct box of the correct principle involved)

diffusion	a) Drinking a sports drink after exercise b) Gas exchange in the lungs
Osmosis	c) Absorbing nutrients from food into the body d) Moving ions into cells e) The effect of salt on slugs f) Penguins huddling to keep warm
active transport	g) Potato pieces get heavier when put into pure water h) Potato pieces get lighter when put in very salty water
changing surface area or length	i) Cacti do not have thin, large leaves **Extension:** try to explain how the principles are involved in each example (complete on lined paper)

Topic 5 Monomers and polymers

Proteins, lipids (fats and oils) and DNA are all large molecules (polymers) that are made of smaller molecules (monomers). Carbohydrates can also exist as polymers and monomers

Revise the functions of these polymers and revise the monomers that make them up.

https://www.bbc.co.uk/bitesize/guides/zwxv6yc/revision/4

Why does the body need these large molecules?	
How do we get a supply of these molecules?	

Carbohydrates

Name four carbohydrates (at least two of which are polymers)	
What are the two polymers in that list?	
What are the functions of starch and glycogen?	Starch Glycogen

Proteins

What are the monomers that make proteins?		
Name four proteins.	1.	2.
	3.	4.
For each of those four proteins state their function	1.	2.
	3.	4.

Lipids

What are the two kinds of lipids?	
What are the smaller units that make up a lipid?	
Why are lipids needed in the body?	

Digestion

Polymers are digested into monomers so they can be absorbed into our blood.

What is the definition of digestion?	

Complete this table using information from https://www.bbc.co.uk/bitesize/guides/zwxv6yc/revision/4

	Type of enzyme that breaks them down	Where those enzymes are made	The products of digestion
Carbohydrates			
Proteins			
Lipids			

Topic 6 DNA DNA is an extremely important polymer that carries the genetic information.

Revise DNA and complete the tasks below:

Seneca Learning 3.2.5 Nucleotide structure https://app.senecalearning.com/classroom/course/14a5e0a0-1e12-11e8-82e4c9ec1e8bc494/section/7838cb40-1e13-11e8-82e4-c9ec1e8bc494/session

a) What is DNA an abbreviation for?	
b) Where is DNA found in a eukaryotic cell?	
c) What is the name given to the shape of a DNA molecule?	
d) What is the name of the monomer that makes up DNA?	
e) Draw and label one of the monomers that make up DNA	
f) Which parts of DNA make up the backbone?	
g) What are the names of the 4 bases found in DNA?	
h) What are the complementary base-pairing rules?	
i) If the base sequence on one strand of DNA was AAT CGC ATA CAT, what would be the sequence on the other strand?	
j) What type of bonds hold the two strands of DNA together?	
k) Which part of DNA carried the genetic code?	
l) What does DNA code for?	
m) What is meant by a triplet code?	

Topic 7 Genetics

Genetics is the study of genes, the genetic variation those genes cause and how those genes are inherited.

Before you start on the questions revise the topic here:

https://www.bbc.co.uk/bitesize/guides/znhgrwx/revision/1

On Seneca the work is 3.3.3 to 3.3.9 **https://app.senecalearning.com/classroom/course/681e2220-1d4e-11e8-b373-d7e35435fc8a/section/f3f67992-f30c-4ba4-82d5-79db7ad32fd7/section-overview?mode=default**

There are lots of words we need to be able to use and understand in this topic. Find the definitions of these and learn them.

Word	**Definition**
Genotype	
Phenotype	
Mutation	
Gene	
Chromosome	
Natural selection	
Evolution	
Alleles	
Genome	
Homozygous	
Heterozygous	
Dominant	
Recessive	

The height of pea plants is controlled by a single gene which has two alleles: tall and short.
The tall allele is dominant and is shown as T. The small allele is recessive and is shown as t.

Complete this Punnett square to show the possible allele combinations of the offspring produced when two pea plants are bred. Parent 1 is TT tall. Parent 2 is tt short

	T	T
t		
t		

Describe and explain the characteristics of the offspring.

