



Durham Johnston



Transition from year 11 into A level Biology

July-August 2020

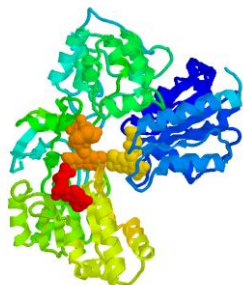
To complete Sections A to E of this booklet you can:

Print it out and complete Sections A to E where indicated

or

Write your answers to Sections A to E clearly on some file paper following the instructions at the end of this booklet.

Your completed work should be brought into school at the start of term in September.



Mr Durham
Johnston
form

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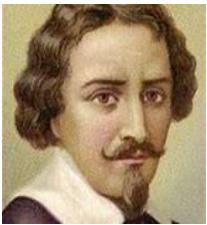


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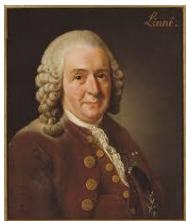

Welcome to the A Level Biology Course

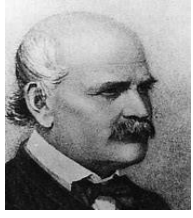
Hopefully you have chosen to study Biology because you find the subject interesting. There is a lot of knowledge to learn and understand and it will need consistent hard work to achieve success. You will also gain a lot of practical experience as investigation skills are very important in Science and are tested regularly in exam papers.




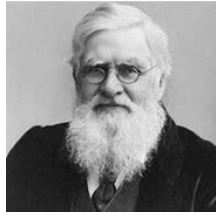
Section A: Famous scientists

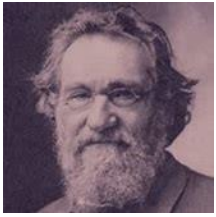

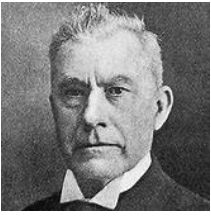
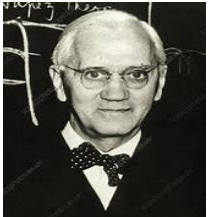
Over the centuries many important discoveries have been made that have greatly influenced the field of biology. Do some research and name the scientists who made the important discoveries. **(1 mark each; 40 marks)**





			
1.	2.	3.	4.
1578-1657	1585-1632	1632-1723	1635-1703
English	Dutch	Dutch	English
Blood circulation	Inventor of microscope?	Discovery of micro-organisms	First to observe cells under microscope



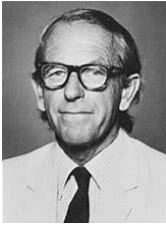

			
5.	6.	7.	8.
1689-1762	1707-1778	1749-1823	1799-1847
English	Swedish	English	English
Introduced smallpox "variolation" to Britain	Classification system	Pioneer of vaccination and smallpox vaccine	Fossil hunter – founder of palaeontology

			
9.	10.	11.	12.
1805-1881	1809-1882	1810-1882	1818-1865
Jamaican-British	English	German	Hungarian
Nursing and set up "British Hotel" in Crimean War	Theory of Natural selection	Cell theory (in animals)	Aseptic technique





			
13.	14.	15.	16.
1820-1910	1822-1884	1822-1895	1823-1913
British	Austrian	French	British
Founder of modern nursing	Inheritance patterns	Microbiological fermentation and pasteurisation	Natural selection theory





			
17.	18.	19.	20.
1845-1916	1846-1910	1851-1931	1881-1955
Russian	Belgian	Dutch	Scottish
Discovered Phagocytosis	Discovery of animal chromosomes	Founder of viruses	Discovery of lysozyme / penicillin

			
21.	22.	23.	24.
1891-1941	1901-1994	1916-2004	1916-2004
Canadian	American	English (NZ born)	English
Discovery of Insulin	Protein structure	DNA structure	DNA structure

			
25.	26.	27.	28.
1902-1992	1907-1964	1918-2013	1920-1958
American	American	English	English
Discovered mobile genetic elements ("jumping genes")	Global environment movement and wrote silent spring	DNA sequencing	DNA structure

