SIXTH FORM CENTRE
UNIVERSITY COLLEGE BIRMINGHAM

A-Level Biology
Summer Transition Work
2025-2026

Welcome to A-level Biology!

There are a two important things that you need to do to be ready to start the A level in September.

1. Make sure you have appropriate materials for lessons. We recommend folders, dividers, A4 paper, stationary such as pens, pencils and highlighters and ideally a scientific calculator.

2. Complete the transition **summer work** detailed in the tasks on the following pages

It is so important that you start the course feeling prepared so please give yourself plenty of time to complete the transition work. It should take between 5 and 10 hours.

If you studied Combined Science, not Triple Science:

This doesn't mean you will be at a disadvantage if you study A Level Biology. However, the tasks below will help to improve your confidence and fill in any gaps you might have:

1. Genes are hereditary units that determine the characteristics of all living organisms. Watch the video (https://www.youtube.com/watch?v=gG7uCskUOrA) about how genes code for proteins, and thereby determine characteristics. Watch the video a second time, pausing regularly in order to create a flow chart of this process (known as protein synthesis). Adding diagrams will make it more memorable.

2. Read BBC Bitesize and watch videos of the two core practicals that were only in the Triple Science course:

a) Food tests
https://www.bbc.co.uk/bitesize/guides/z88hcj6/revision/5
https://youtu.be/xFLuYKy3m1g

b) Effect of different antibiotics on bacteria
https://www.bbc.co.uk/bitesize/guides/zyxg7p3/revision/11
https://youtu.be/Cl6EMg0zA-A

Task 1: Maths Skills

Maths Skills. Analysing and interpreting data in Biology is essential. Read the information and complete the tasks below to reinforce the basic skills:

Understanding and using SI units

Every measurement has a size (e.g. 2.7) and a unit (e.g. metres or kilograms). Sometimes, there are different units available for the same type of measurement. For example, milligram, gram, kilogram and tonne are all units used 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.

There are seven SI base units, which are given in the table.

Physical quantity	Unit	Abbreviation
Mass	kilogram	kg
Length	metre	m
Time	second	s
Electric current	ampere	A
Temperature	kelvin	K
Amount of substance	mole	mol

All other units can be derived from the SI base units. For example, area is measured in metres squared (m^2) and speed is measured in metres per second ($m\ s^{-1}$, this is a change from GCSE where it is written m/s).

What would be the most appropriate unit to use for the following measurements?

1. The time between heart beats
2. The diameter of a cheek cell
3. The distance that a migratory bird travelled each year
4. The thickness of a DNA helix
5. The mass of a rabbit
6. The mass of iron in the body
7. The diameter of a glucose molecule

Converting units

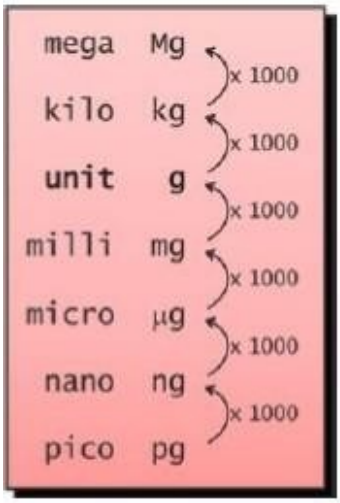
Knowing how different units are related to each other can come in useful if you need to swap from one to the other. You just have to remember the number you need to multiply or divide by (the **conversion factor**).

- ✓ To convert from a larger to a smaller unit, you **multiply** by the conversion factor.
- ✓ To convert from a smaller to a larger unit, you **divide** by the conversion factor.

In both of the following examples, the conversion factor is 1000.

e.g. convert 2 m to mm 2 m X 1000 = 2000 mm

e.g. convert 5000 g to kg 5000 g ÷ 1000 = 5kg



Re-write the following:

1. 0.00224 metres in millimetres
2. 104 micrograms in grams
3. 6.2 kilometres in metres
4. 10 micrograms in nanograms
5. 70 decilitres in litres
6. 10 cm^3 in litres

Rounding and significant figures

Sometimes a calculation will give a number with a lot of digits after the decmal point. Rather than writing them all down, **rounding** can cut out a lot of the digits, while keeping the value roughly the same.

e.g. 4.26866 can be rounded to

- ✓ 4.2687 (to 4 decimal places)
- ✓ 4.269 (to 3 decimal places)
- ✓ 4.27 (to 2 decimal places)
- ✓ 4.3 (to 1 decimal place)

Rounding to significant figures is the same as rounding to decimal places, except for one thing: instead of counting from the decimal point, count from the first digit that isn't zero.

e.g. 0.0020531 is rounded to 5 significant figures. If it were rounded to 2 significant figures it would be 0.0021.