The inheritance of fur colour in mice is controlled by a single gene with two alleles. White fur is recessive (g). Grey fur is dominant (G). One mouse is homozygous recessive and the other is heterozygous. Use a Punnett square to determine the probability of getting a white mouse in the next generation.

Huntington's disease is caused by a dominant allele (H) the recessive allele (h) is healthy.

		Paternal (father's) alleles	
		H	h
Maternal (mother's) alleles	h		
	h		

Cystic fibrosis is caused by a recessive allele (f) the healthy allele is dominant (F)

		Paternal (father's) alleles	
		F	f
Maternal (mother's) alleles	F		
	f		

For each of the Punnett squares:

1. Complete the diagrams to show the alleles for each child.
2. For each parent and child state whether they are healthy, have the disease or 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.

Topic 8 Enzymes

Enzymes are proteins that are able to speed up chemical reactions. They are very important in biology because they control all the reactions that happen in cells.

We need to revise how enzymes work, how they are affected by conditions like temperature and pH. We also need to revise how to investigate them through practical experiments.

https://www.bbc.co.uk/bitesize/guides/zwxv6yc/revision/1 Seneca

Learning 1.2 Enzymes

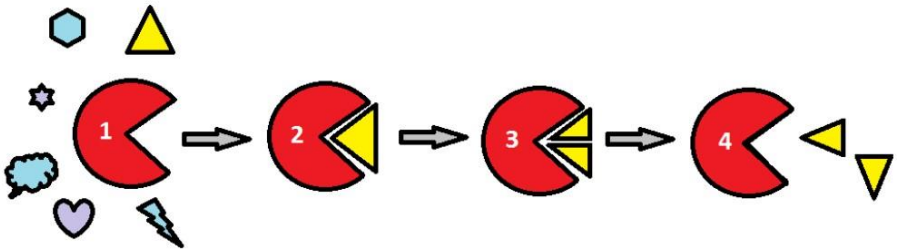
https://app.senecalearning.com/classroom/course/681e2220-1d4e-11e8-b373-d7e35435fc8a/section/afce87d01d4f-11e8-b373-d7e35435fc8a/section-overview

Use the bitesize site to help you answer these questions

What are enzymes?

What are the monomers that make proteins	
What is a catalyst?	

The lock and key hypothesis



Use the bitesize link to help you explain what is happening in each stage: 1,2,3 and 4

1	
2	
3	
4	

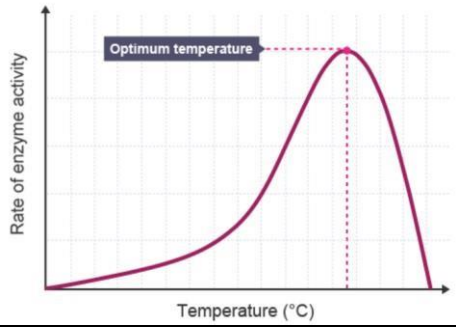
Denaturing

Explain why an enzyme won't work if it is denatured Use key words and ideas to give a full explanation	

Rate of reaction

If 10g of substrate is all used up in 5 minutes what is the rate of reaction?
If 0.5g of product is produced in 5 seconds what is the rate of reaction?

Affecting the rate of reaction

	Why is the reaction slow at low temperature? Why does the reaction slow down at high temperatures? What is the optimum temperature for most enzymes found in human cells?

Investigating enzymes

Read the method on https://www.bbc.co.uk/bitesize/guides/zwxv6yc/revision/3

What is the enzyme in the experiment?	
What is the substrate?	
What is the independent variable?	
Why did they use iodine?	

Results

pH	Time taken to digest all the starch (s)
5	240
6	120
7	60
8	140

Draw a sketch graph of pH and time taken to digest the starch

What is the optimum pH of this enzyme?

Topic 9 Photosynthesis and Respiration

Two of the most important reactions to take place in living things are photosynthesis and respiration.