			
29.	30.	31.	32.
1928-present	1928-2012	1932-1985	1934-present
American	American	American	English
DNA structure	3 domain system of classification	Expert on behaviour of mountain gorillas	World expert on chimpanzees

			
33.	34.	35.	36.
1938-2011	1938-present	1939-present	1940-2018
American	American	Israeli	American
Advanced the endosymbiotic theory of evolution	Virus classification and reverse transcriptase	Structure of the ribosome	Structure of ribosome

			
37.	38.	39.	40.
1944-2019	1948-present	1948-present	1952-present
American	Australian/American	American	Indian-British-American
Polymerase Chain Reaction	Discovered enzyme telomerase used in chromosome repair	Differentiation of cells can be reversed	Structure of the ribosome

Note: The use of the enzyme reverse transcriptase (scientist 34) coupled with the technique of PCR (Polymerase Chain Reaction) (Scientist 37) is the basis of the diagnostic test for Coronavirus. You will learn about these techniques in the Gene Technologies topic in Year 13.

Careers in Biology

A level biology will set you up for many degree courses and potential careers in many different areas of employment. In these unprecedented times over the last few months, the importance of Biology in Society has probably never been more apparent, in terms of assessing the risks of Coronavirus, understanding its spread and developing treatments and vaccines. The development of potential diagnostic tests, antibody tests,

ventilators and vaccines is down to the skills of biologists and other scientists in the public and private sectors of employment.



This image is from the website of the Royal Society of Biology which has lots of information for Biologists regarding careers and other areas.

<https://www.rsb.org.uk/careers-and-cpd/careers>

Section B: The A level Biology specification

To get started you should first briefly familiarise yourself with the specification. You will follow the OCR Biology A GCE A level course (Course code H020 for AS level and H420 for the full two year A level). Take a look at the specification and answer the questions. **(8 marks)**

<https://ocr.org.uk/qualifications/as-and-a-level/biology-a-h020-h420-from-2015/>

1. Module 1 is about practical investigation. What are the **four** investigation skills learned during section 1.1 of Module 1? **(1)**

.....

2. Module 2 is called “Foundations in Biology” and deals with underlying concepts in Biology. What are the **six** topics of Module 2? **(1)**

.....

.....

3. State the titles of Module 3 and of Module 4 (1)

Module 3:

Module 4:

4. Modules 1 to 4 make up the AS level content. After one year, how many exam papers are there for AS level Biology, how long is each paper and how many marks is each paper worth? (1)

.....

5. For A level there are two additional modules to learn. State the titles of Module 5 and 6. (1)

Module 5:

Module 6:

6. After two years, there are three exam papers to sit. Calculate the **total** time and the total number of marks for all three papers? (1)

.....

7. Which modules are tested on which papers? (1)

Paper 1 (Biological processes):

Paper 2 (Biological diversity):

Paper 3 (Unified Biology) :

There is also a practical endorsement where you must show competency in practical skills from 12 different practical assessment groups (PAGs).

8. Name **four** of the practical assessment groups: (1)

.....

.....

Section C: Maths skills

You will also find near the end of the specification all the maths skills that you are expected to have.

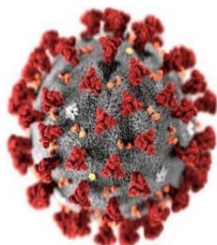
Some maths skills you will need are understanding standard form, converting units of measurement, using significant figures and decimal places, rearranging formulae and calculating percentage change. Have a go at these questions to practise these skills. **Make sure you write your final answer clearly on the answer line. (8 marks)**

1. As of 12.30pm April 16th 2020, there had been 98476 recorded cases of COVID-19 in the UK.

Write this number in **standard form to 3 significant figures. (2)**

.....

