

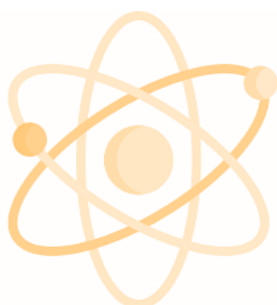


OAKS PARK SIXTH FORM
Learning Together, Achieving Together



A Level Biology

Transition Booklet 2026-27



Full Name: _____

Key Areas of Focus	
Introduction to A Level Course	AS and A-Level Biology Specification
Activities: Working Scientifically and Math Skills	Mathematical Requirements in Biology
Activities: GCSE knowledge links	A range of videos on different Biological topics
Wider Reading	Biological Sciences Review (some free articles) Careers in Biology

Introduction to A Level Course

Understanding the specification and the assessments

The specification is a useful reference document for you. You can download a copy from the **AQA website**.

In Biology, the subject content is split between AS and A level (sections 3.1 – 3.4) and A level only (sections 3.5-3.8). The section titles are listed here:

- 1.1 Biological molecules**
- 1.2 Cells**
- 1.3 Organisms exchange substances with their environment**
- 1.4 Genetic information, variation and relationships between organisms**
- 1.5 Energy transfers in and between organisms (A level only)**
- 1.6 Organisms respond to changes in their internal & external environments (A level)**
- 1.7 Genetics, populations evolution and ecosystems (A level only)**
- 1.8 The control of gene expression (A level only)**

Assessment structure

AS: The assessment for the AS consists of two exams taken at the end of the course.

Paper 1	+	Paper 2
What's assessed Any content from topics 1-4 including relevant practical skills		What's assessed Any content from topics 1-4 including relevant practical skills
How it's assessed - Written exam: 1 hours 30 mins 75 marks 50% of the AS-level		How it's assessed - Written exam: 1 hours 30 mins 75 marks 50% of the AS-level
Questions 65 marks short answers questions 10 marks comprehension questions		Questions 65 marks short answers questions 10 marks comprehension questions

A level: The assessment for the A-level consists of three exams taken at the end of the course.

Paper 1	Paper 2	Paper 3
What's assessed Any content from topics 1-4 including relevant practical skills	What's assessed Any content from topics 5 – 8 including relevant practical skills	What's assessed Any content from topics 1-8 including relevant practical skills
How it's assessed - Written exam: 2 hours 91 marks 35% of the A-level	How it's assessed - Written exam: 2 hours 91 marks 35% of the A-level	How it's assessed - Written exam: 2 hours 78 marks 30% of the AS-level
Questions 76 marks: a mixture of short and long answer questions 15 marks: extended response questions	Questions 76 marks: a mixture of short and long answer questions 15 marks: extended response questions	Questions 38 marks: structured questions, including practical techniques 15 marks: critical analysis of given experimental data 25 marks: one essay from a choice of two titles

Assessment objectives

As you know from GCSE, we have to write exam questions that address the Assessment objectives (AOs). It is important you understand what these AOs are, so you are well prepared. In Biology there are three AOs.

- **AO1: Demonstrate knowledge and understanding of scientific ideas, processes, techniques, and procedures**
- **AO2: Apply knowledge and understanding of scientific ideas, processes, techniques, and procedures;** in a theoretical context, in a practical context, when handling qualitative data, when handling quantitative data
- **AO3: Analyse, interpret, and evaluate scientific information, ideas, and evidence, including in relation to;** make judgements and reach conclusions and develop and refine practical design and procedures

Other assessment criteria

At least 10% of the marks for AS and A-level Biology will assess mathematical skills, which will be equivalent to Level 2 (Higher Tier GCSE Mathematics) or above.

At least 15% of the overall assessment of AS and A-level Biology will assess knowledge, skills and understanding in relation to practical work.

Activities: Working Scientifically and Math Skills

The following activities cover some of the key skills from GCSE science that will be relevant at AS and A-level. They include the vocabulary used when working scientifically and some maths and practical skills

Activity 1 Scientific vocabulary: Designing an investigation

Link each term on the left to the correct definition on the right.

Hypothesis

The maximum and minimum values of the independent or dependent variable

Dependent variable

A variable that is kept constant during an experiment

Independent variable

The quantity between readings, eg a set of 11 readings equally spaced over a distance of 1 metre would give an interval of 10 centimetres

Control variable

A proposal intended to explain certain facts or observations

Range

A variable that is measured as the outcome of an experiment

Interval

A variable selected by the investigator and whose values are changed during the investigation

Activity 2 Scientific vocabulary: Making measurements

Link each term on the left to the correct definition on the right.