State the number of significant figures in each of the following numbers.

(a) 1302

(a) 600

(a) 0.005601

(a) 0.04500

Round the following numbers to the specified number of significant figures.

(a) 1865 to two significant figures

(b) 0.358 to one significant figure

(c) 0.09076 to three significant figures

(d) 0.000 49648 to two significant figures

Standard form

(https://www.bbc.co.uk/bitesize/guides/zxsv97h/revision/1 or Google 'standard form GCSE')

1. Convert the following measurements into standard form:
   a) 3060 kJ b) 140 000 kg c) 0.00018 m d) 0.000004 m

2. Write the following numbers in standard form:
   a) 100 b) 10 000 c) 0.01 d) 21 000 000

3. Write the following values as decimals:
   a) 10^6 b) 4.7×10^9 c) 1.2×10^{12} d) 7.96×10^{-4}

Calculating percentages

To work out a percentage, you must identify or calculate the total number using the equation:

$$\text{percentage} = \frac{\text{number you want as a percentage of total number}}{\text{total number}} \times 100\%$$

For example, in a population, the number of people who have brown hair was counted.

The results showed that in the total population of 4600 people, 1800 people had brown hair.

The percentage of people with brown hair is found by calculating:

$$\frac{\text{number of people with brown hair}}{\text{total number of people}} \times 100$$

$$= \frac{1800}{4600} \times 100 = 39.1\%$$

Practice questions

1 The table below shows some data about energy absorbed by a tree in a year and how some of it is transferred.

Energy absorbed by the tree in a year	3 600 000 kJ/m^2
Energy transferred to primary consumers	2240 kJ/m^2
Energy transferred to secondary consumers	480 kJ/m^2

Calculate the percentage of energy absorbed by the tree that is transferred to

a primary consumers **b** secondary consumers.

2 One in 17 people in the UK has diabetes.

Calculate the percentage of the UK population that have diabetes.

Calculating percentage change

$$\%\ \text{increase} = \frac{\text{increase}}{\text{original amount}} \times 100$$

$$\%\ \text{decrease} = \frac{\text{decrease}}{\text{original amount}} \times 100$$

Calculate the percentage change if:

1. a carrot chip changes from 5 mm long to 4.8 mm long in salt solution.
2. a reaction produces 22 cm^3 of gas per min at 20°C and 48 cm^3 of gas per min at 30°C.
3. the number of bacterial cells in a colony changes from 5×10^4 to 2×10^5 after 1 hour.
4. an athlete's pulse rate changes from 165 beats per min to 75 bpm after a race.

Task 2: A-level Biology goes into the topics you studied at GCSE in more detail and depth.

The tasks below will help you in the first few lessons when you join us in September. Please bring your completed work with you and we can use this to give you the best start to the course and build your confidence.

At GCSE, you will have learned the names of some of the organelles found within eukaryotic cells. At A Level, you will learn about more organelles and in much more details.

Eukaryotic Cell Structure from Miss Estruch:

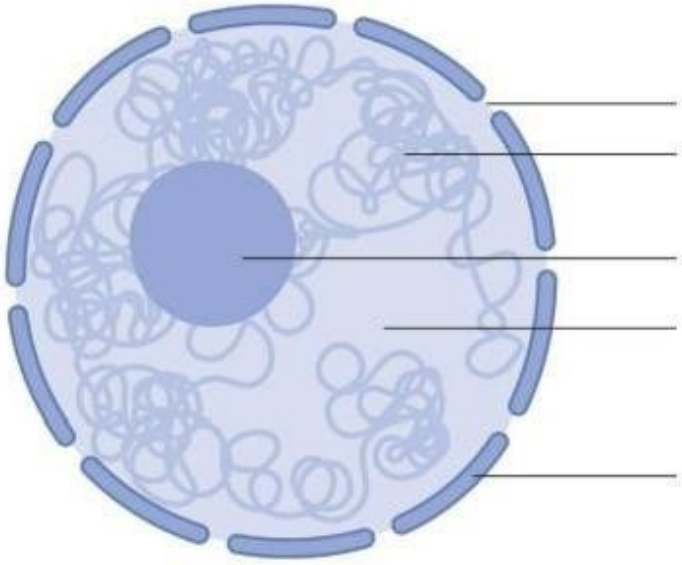
https://www.youtube.com/watch?v=vEzXQGJSXhU

