Biology Bridging Work

As you embark upon your study of AS Biology, you will begin to explore the detailed structure of cells (Topic 2) and important biological molecules (Topic 1). The topics that you will extend your current knowledge on over the two year course are outlined below. Topics 1-4 will be taught in year 12 and topics 5-8 will be covered in year 13.

1 Biological molecules (AS level)

2 Cells (AS level)

3 Organisms exchange substances with their environment (AS level)

4 Genetic information, variation and relationships between organisms (AS level)

5 Energy transfers in and between organisms (A-level only)

6 Organisms respond to changes in their internal and external environments (A-level only)

7 Genetics, populations, evolution and ecosystems (A-level only)

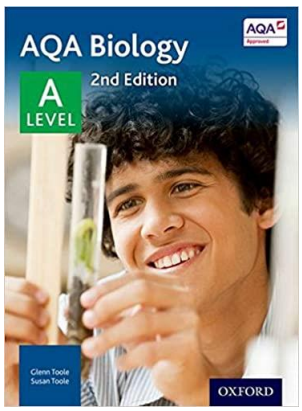
8 The control of gene expression (A-level only)

If you would like to read further into the specification you can do so using this link; https://filestore.aqa.org.uk/resources/biology/specifications/AQA-7401-7402-SP-2015.PDF.

Throughout the A-level course you will not only develop your knowledge and understanding of Biology but will also develop your practical, literacy and mathematical skills. To reach the highest grades at AS and A-level Biology, you should regularly engage in wider reading around the subject to extend your knowledge beyond the specification.

Book Recommendations

This is the course book we will be using and recommend. A couple of copies are in the library to borrow as well as potentially buying second hand copies from the current Y13 or online.



Interesting reads

JUNK DNA- Nessa Carey
A Short History of Nearly Everything- Bill Bryson
Frankenstein's Cat- Emily Anthes
Hen's Teeth and Horses Toes- Stephen Jay Gould

Tasks to Complete

These Biology Bridging Tasks are designed to help you to review the core principles that you learnt during your GCSE's and to prepare yourself for the first topic that will be taught at the beginning of year 12. You must bring this work to your first Biology lesson in September.

Cell Structure

Task 1

In September, you will be expected to be able to identify and describe the function of a range of organelles in plant and animal cells. You will already know the basic structure of these eukaryotic cells from GCSE. However, there are many more organelles to be aware of at AS level.

Find a diagrammatical representation of an animal and a plant cell showing its ultrastructure. Produce a summary table of the following organelles found in cells: Nucleus, Nucleolus, Ribosome, Mitochondrion, Golgi apparatus, Golgi vesicles Lysosome, Rough Endoplasmic Reticulum, Smooth Endoplasmic Reticulum, Chloroplast, Cell wall and Cell Vacuole. For each organelle you must include a diagram showing its structure, state whether it is found in plants and/or animal cells, and give a brief (no more than 15 words) description of its function.

The following online websites will give you information about the organelles found in cells.

http://www.cellsalive.com/cells/3dcell.htm

http://tinyurl.com/p784phe

https://www.youtube.com/watch?v=cj8dDTHGJBY

Task 2

Once you have completed your research, name each organelle below.

Plant cell

A

B

C

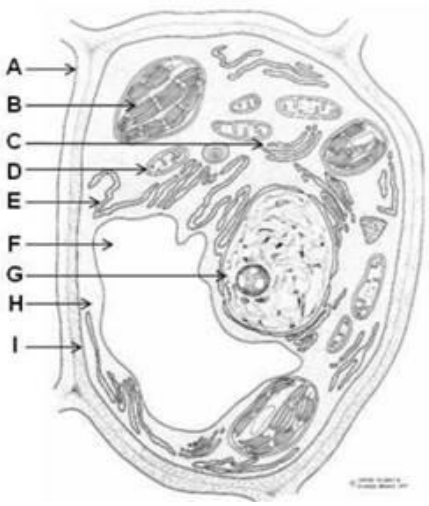
D

E

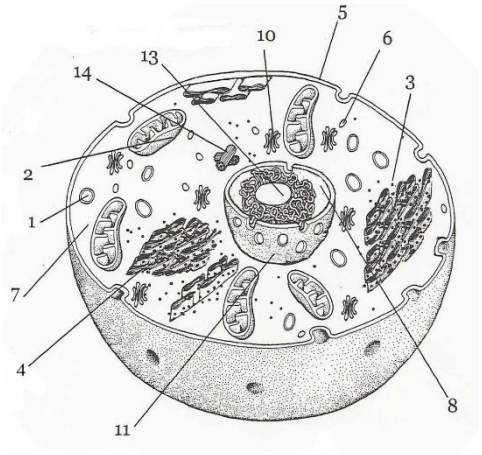
F

G

H



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



1

2

3

4

5

6

7

8

9

10

11

12

13

1. Which of the organelles listed above are not bound by a membrane.

2. Which of the organelles contains nucleic acid?

Task 3: Prokaryotic cell structure

1. Produce a clearly labelled diagram of a typical prokaryotic cell in the space below. It is an important skill to be able to draw specimens and reproduce diagrams at A-level. Use the guidelines below when completing your diagram;
   - Diagrams must be drawn and labelled in pencil.
   - They must be large and clear so that features can be easily distinguished.
   - Distinct single lines should be used when drawing, do not sketch.
   - Add a title and labels to your diagram. The title should be centred above the diagram and all the labels down either the left or right hand side of the diagram. Each label line should be straight and must not overlap with other label lines.
   - Annotation can be added, next to or underneath the label.
   - Add a scale bar to show relative sizes of the parts of the cell.