To revise photosynthesis start here: https://www.bbc.co.uk/bitesize/guides/ztc297h/revision/1

And for respiration start here: https://www.bbc.co.uk/bitesize/guides/zw9x8mn/revision/6

On Seneca the work is 6.1.1 and 6.1.2 for photosynthesis:
https://app.senecalearning.com/classroom/course/681e2220-1d4e-11e8-b373-d7e35435fc8a/section/9c28aa201d50-11e8-b373-d7e35435fc8a/session

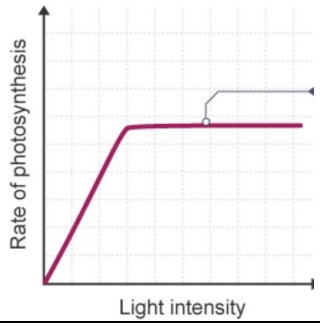
And also 8.3.2 respiration: https://app.senecalearning.com/classroom/course/681e2220-1d4e-11e8-b373-d7e35435fc8a/section/4c3f8f71-c95c-434f-b751-9fe7ee6bdf9d/section-overview?mode=default

Photosynthesis

Photosynthesis makes glucose. Much of that glucose is used for respiration, but not all of it.

Make a list of the uses of glucose (apart from respiration	

Many factors control the rate of photosynthesis. For each of these factors sketch the graph and give a short explanation.

Factor	Graph	Explanation
Light intensity		At low light levels, light is the limiting factor so, as light intensity increases, the rate of photosynthesis increases At high light levels, light is not the limiting factor so, when light intensity increases there is no increase in the rate of photosynthesis
Carbon dioxide concentration		
Temperature		

Respiration

Make a list of the processes that the energy from respiration is used for in organisms	

The rate of respiration increases when we exercise. If the exercise is very strenuous cells can switch to anaerobic respiration.

Explain why the heart and breathing rate increase during exercise	
Explain why we cannot do strenuous exercise for a long time.	

Complete the table

	Photosynthesis	Aerobic respiration
Which organisms carry out the process?		
Where in the organism does the process take place?		
Energy store at the beginning of the process	sunlight	
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		

Topic 10 - Vocabulary for practical work

You should have come across most of these words at GCSE. Match the keyword to its definition.

accurate	A statement suggesting what may happen in the future
data	An experiment that give 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 of a measuring instrument that gives a perceptible change in the reading
uncertainty	The interval within which the true value can be expected to lie
variable	The spread of data, showing the maximum and minimum values of the data
independent variable	Measurements where repeated measurements show very little spread
control variable	Information, in any form, that has been collected
dependent variable	A variable that has its values chosen or changed by the person carrying out the practical

Topic 11 - Units for Biology You should be confident with using SI units and prefixes in biology. Complete the tables and then try the questions.

SI units:

Physical quantity	Unit	Abbreviation
	kilogram	
length		m
		s
		K
amount of substance		mol

(although we commonly use °C in biology)

Prefixes:

Prefix	Symbol	Multiplication factor	
Giga		10^9	
	M		1 000 000 000
deci	d	10^{-1}	
		10^{-2}	
milli			0.001
	µ		
			0.000 000 001
pico			

We most commonly work with nano to kilo in biology, and we often have to convert from one measurement to another.

Which SI unit and prefix would you use for the following quantities? (the first is completed as an example)

a) The width of a virus	nm
b) The time between heart beats	
c) The length of a leaf	
d) The distance that a migratory bird travelled each year	
e) The width of a cheek cell	
f) The mass of a rabbit	
g) The mass of iron in the body	
h) The volume of the trunk of a large tree	

Extension (complete in the space below)
Try to put these in order of size from largest to smallest:

height of an elephant; length of a 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

Topic 12 - Analysing data in tables and graphs Biological investigations often result in large amounts of data being collected. It is important to be able to analyse this data carefully to pick out trends.

1. Mean, median, 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 show 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.