2. The COVID-19 virus has a diameter of approximately 1.5×10^{-7} m.



What is the diameter for this virus expressed in nm? **(1)**

..... nm

You should recall from GCSE that magnification = image size \div object size

3. Rearrange the equation to show how you would calculate image size. **(1)**

Image size =

4. If an electron microscope with a magnification of 5.0×10^5 was used to observe the COVID-19 virus, how large would its image be? Give your final answer **in cm** and express it to **1 significant figure (sf)**. **(2)**

..... cm

5. As of 15.30pm on April 16th 2020, the number of cases of COVID-19 in the UK had increased to 103,093. Calculate the percentage increase in cases over the 3 hour period between 12.30 and 15.30pm (refer back to Q1) and give your answer to **one decimal place (dp)**. **(2)**

Show your working:

..... %

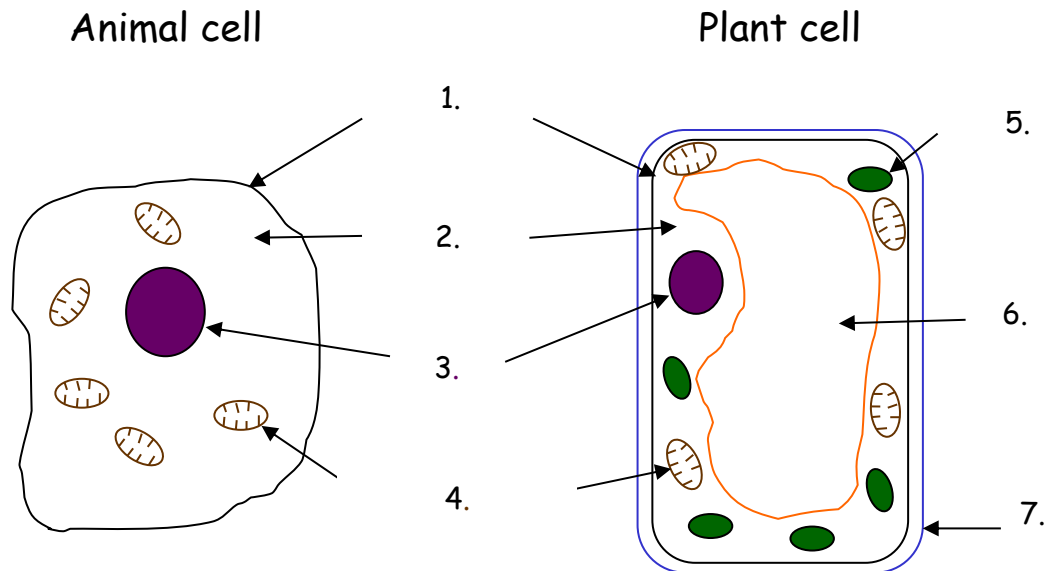
Section D: Transition work to get prepared for A level Biology

The following two pages outline how the course will be taught over the two years and then there is some transition work that you should complete on pages 11-20. The transition work will help to consolidate some important underlying GCSE work and develop some independent learning skills by starting some AS level work on cells, biological molecules, the genetic code and biodiversity.

Cell Structure:

1. Below is a diagram of an animal cell and a plant cell as seen using a light microscope. From your knowledge at GCSE you should be able to label the parts shown. **(7 marks)**

General structure of cells (from GCSE)