2. Complete the table to show the roles of the components in prokaryotic cells.

Component of prokaryotic cell	**Structure**	**Function**
Circular DNA		Contains the genetic information for the replication of cells
Cell membrane	Made of phospholipids and proteins.	
Cell wall		A physical barrier which excludes certain substances and protects against mechanical damage and osmotic lysis.
Ribosomes		Site of protein synthesis
	DNA in the form of small circular strands.	Has the genes that may aid survival of bacteria in adverse conditions.

Task 4: Maths Skills

Part of the course will rely on you being able to convert between the different units used when measuring cells and the organelles in cells. You will have met this in your GCSE course when converting mm to µm.

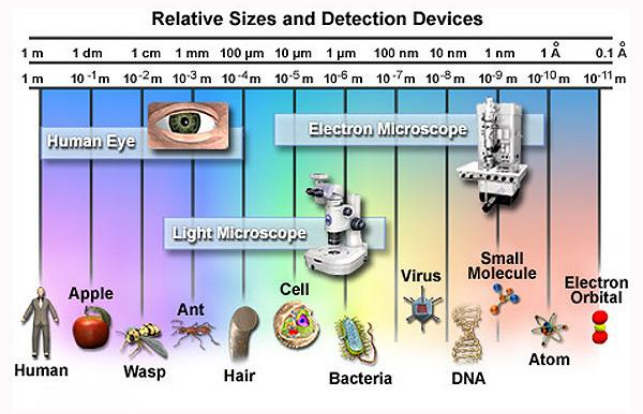
Useful information about units, prefixes and standard form

Name	Number	Symbol	Standard form	Getting it in perspective
deci	0.1m	d	10^{-1}	One tenth of a metre
centi	0.01m	c	10^{-2}	One hundredth of a metre
milli	0.001m	m	10^{-3}	Thousandth of a metre
micro	0.000001m	µ	10^{-6}	Millionth of a metre
nano	0.000000001m	n	10^{-9}	Billionth of a metre
pico	0.000000000001m	p	10^{-12}	Trillionth of a metre

Divide by 1000 for each step to convert in this direction →

Nano	micro	milli	whole unit	kilo
Nm	µm	mm	m	km

←Multiply by 1000 for each step to convert in this direction



Complete the gaps in the table to show the sizes of different organelles when expressed as different units

Structure	metres	millimetres	micrometres	nanometres
Human egg cell			130	
Length of a sperm cell	0.00006			60000
Length of an *E.coli* bacterium				3000
Diameter of a lysosome		0.001		
Width of a mitochondrion			0.8	
Diameter of the measles virus				220
Diameter of the rhinovirus				30
Antibody				12

Task 5: The use of microscopes

All living organisms are made up of cells that can only come from pre-existing like-cells. Therefore, to understand behaviour, genetics or disease we must study cells. Our knowledge of cell structure has come through a variety of approaches including biochemistry, physical analysis, computer analysis, and molecular genetics. However the traditional microscope has to have been the single most important tool in examining these all important 'work-houses'.

Your task is to produce an **A4 information sheet** about light and electron microscopy. You may use any of the following resources listed below or any other resources, however all resources must be appropriately referenced. It is vital that all work is in your **own words**.

Your fact sheet must include the following points:

- Why we need to use microscopes to study cells.
- A brief summary of the types of microscope available and a simple description of how each one works (limited to optical, transmission electron microscopes and scanning electron microscopes). You may wish to use diagrams in this section.
- What we mean by the terms **magnification** and **resolution** and how and why these vary in the different types of microscope.
- Why increasing magnification does not always increase the detail you can view of a specimen or image.
- The main limitations of each of the three types of microscope.
- You could also research the history how microscopes have developed and the importance of recent advance in staining techniques in developing our understanding.
- The key terminology which should appear in your information sheet is listed in the table below. For your own learning you may benefit from producing a glossary for each of the terms shown in bold.

microscopy	**resolution**	**magnification**	**specimen**	**image**
transmission electron microscope (TEM)	**scanning electron microscope (SEM)**	**Optical microscope**	**wavelength of light**	**wavelength of a beam of electrons**
Resolving power	**eye piece lens**	**objective lens**	**condenser lens**	**photomicrograph**
Electron gun	**artefacts**	**2D image**	**3D image**	**scattered electrons**