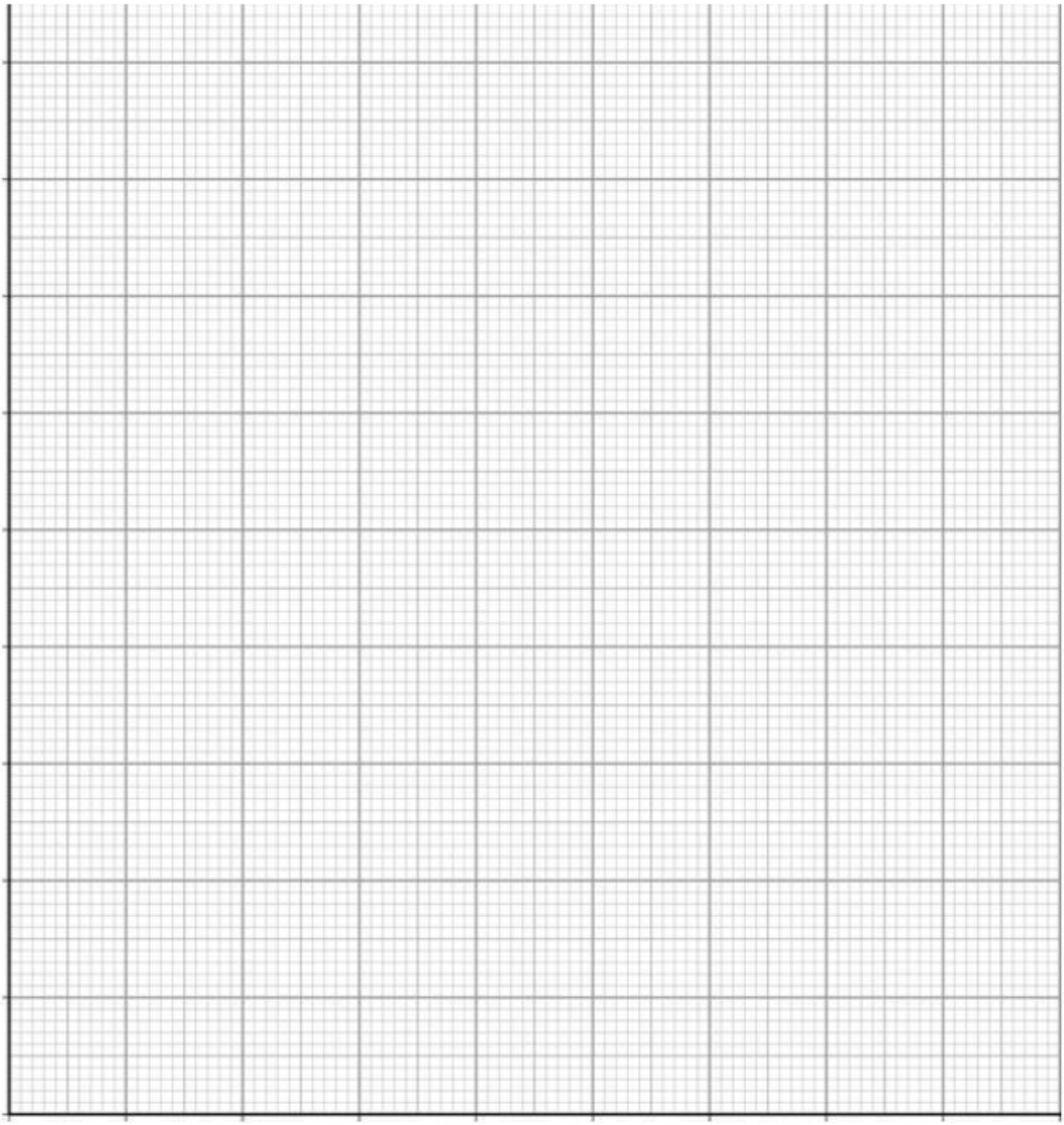
a) Calculate:

i. The modal area of soft rush in the sample

ii. The mean soil depth

iii. The median amount of bare ground in the sample

b) 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 for each)



c) What conclusions does your graph suggest?

2. 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

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

b) What percentage of deaths from chronic bronchitis in women happened to be women aged 65-74?