Notes on Cell Structure from Save my Exams:

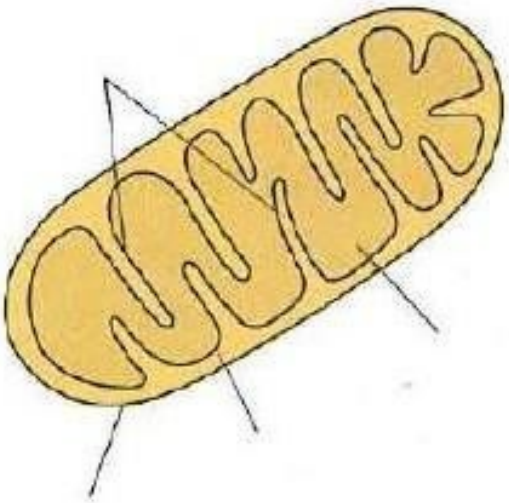
https://www.savemyexams.com/a-level/biology/aqa/17/revision-notes/2-cell-structure/2-1-cell-structure/2-1-2-structure-of-eukaryotic-cells/

Watch the video above and use notes above to label the diagrams of the organelles with their key features.

Nucleus

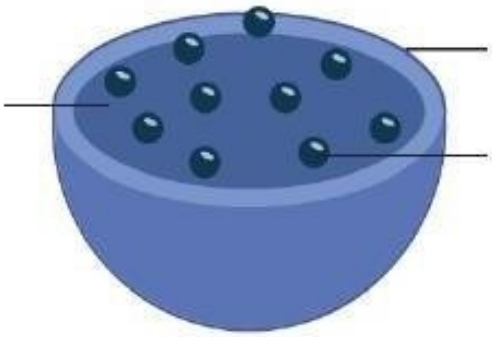


Mitochondria

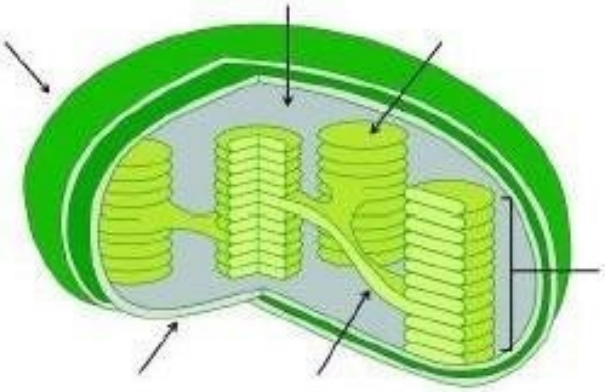


Golgi Apparatus

Lysosome

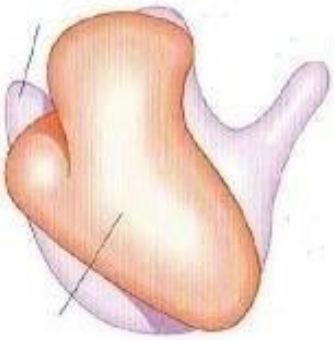


Chloroplast



Rough Endoplasmic Reticulum

Ribosome



Once again using the video and notes, rearrange the table below to match the organelles to their structure and function.