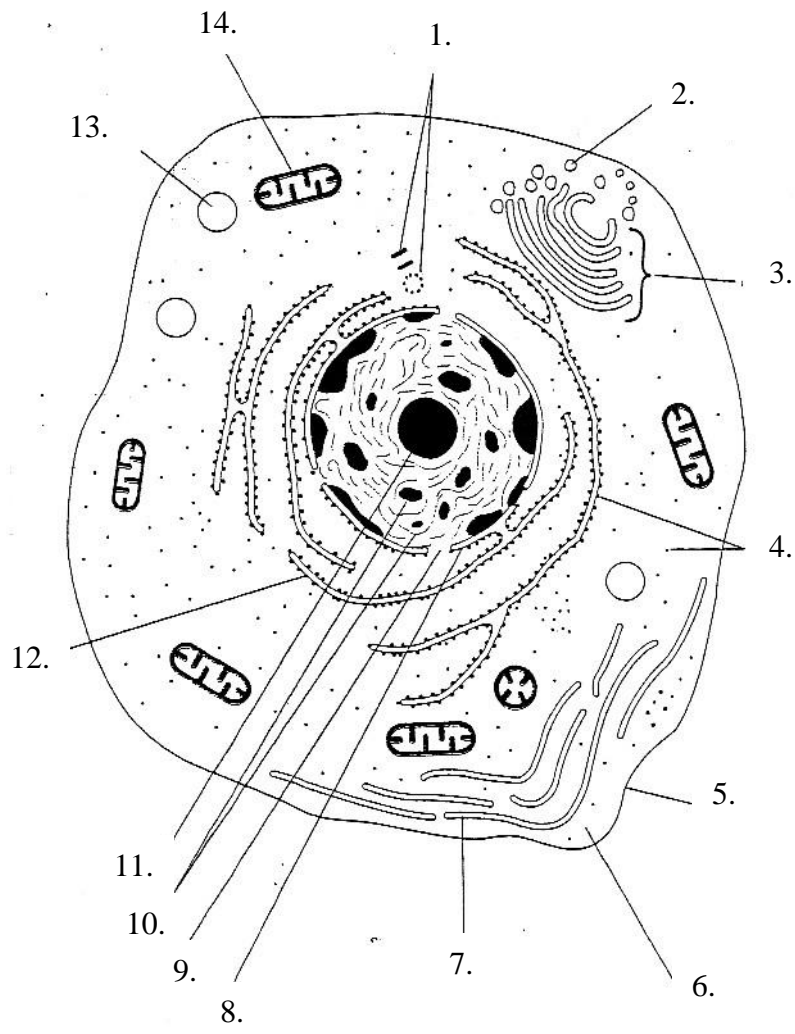
As part of your AS level Biology studies you will study Cell Structure in much more detail. The following pages show a diagram of an animal cell and a plant cell observed using an electron microscope. There are many more structures visible in the cell now. Use the internet or other sources of information to label the parts shown. Key words are given below to help you. Note that not all these structures are found in both animal and plant cells.

plasma membrane
cytoplasm
nuclear envelope
nuclear pore
nucleolus
chromatin
rough endoplasmic reticulum
smooth endoplasmic reticulum
ribosomes
mitochondrion

Golgi Apparatus
Golgi vesicle
centriole
lysosome
chloroplast
chloroplast envelope
cell wall
large vacuole
plasmodesma
tonoplast
grana

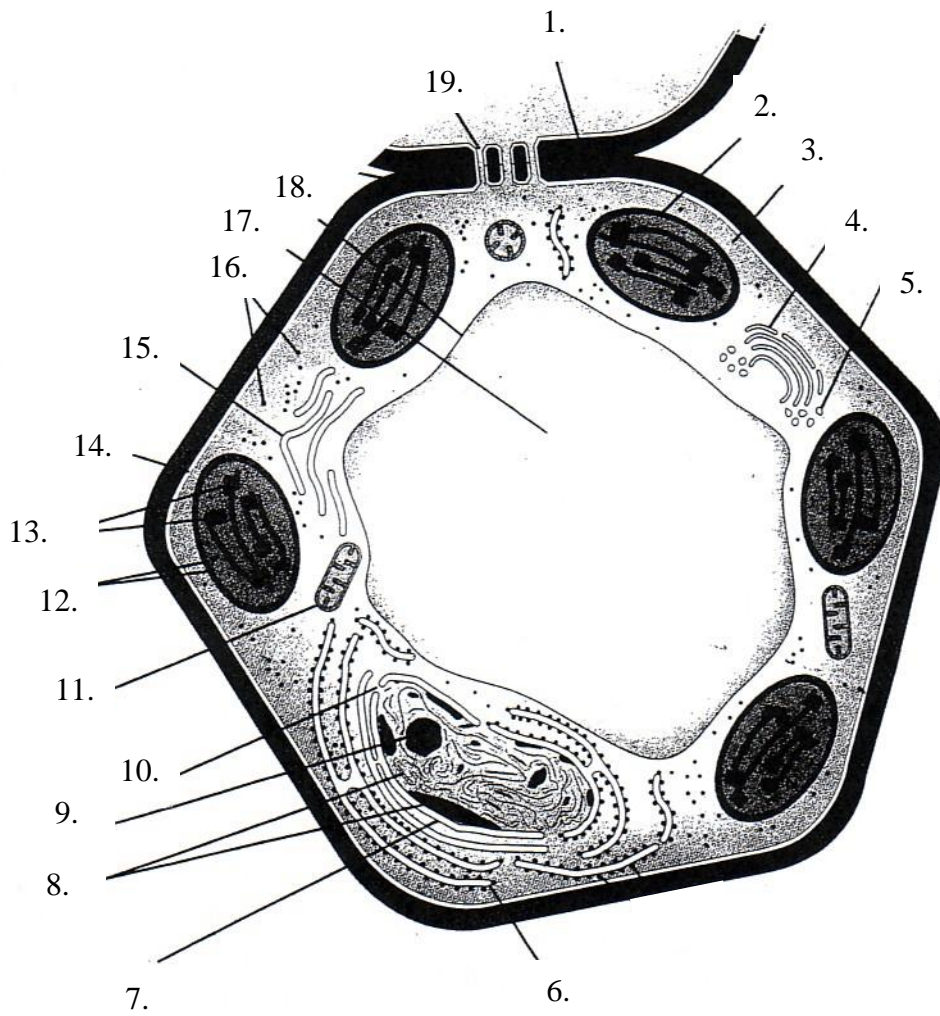
2. Using only the words in the list on the bottom of page 11, label this diagram of an animal cell seen using an electron microscope:

(14 marks)



3. Using only the words in the list at the bottom of page 11, label this diagram of a plant cell seen using an electron microscope:

(19 marks)



4. Research the functions of these cell parts and complete this table. You should either print out a suitable picture from the internet and stick it in the picture column or draw a neat diagram yourself. **You should state each function using no more than 2 words for each. (16 marks)**

Part of cell	Diagram or picture	State the function
Mitochondrion		
Nucleolus		
Rough endoplasmic reticulum		
Smooth endoplasmic reticulum		
Golgi Apparatus		
Lysosome		
Ribosome		
Chloroplast		

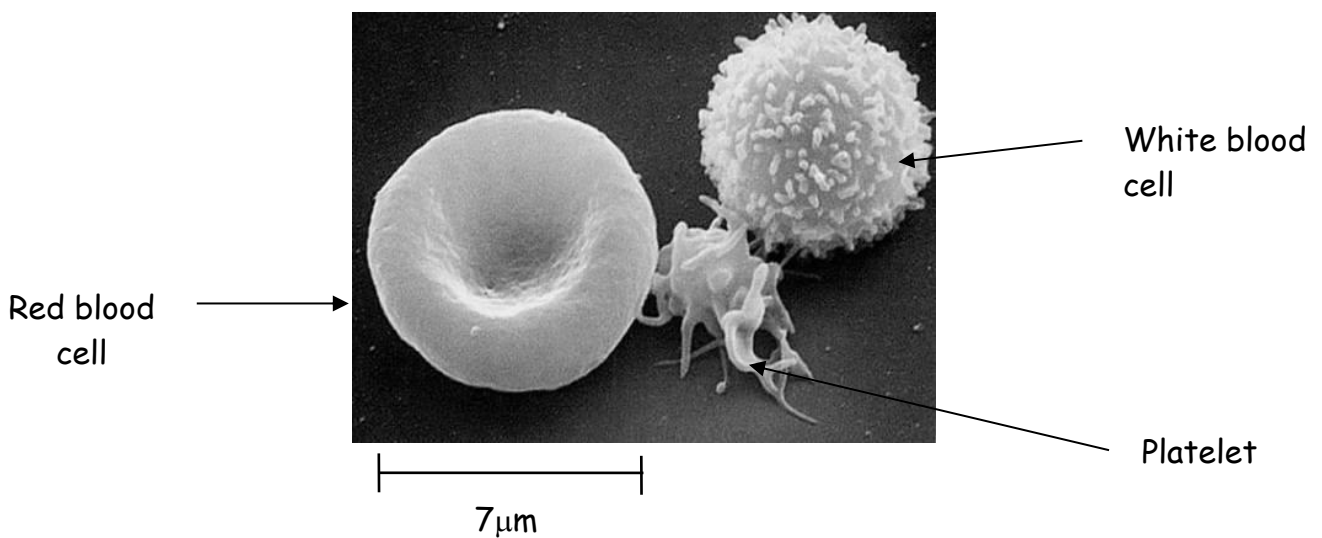
5. Magnification question:

Some amazing 3D pictures of cells can be seen using a Scanning Electron microscope.