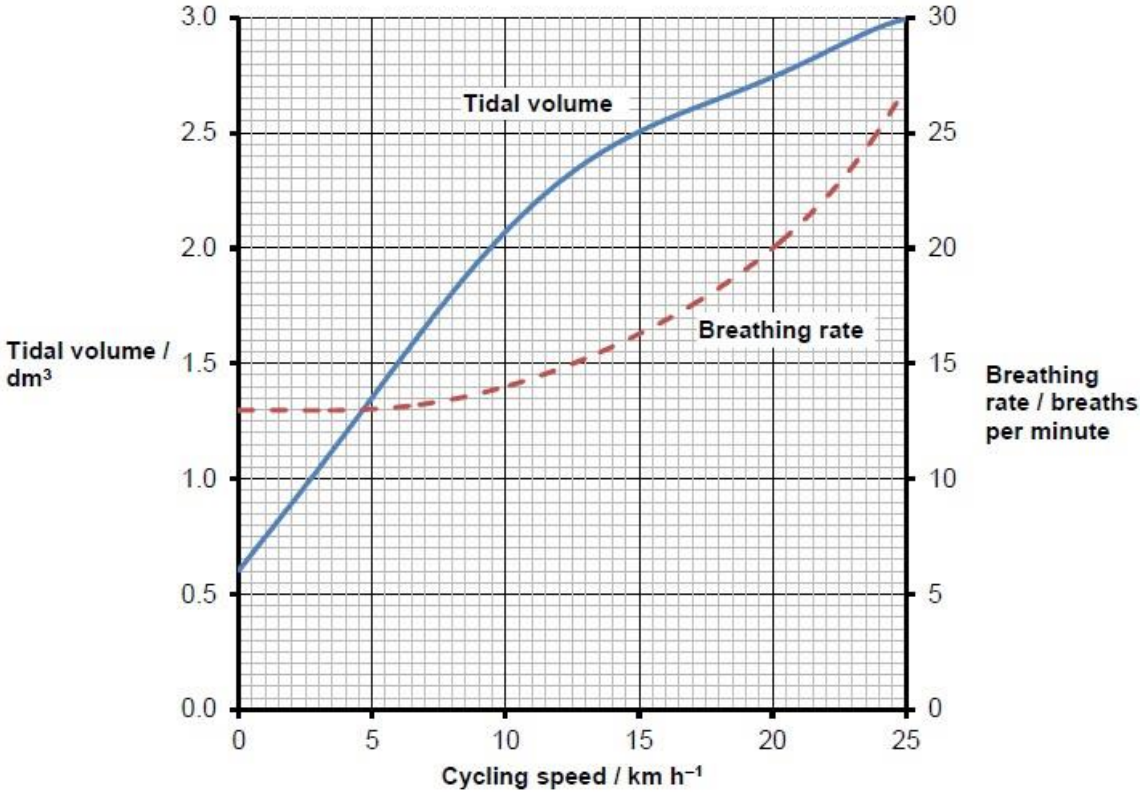
c) Deaths from lung cancer drop as people get older. Is there a bigger percentage difference form men or women from 35-64 to 75+?

d) What fraction of coronary heart disease deaths of men over 34 are in the 75+ bracket?

e) What fraction of coronary heart disease deaths of women over 34 are in the 75+ bracket?

3. 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 pedalling at different speeds. The graph shows the results.



a) What was the tidal volume when the cycling speed was 17 km h^{-1}?

b) What was the breathing rate when the cycling speed was 8 km h^{-1}?

c) What was the change in breathing rate when the cyclist changes from 10 to 20 km h^{-1}? Express this as a percentage.

d) At what speed did the breathing rate start to increase?

e) 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}.

f) For this initial linear section, what is the equation of the tidal volume line? (Hint: use $y=mx+c$)

Section B – OPTIONAL - Complete one research task from the four choices in this section.

1. Cells

The cell is a unifying concept in biology. It features many times in the A level course. Prokaryotic and eukaryotic cells can be distinguished on the basis of their ultrastructure. In complex multicellular organisms, cells are organised into tissues, organs and systems. During the cell cycle, genetic information is copied and passed to daughter cells. This can be during mitosis or meiosis.