True value

The range within which you would expect the true value to lie

Accurate

A measurement that is close to the true value

Resolution

Repeated measurements that are very similar to the calculated mean value

Precise

The value that would be obtained in an ideal measurement where there were no errors of any kind

Uncertainty

The smallest change that can be measured using the measuring instrument that gives a readable change in the reading

Understanding and using SI units

Every measurement has a size (eg 2.7) and a unit (eg 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
luminous intensity	candela	cd

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

Using prefixes and powers of ten

Very large and very small numbers can be complicated to work with if written out in full with their SI unit. For example, measuring the width of a hair or the distance from Manchester to London in metres (its SI unit) would give numbers with a lot of zeros before or after the decimal point, which would be difficult to work with.

So, we use prefixes that multiply or divide the numbers by different powers of ten to give numbers that are easier to work with. You will be familiar with the prefixes milli (meaning 1/1000), centi (1/100), and kilo (1×1000) from millimetres, centimetres, and kilometres.

There is a wide range of prefixes. Most of the quantities in scientific contexts will be quoted using the prefixes that are multiples of 1000. For example, we would quote a distance of 33 000 m as 33 km.

The most common prefixes you will encounter are given in the table.

Prefix	Symbol	Power of 10	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 3 SI units and prefixes

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

Activity 4 Units

Choose the most appropriate unit and estimate the size of each of the following.

1. The mass of an earthworm
2. The volume of water in a teardrop
3. The volume of water in a garden pond
4. The time taken for a sunflower to grow
5. The temperature difference between the blood in the heart and in the ear on a cold day
6. The diameter of a human hair
7. The length that your fingernails grow each day
8. The total length of DNA in one human body cell

Activity 5 Converting data

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 cm³ in litres

Practical skills

The practical skills you learnt at GCSE will be further developed through the fieldwork and practicals you undertake at A-level.

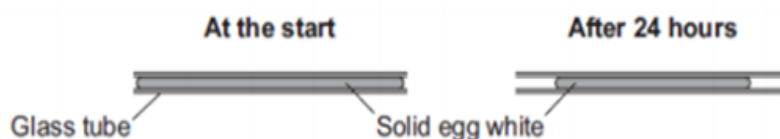
Activity 6 Investigating how temperature and pH affect enzymes

Egg white is made of protein. The students were investigating how temperature and pH affect the digestion of protein

The students carried out the following procedure:

- Filled six narrow glass tubes with fresh egg white
- Boiled the tubes so the egg white became solid
- Placed each tube into a different beaker containing human protease enzyme at different pH values at room temperature and 3 in neutral pH but at different temperatures for 24 hours
- Measured the length of solid egg white in each tube after 24 hours

The diagram shows the investigation.



The results were recorded in the tables below:

pH	Original length of solid egg white (cm)	Final length of solid egg white (cm)	% change
4	6.0	5.6	
7	6.0	3.8	
9	6.0	5.8	

Temperature (°C)	Original length of solid egg white (cm)	Final length of solid egg white (cm)	% change
15	6.0	5.7	
35	6.0	3.8	
55	6.0	5.3	

1. State a hypothesis for this investigation.
2. The students predicted that the enzyme would be most effective in conditions similar to those found in the human body. Was their prediction correct?
3. Identify the independent and dependent variables in this investigation.
4. Suggest the control variables for this investigation.
5. Describe the difference between repeatable and reproducible.
6. What would be the most likely resolution of the ruler you would use in this investigation.
7. Suggest how repeating the investigation would be an improvement.
8. Calculate the % change for each result in this investigation. Show your answers to 3 significant figures.

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 7 Mean mode median and scatter graphs

A student investigated an area of moorland where succession was occurring.

The student used quadrats to measure the area covered by; different plant species, bare ground and surface water.

They did this every 10 metres along a line transect. The student also recorded the depth of soil at each quadrat. Their 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

Calculate:

1. Calculate the mode area of soft rush in the sample.

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2. Calculate the mean soil depth of the area of moorland sampled.

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3. Calculate the median amount of bare ground in the sample.

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4. Using the data in the table plot a **scatter graph** of the soil depth against the area covered by bare ground, soft rush and bog moss (use different colours or markers for each).