This is a photograph of a red blood cell, a platelet and a white blood cell. The scale bar indicates its actual size but obviously its image on the paper is much bigger. If you are not printing this out, check the length of the scale bar by highlighting it and going to “format”. Now calculate the magnification of the image.

(Hint: Magnification is the size of the image divided by the actual size of the cell. The symbol μm means micrometres and 1 mm equals 1000 μm . To calculate the magnification, the size of the image and the size of the cell must be in the same units) **(3 marks)**

Image from <http://csu-cvmb.colostate.edu/images/immunology-image-150x150.jpg>



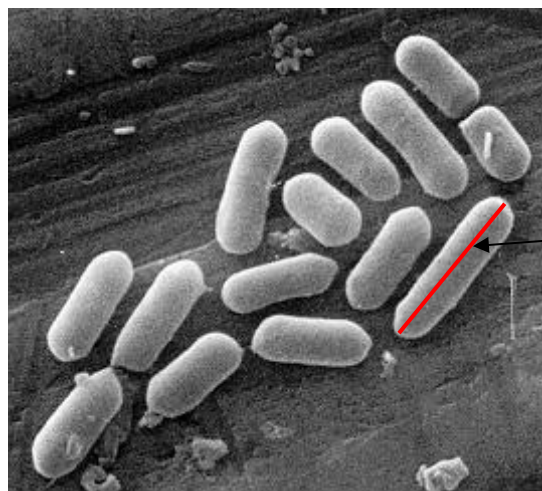
Show your working and then write your final answer clearly on the answer line:

Magnification is _____

6. Calculating the length of a cell:

Below is a Scanning Electron micrograph image of rod-shaped bacterial cells. The image has been magnified 10,000 times. Measure the length of the longest cell using a ruler and use this measurement to calculate the actual length of this bacterial cell. If you are not printing this out, highlight the red line and click format to find out the length of the line and use this measurement to calculate the actual length of this bacterial cell.

Show your working and **give your answer in μm . (3 marks)**



The longest bacterial cell in the image

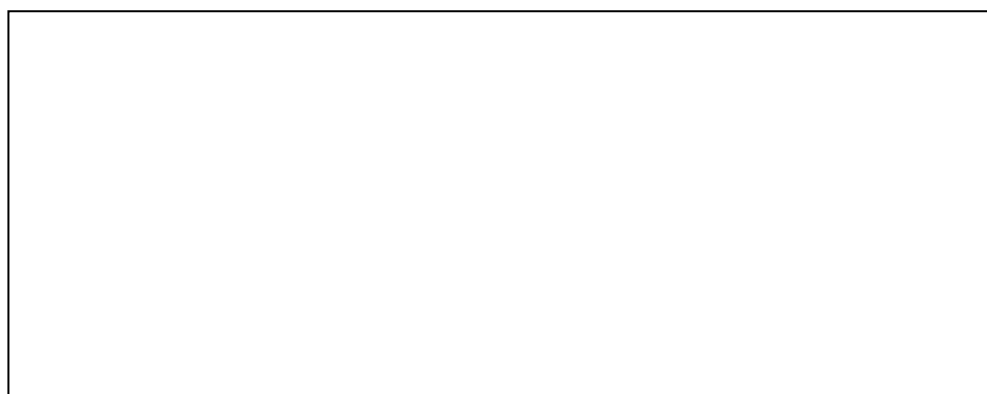
Show your working and then write your final answer clearly on the answer line:

Actual length of bacterial cell: _____ μm

7. Carbohydrates

As part of the AS level course you also learn about biological molecules in more detail. These include carbohydrates, fats, proteins and DNA. Carbohydrates that you will learn about include glucose, starch, cellulose and glycogen.

- a. The molecular formula of glucose is $C_6H_{12}O_6$. This means it has six carbon atoms, 12 hydrogen atoms and 6 oxygen atoms held together by covalent bonds. Use the internet to find out the structural formula of the **ring form** of **alpha** glucose that shows the positions of all the atoms and draw it here. (The structural formula shows the arrangement of atoms in the molecule). **(2 marks)**



- b. Starch, cellulose and glycogen are much larger molecules. Describe why they are much larger and what the differences in structure are between these three biological molecules. **(5 marks)**

.....