Read the information on these websites:

https://a-levelnotes.co.uk/notes/biology/aqa

https://app.senecalearning.com/classroom/course/d0ce0c30-6417-11e8-8edc-d9cd1c890408/section/9161a5a90b79-4a52-a8fe-011a443df39f/session

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 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.

2. Ecosystems

Ecosystems range in size. Biomass transfers through ecosystems and the efficiency of transfer through different trophic levels can be measured. Microorganisms play a key role in recycling chemical elements. Ecosystems are dynamic systems, usually moving from colonisation to climax communities in a process known as succession. The dynamic equilibrium of populations is affected by a range of factors. Humans are part of the ecological balance and their activities affect it both directly and indirectly. Effective management of the conflict between human needs and conservation help to maintain sustainability of resources.

Read the information on this website:
https://a-levelnotes.co.uk/notes/biology/aqa/genetics-populations-evolution-and-ecosystems/populations-in-ecosystems

And take a look at these videos:
https://www.youtube.com/watch?v=jZKIHe2LDP8
https://www.youtube.com/watch?v=E8dkWQVFAoA

Task:
Produce a newspaper or magazine article about one ecosystem (e.g. the arctic, the Sahara, the rainforest, or something closer to home like your local woodland, nature reserve or shoreline). Your article should include:
Key words and definitions
Pictures or diagrams of your chosen ecosystem.
A description of the changes that have occurred in this ecosystem
An explanation of the threats and future changes that may further alter this ecosystem.

3. Control Systems

Homeostasis is the maintenance of a constant internal environment. Negative feedback helps maintain an optimal internal state in the context of a dynamic equilibrium. Stimuli, both internal and external, are detected leading to responses. Coordination may be chemical or electrical in nature

Read the information on this website
https://a-levelnotes.co.uk/notes/biology/aqa/organisms-respond-to-changes-in-their-internal-and-external-environments/principles-of-homeostasis-and-negative-feedback

And take a look at this video:
https://www.youtube.com/watch?v=x4PPZCLnVkA

Task:
Produce a poster to display in your classroom summarising one of the following topics:
Temperature Control, Water and the Kidneys, Glucose, or The Liver.

Whichever topic you choose, your poster or display should include:
Key words and definitions
Clearly labelled diagrams
Short explanations of key ideas or processes.

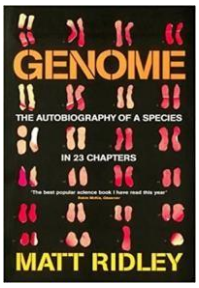
4. Scientific and Investigative Skills

As part of your A level you will complete practical assessments. 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.

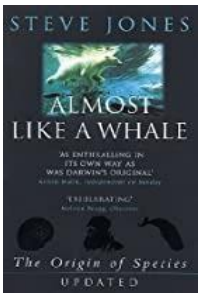
Task:
Produce a glossary for the following key words:

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

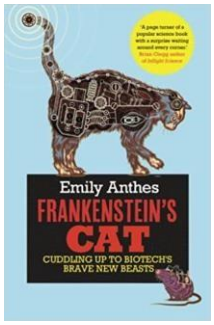
Book Recommendations



"Provocative and delightfully discursive essays on natural history". This collection of essays on biology is very interesting.

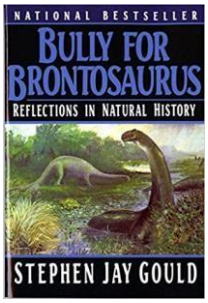


More than 98 percent of human genes are shared with two species of chimpanzee. The 'third' chimpanzee is man. Jared Diamond surveys out life-cycle, culture, sexuality and destructive urges both towards ourselves and the planet to explore the ways in which we are uniquely human yet still influenced by our animal origins

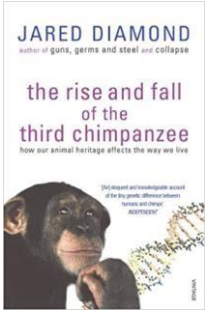


Packed with inspiring explanations of space, time and evolution, laced with humour and clever thought experiments, it explores a stunningly wide range of natural phenomena. This is a page turning, inspirational detective story that not only mines all the sciences for its clues but primes the reader to think like a scientist too.