Organelle name	Description of structure	Description of function
Nucleus	A crescent shaped stack of flattened, membrane-bound sacs called cisternae.	Produce ATP during aerobic respiration
Mitochondrion	Consist of a lumen, surrounded by a single membrane and contains hydrolytic enzymes.	Site of protein synthesis
Rough Endoplasmic Reticulum (RER)	A single membrane called a tonoplast, containing a solution of mineral salts, sugars, amino acids, wastes and sometimes pigments.	Hydrolyses material ingested by phagocytes, releases enzymes out of the cell, digests worn out organelles and breaks down cells after they have died.
Chloroplast	Composed of cellulose microfibrils in plant cells. These structures also have pores, called plasmodesmata, that allow the cytoplasm of adjacent cells to connect.	Contains the genetic material that is passed on from one generation to the next & provides the code for protein synthesis.
Cell wall	Consists of a series of flattened, membrane bound sacs (cisternae) that are linked to the nuclear envelope. It does not have ribosomes.	Supports herbaceous plants, acts as a temporary food store, may colour parts of plants e.g., petals to attract pollinators.
Golgi Apparatus	Large organelle surrounded by a double membrane. Contains a gel- like fluid called the stroma and internal membranes called thylakoids; these contain chlorophyll.	A variety of functions but its main role is chemically modifying & packaging proteins to be exported from the cell.
Smooth Endoplasmic Reticulum (SER)	Made of a type of RNA and protein. Consist of a large subunit and a small subunit.	Synthesises, stores and transports lipids and carbohydrates
Ribosome	Consists of a series of flattened, membrane-bound sacs (cisternae) that are linked to the nuclear envelope. This type of ER has ribosomes studded into its membranes.	Provides mechanical strength and support. Stops the cell bursting in dilute solutions i.e., prevents osmotic lysis.
Lysosome	Organelle found in nearly all cells surrounded by a double membrane consisting of an outer membrane & a highly folded inner membrane. Inside is a fluid matrix containing ribosomes & a loop of DNA.	Site of protein synthesis and used as a transport system for proteins
Vacuole	Contains DNA which is surrounded by a double membrane called a nuclear envelope. The nuclear envelope has pores which allow the movement of large molecules out of the nucleus.	Site of photosynthesis

As with eukaryotic cells, at A Level, you will learn more detail about the structure of prokaryotic cells.

Introduction to Prokaryotic Cells on SnapRevise:
https://www.youtube.com/watch?v=W_geqbT3KUc&list=PLkocNW0BSuEEMyVUCyaRPVj_cahCvjxAr&index=28

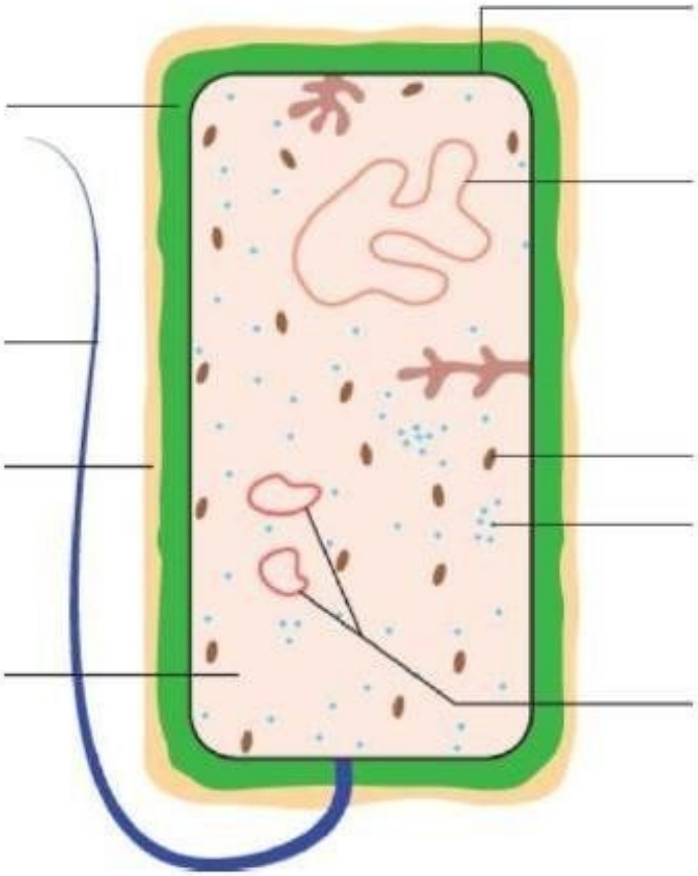
Notes on Prokaryotic Cell Structure from Save my Exams:

ttps://www.savemyexams.com/a-level/biology/aqa/17/revision-notes/2-cell-structure/2-1-cell-structure/2-1-5-structure-of-prokaryotic-cells/

Using the video and notes above, label the diagram below. Your labels should include the name of the feature, key details of its composition and its function. One is done for you as an example.