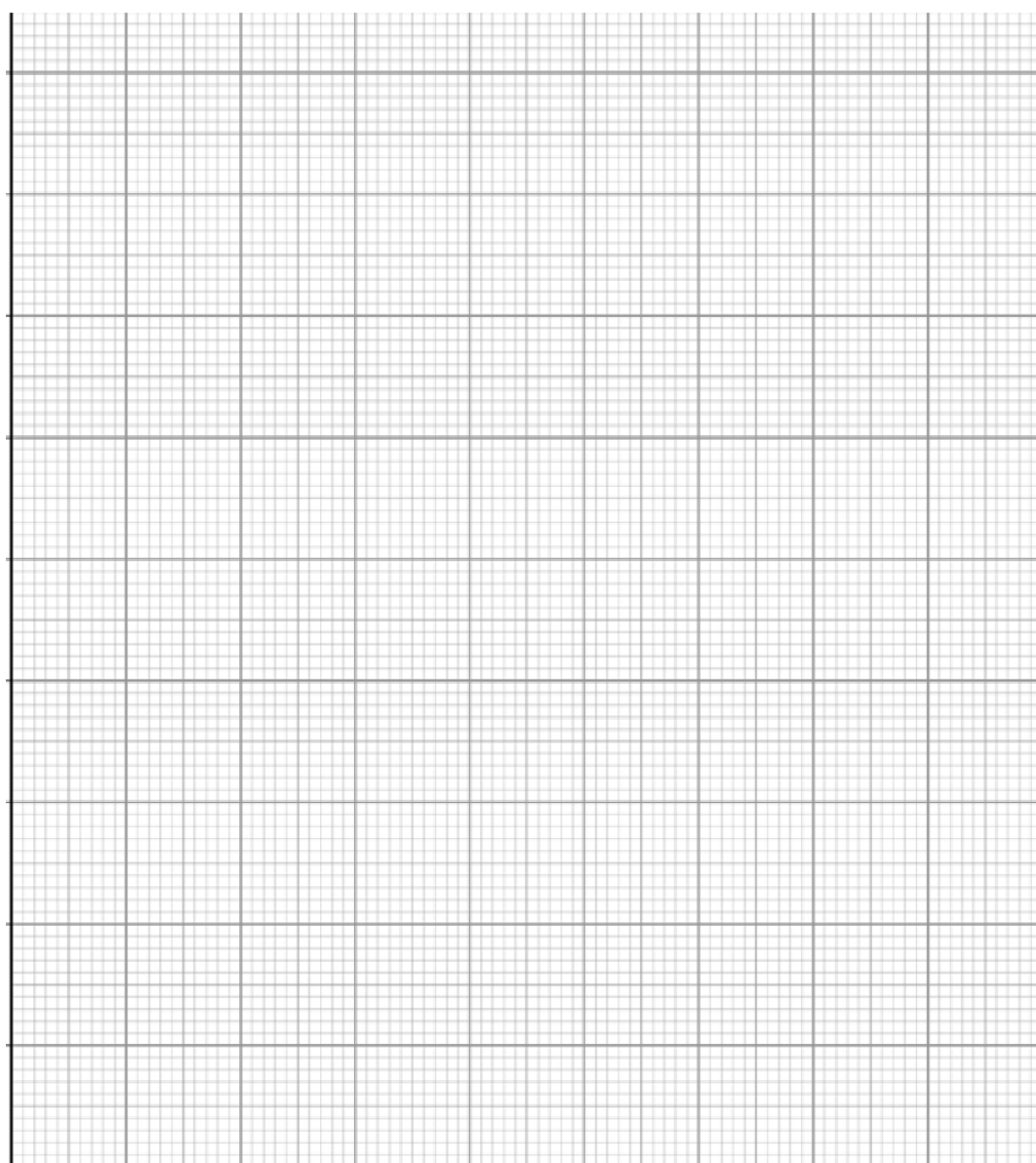
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5. What conclusions can you draw from this graph?

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6. Suggest how to improve the validity of these conclusions.

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Activity 8 Data in tables

A patient with a leaking heart valve may have the valve replaced. A study compared two different types of replacement heart valve:

- mechanical valves
- biological valves from pigs.

The data used in the study was collected from female patients aged 50–69. **Table 4** shows the data

Table 4

	Type of replacement heart valve	
	Mechanical	Biological
Number of patients given the valve	2852	1754
Number of patients who died from heart-related problems after valve replacement	180	178
Percentage of patients alive after 5 years	91	89
Percentage of patients needing a second valve replacement within 6 years	2.2	5.2
Percentage of patients who had a blood clot on the brain after surgery	5.8	0.1

1. Give **one** conclusion about the death of patients from heart-related problems after a valve replacement.
Include calculations to support your answer.

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2. Evaluate the use of mechanical replacement heart valves and biological replacement heart valves. Use information from **Table 4**.