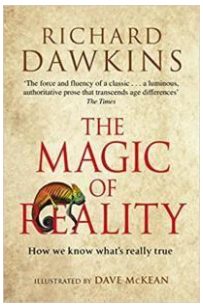
A brilliant explanation of genetics, old and new, one chromosome at a time! By looking at our genes we can see the story of our evolution, what makes us individual, how our sexuality is determined, how we acquire language, why we are vulnerable to certain diseases, how mind has arisen.



A modern accessible re-writing of Darwin's Origin of Species. From AIDS to dinosaurs, from conservation to cloned sheep, bursting with anecdotes, jokes and irresistible facts, Almost Like a Whale is a popular account of the science that makes biology make sense.

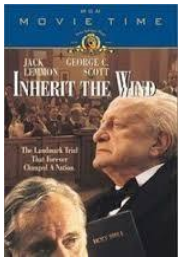


From the petri dish to the pet shop, meet the high-tech menagerie of the near future, as humans reinvent the animal kingdom. Discover how glow in the dark fish are made and more great Biotechnology breakthroughs. Frankenstein s Cat is an eye-opening exploration of weird science and how we are playing god in the animal world.



Film Recommendations Everyone loves a good story, especially one with some science in it! 😉

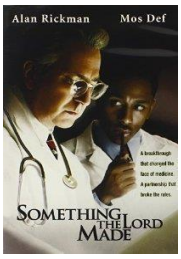
Gorillas in the Mist (1988)
An absolute classic that retells the true story of the life and work of Dian Fosseyand her work studying and protecting mountain gorillas from poachers and habitat loss. A tear jerker.



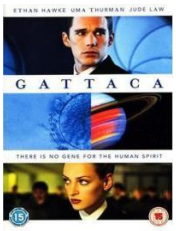
Inherit the Wind (1960)
Great if you can find it. Based on a real-life trial of a teacher accused of the crime of teaching Darwinian evolution in school in America. Does the debate rumble on today?

Andromeda Strain (1971)
Science fiction by the great thriller writer Michael Crichton he of Jurassic Park fame). Humans begin dying when an alien microbe arrives on Earth.

Lorenzo's Oil (1992)
Based on a true story. A young child suffers from an autoimmune disease. The parents research and challenge doctors to develop a new cure for his disease.