.....

.....

.....

.....

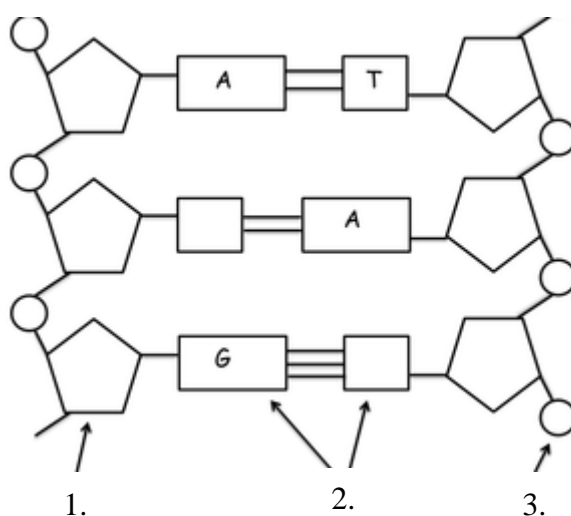
.....

.....

8. DNA

Another biological molecule you will learn about in detail is DNA. Secure knowledge of DNA structure will be fundamentally important in understanding how genetic material is replicated when cells divide and how genes are expressed so that proteins can be made.

- a. Label the arrows 1,2 and 3 at the bottom of this diagram of DNA with the following terms: base, sugar, phosphate and complete the missing bases. (2 marks)



At GCSE you learned that genes code for proteins. Genes are sections of DNA and therefore have a particular order of bases. In a gene each set of three consecutive bases is called a triplet codon and each triplet codon codes for a particular amino acid. Depending upon the order of the codons, amino acids are then linked together in a certain order to make a particular protein.

- b. There are twenty different amino acids that can be used to make proteins. Do a bit of research to find out which triplet codons code for which amino acids (the genetic code) and then state which four amino acids could be coded for by DNA above. (3 marks)

Possible triplet codon	Three letter abbreviation of amino acid	Full name of amino acid

9. Biodiversity and Conservation

Another important area of biology is conservation and how to maintain the biodiversity of our planet. Watch the video about Pangolins at the following link and answer the questions. If this video is unavailable, research a conservation project of another named mammal and answer the same questions.

<https://vimeo.com/181594609>

Questions on conservation of pangolins (or another mammal of your choice) **(6 marks)**

a. Describe two adaptations of this mammal. **(2)**

.....
.....

b. Explain why this mammal has become an endangered species. **(1)**

.....
.....
.....

c. What is the main diet of this mammal in the wild? **(1)**

.....

d. Describe two methods used to help to conserve this mammal? **(2)**

.....
.....
.....
.....

Section E: Biology in the news.

Currently the news is likely to be overwhelmed with articles on the Coronavirus outbreak. Try to find another news story involving biology over the summer holiday that you find interesting and give a brief description of the news story here. **(4 marks)**

Headline **(1)** :

.....
.....

Brief summary of news article **(2)** :

.....
.....
.....
.....

Where did you get your information about this news story? **(1)**

.....
.....

If you want to get ahead with your A level Biology studies, you can start to learn some of the knowledge for the course using the Seneca learning website:

<https://www.senecalearning.com/>

This is a free online resource. You will need to register. Once registered you can click “join class” and put in this code **4ebl490efo** and this will put you into the year 12 biology course for 2020-2022. Work your way through some of the topics to get a head start with some of the knowledge that you will need to know.

Other Biology websites that you might want to look at are:

<https://www.yourgenome.org/>

A great website if you are interested in learning more about molecular biology and genetics.

<https://www.wildscreen.org>

The world's biggest encyclopaedia of life on Earth if you are interested in ecology and conservation

<https://www.wwf.org.uk/>

World Wildlife Fund for Nature: the World's leading independent conservation organisation

<https://www.innerbody.com/>

Human anatomy website if you are interested in learning more about the human body.