Highlight the features that occur in ALL prokaryotic cells, leaving the features that may be present unhighlighted.

Cell wall- Made of the glycoprotein murein. Provides strength and rigidity to the cell.



Microscopy is one of the tools that scientists have used to determine the structure of different cell types. You will be familiar with light microscopes and may have also come across electron microscopes. At A Level, we will look at these in more detail and you will become more confident in your use of light microscopes.

Notes on Studying Cells from Save my Exams

-https://www.savemyexams.com/a-level/biology/aqa/17/revision-notes/2-cell-structure/2-2-the-microscope-in-cell-studies/2-2-1-methods-of-studying-cells/

Be sure to use the menu on the right to find all of the correct information for each task.

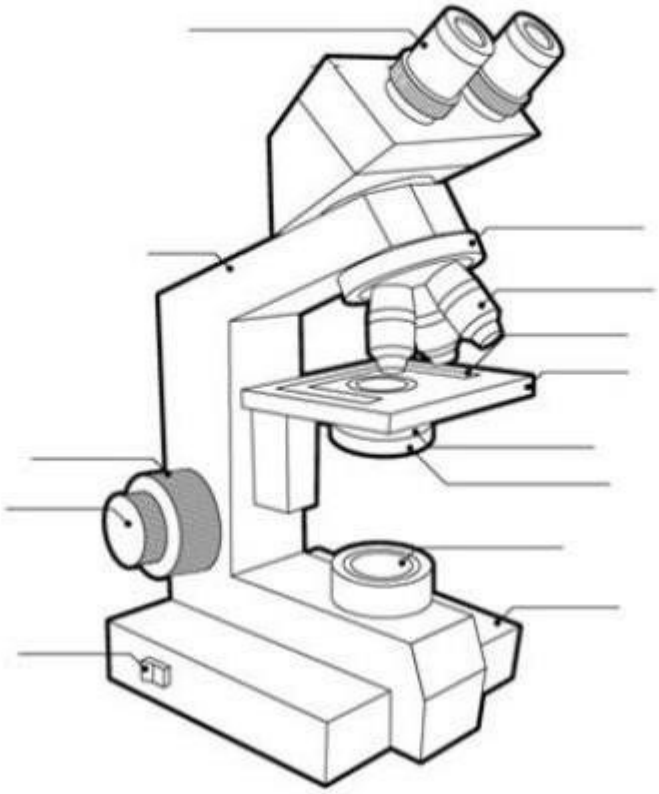
Define the following terms:

Magnification-

Resolution-

Label the diagram to show the key parts of the microscope.

Parts of a Microscope



Complete the table. One is done for you as an example of the level of detail to include.

		Advantages	Disadvantages
Optical microscope			• Lower resolution- maximum of 0.2 µm
Electron microscope	Transmission	• Higher resolution- maximum of < 1nm	
	Scanning	• Higher resolution- maximum of 1-20 nm	

Final notes

The notes that you make in lesson are important but not as important as the effort you with the various tasks in independent study. You should be spending the same amount of time outside the lesson as inside on this. It's much easier if you stay on top of this. If you are struggling make sure you speak to your teacher and tutor for extra help and support.

You should regularly access Canvas to review the various lesson materials we will be using, as well as using the textbook effectively, completing any independent study work and coming to all lessons, on time and with the appropriate equipment.

Biology is the Science of Life and is a huge subject. There are regularly stories in the news concerning the biological sciences so make sure you are looking out for notifications on your channels. It also really helps to read effectively around the subject and make this a habit for success.

Here are some ideas for some summer reading to help to inspire you for next year:

- The Double Helix by James Watson
- Silent Spring by Rachel Carson
- Genome by Matt Ridley
- Creation by Adam Rutherford
- The Body: A Guide for Occupants by Bill Bryson
- The Immortal Life of Henrietta Lacks by Rebecca Skloot
- A Crack in Creation by Jennifer Doudna and Samuel Sternberg
- Sapiens by Yuval Noah Harari