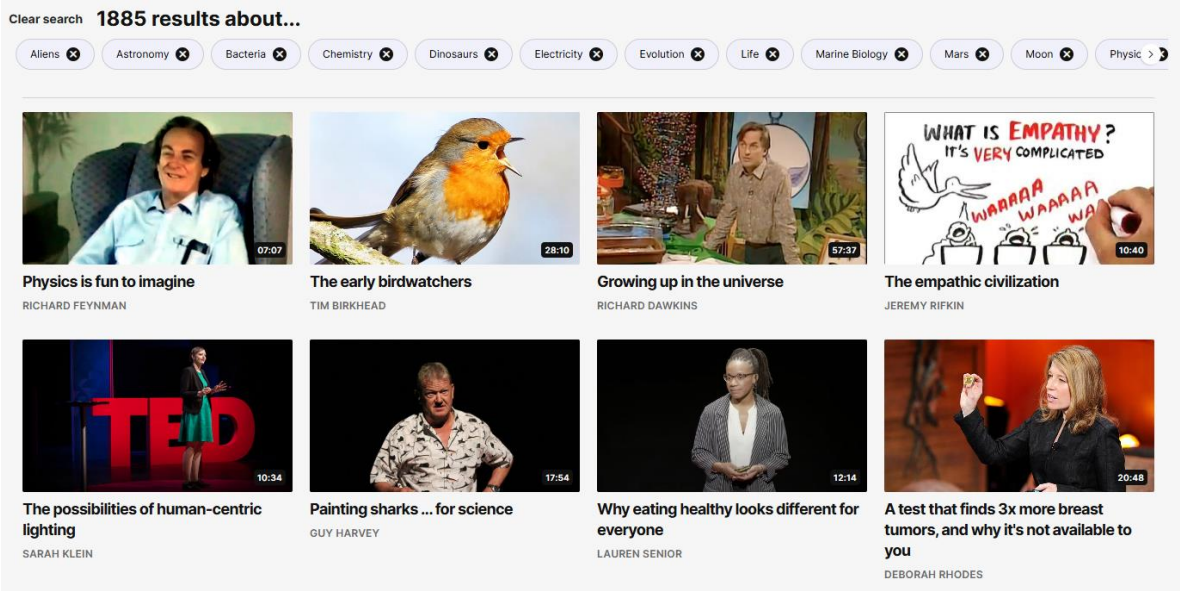


Something the Lord Made (2004)
Professor Snape (the late great Alan Rickman) in a very different role. The film tells the story of the scientists at the cutting edge of early heart surgery as well as issues surrounding racism at the time.



Gattaca
A dark, understated film about the dangers of eugenics. This film was ahead of its time.

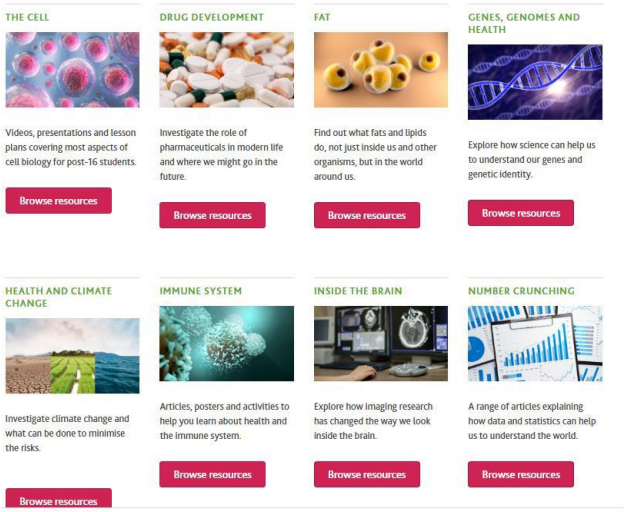
Other things to watch https://www.ted.com/talks You can filter by subject and duration



There are some great TV series and box sets available too, you might want to check out: **Blue Planet, Planet Earth, The Ascent of Man, Catastrophe, Frozen Planet, Life Story, The Hunt and Monsoon.**

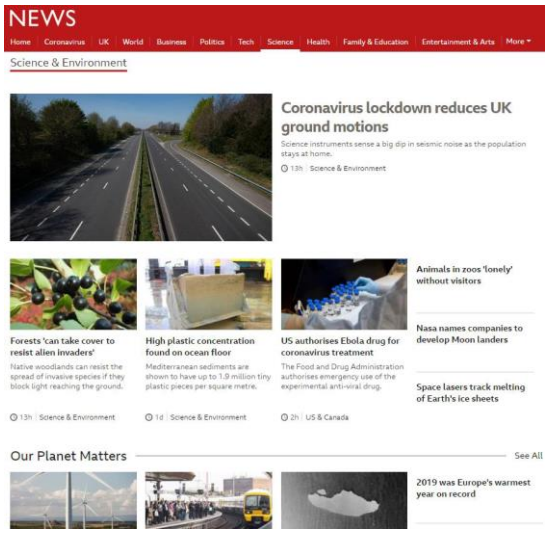
Articles

Biological Sciences Review This is a great combination of articles and exam hints.



The Big Picture is an excellent publication from the Wellcome Trust. Along with the magazine, the company produces posters, videos and other resources aimed at students studying for GCSEs and A level.

https://www.stem.org.uk/big-picture/resource-collection



You should keep up to date with science in the news. You can set up the BBC News app to show you news stories about science and environment or genetics.

https://www.bbc.co.uk/news/science_and_environment