<https://www.biologyonline.com/>

Biology definitions, articles and tutorials website

<https://plos.org/>

<https://www.nature.com/>

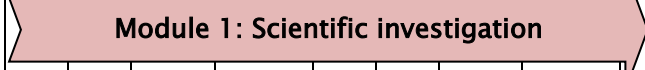
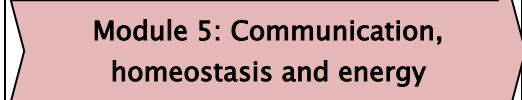
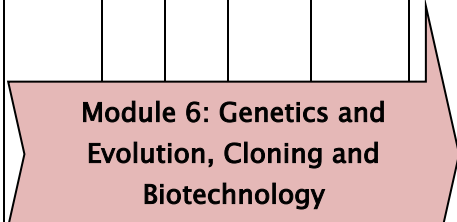
<https://www.biomedcentral.com/>

<https://www.cell.com/>

These are all websites with online access to some scientific journals if you want to see how a scientific paper is written.

The information on the last two pages shows how the course will be taught over the two years and how it is assessed.

Year 12 of Biology A level	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	
<p>Paper 1: Breadth in Biology; 1 hr 10 min; 70 marks</p> <p>Paper 2: Depth in Biology; 1 hr 10 min; 70 marks</p> <p><input type="checkbox"/> Section A - multiple choice (20 marks)</p> <p><input type="checkbox"/> Section B - includes short answer style questions (structured, problem solving, calculation, practical) and extended response questions (50 marks)</p> <p>Both papers assess all Modules 1 to 4</p> <p>Over both papers the following skills are tested:</p> <p>AO1: Recall of knowledge: 35–40%</p> <p>AO2: Application of knowledge: 40–44 %</p> <p>AO3: Analysis and Evaluation: 20–23%</p> <p>10% of the total marks will test maths</p>	Late Sept Reflection		Early Nov (1) Report		Mock Exam on Modules 1 and 2	Early Feb Full report (2) Early Feb Decide on INT or EXT exam?			Internal/ External exams	Internal/ External exams		
	Module 1: Scientific investigation									Module 1		
	Module 2: Foundations in Biology											
							Module 3: Exchange and Transport					
								Module 4: Biodiversity, Evolution and Disease				
										Module 6: Ecosystems, populations and sustainability		

Year 13 of Biology A level	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
<p>Paper 1: Biological Processes; 2hr 15 min; 100 marks (assesses Modules 1,2,3,5)</p> <p>Paper 2: Biological Diversity; 2 hr 15 min; 100 marks (assesses Modules 1,2,4,6)</p> <p><input type="checkbox"/> Section A - multiple choice (15 marks)</p> <p><input type="checkbox"/> Section B - includes short answer style questions (structured, problem solving, calculation, practical) and extended response questions (85 marks)</p> <p>Paper 3: Unified Biology; 1 hr 30 min; 70 marks (assesses Modules 1,2,3,4,5,6 using section B style questions only)</p> <p>Over all papers the following skills are tested:</p> <p>AO1: Recall of knowledge: 31–34 %</p> <p>AO2: Application of knowledge: 40–43%</p> <p>AO3: Analysis and Evaluation: 25–28 %</p> <p>10% of the total marks will test mathematical skills</p>			Mock	Report			Mock	Report		External exam
 Module 1: Scientific investigation										
 Module 5: Communication, homeostasis and energy										
 Module 6: Genetics and Evolution, Cloning and Biotechnology										

Instructions for answering on file paper:

Set out the work clearly in sections:

Section A: Give the names of the scientists numbered 1 to 40

Section B: Answer questions 1 to 8 making it clear which Modules you are referring to for questions 3 and 5 and which papers you are referring to for question 7.

Section C: When completing questions 1 to 5, show your working clearly and underline your final answer (with units if appropriate) so it is clearly identified.

Section D:

For Q1, list the names of the parts numbered 1 to 7 for the GCSE cells.

For Q2, list the names of the parts numbered 1 to 14

For Q3, list the names of the parts numbered 1 to 19

For Q4, draw your own table and complete it.

For Q5 and Q6, you should show your working and underline your final answers (with units if appropriate) so that they can be clearly identified.

For Q7, draw the structure for part a and give your written answer for b.

For Q8, copy the diagram of DNA and complete it for part a and copy and complete the table for part b.

For Q9, answer parts a to d.

Section E: Clearly write your headline, summary and information source.