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Activities: GCSE knowledge links

Progression of content

What you learnt at GCSE forms the foundation to your further study at A-level. Ideas will be developed and refined, new concepts and skills will be introduced. The follow activities/questions are designed to help refresh your memory of some of the important concepts you will use during your study of AS and A -level Biology.

Activity 9 Cell structure and magnification

Drawing images from microscope observations must be done carefully, including careful measurements for magnification calculations.

Make sure that you are clear on the organelles within different cells and their functions.

You must also be secure in the method used to make observations using a light microscope and the purpose of each method step.

Figure 1 shows an animal cell viewed using a microscope



The cell contains a nucleus.

1. State the function of the nucleus.

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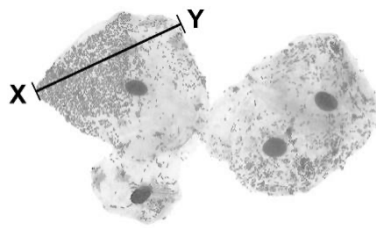
2. Name **one** type of cell that does **not** contain a nucleus.

3. On the diagram label three parts of the cell.

4. Name **one** structure found in a plant cell but **not** found in an animal cell.

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The figure below shows some different cells.



5. The real length from point **X** to point **Y** is 0.06 mm. Calculate the magnification.

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6. The cells shown above were viewed using a light microscope. Give **two** advantages of using an electron microscope instead of a light microscope.

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Activity 10: Transport across cell membranes

In Biology, many processes involve moving substances across boundaries.

Ensure that you know what each of diffusion, osmosis and active transport are and where each takes place.

Questions on transport across cell membranes often involve data and applying knowledge and understanding to unfamiliar contexts.

One of the required practicals at GCSE is on osmosis, make sure that you can interpret the graph used to show the results.

A student carried out an investigation using chicken eggs. This is the method used.

1. Place 5 eggs in acid for 24 hours to dissolve the egg shell.
2. Measure and record the mass of each egg.
3. Place each egg into a separate beaker containing 200 cm³ of distilled water.
4. After 20 minutes, remove the eggs from the beakers and dry them gently with a paper towel.
5. Measure and record the mass of each egg. **Table 4** shows the results.

Table 4

Egg	Mass of egg without shell in grams	Mass of egg after 20 minutes in grams
1	73.5	77.0
2	70.3	73.9
3	72.4	75.7
4	71.6	73.1
5	70.5	73.8

Another student suggested that the result for egg **4** was anomalous.

1. Do you agree with the student? Give a reason for your answer.

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2. Calculate the percentage change in mass of egg **3**.

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3. Explain why the masses of the eggs increased.

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4. Explain how the student could modify the investigation to determine the concentration of the solution inside each egg.

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Chicken egg shells contain calcium. Calcium ions are moved from the shell into the cytoplasm of the egg.

Table 5 shows information about the concentration of calcium ions.

Table 5

Location	Concentration of calcium ions in arbitrary units
Egg shell	0.6
Egg cytoplasm	2.1

5. Explain how calcium ions are moved from the shell into the cytoplasm of the egg.

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Activity 11 Digestion and food tests

It is important to understand the role of enzymes in digestion and how enzymes work. Recalling the food tests is important, particularly how to test for protein and sugars.

1. Describe how a student could test cow's milk to show whether it contains protein and different types of carbohydrate.

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A scientist investigated the effect of bile on the breakdown of fat in a sample of milk.

The scientist used an indicator that is colourless in solutions with a pH lower than 10, and pink in solutions with a pH above 10

This is the method used.

- Add 1 drop of bile to a test tube and one drop of water to a second test tube.
- Add the following to each test tube:
 - 5 cm³ of milk
 - 7 cm³ of sodium carbonate solution (to make the solution above pH 10)
 - 5 drops of the indicator
 - 1 cm³ of lipase.

- Time how long it takes for the indicator in the solutions to become colourless.

	Time taken for the indicator to become colourless in seconds
Solution with bile	65
Solution without bile	143

2. Explain why the indicator in both tubes became colourless.

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3. Explain the difference in the results for the two test tubes in the table above

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Wider Reading

Activity 12 Wider Reading

Science communication is essential in the modern world and all the big scientific companies, researchers and institutions have their own websites and/or social media accounts. TED can provide fascinating and stimulating talks linked to the vast area of Biology and Science. You must watch a video or read an article linked to any area of Biology that fascinates you (or 2 if you like!).

Note your findings, interesting facts, summaries from your wider reading of Biology.

You should include the name & author of the article/video.

Complete your notes on a separate piece of paper.