Applied Science

Sixth Form Preparation Booklet

Year 11 into Year 12 | Cambridge OCR AAQ Applied Science

Complete all tasks and bring this booklet to your first lesson in September

Name: _____

Contents

Section 1 - Research Skills

At Sixth Form level you are expected to find, evaluate, and use scientific information independently. This section introduces the skills you will need to do that well.

What makes a good source?

Not all sources are equal. In science, we prioritise sources that are:

- Peer-reviewed - checked by other scientists before publication
- Published by a credible organisation (universities, government bodies, NHS, research institutions)
- Recent - especially for fast-moving topics such as genetics or climate science
- Clearly attributed - you can identify who wrote it and when

Quick guide to URLs

.ac.uk - UK university (generally reliable)
.gov.uk - UK government body (generally reliable)
.org - non-profit / charity (check who runs it)
.com - commercial site (treat with caution)
Wikipedia - useful starting point only; always check original sources

Task 1 - Source Evaluation

Choose any science topic that interests you (*e.g. antibiotic resistance, CRISPR, climate modelling, cancer treatment*). Find two sources about that topic and complete the table below.

Field	Source 1	Source 2
Topic Area		
URL / Title		
Author / Organisation		
Date Published		
Type (gov / .ac.uk / other)		
Reliability (1–5) ★		
Why is it reliable or not?		

Which of your two sources do you trust more? Explain why in 2–3 sentences below.

Section 2 - Plagiarism & Academic Integrity

Plagiarism means presenting someone else's work or ideas as your own. In Sixth Form and beyond, this is treated very seriously. Understanding what plagiarism is - and how to avoid it - is an essential skill.

What counts as plagiarism?

- Copying text from a website, book, or article without saying where it came from
- Rewording someone else's ideas without crediting the original author
- Copying another student's work
- Using AI-generated text and submitting it as your own (unless told otherwise)

Paraphrasing vs Copying

Good academic writing means reading a source, understanding it, and expressing the idea in your own words. This is paraphrasing. Compare the two examples below:

✗ **Copied (not acceptable)**	☑ Paraphrased (acceptable)
"Enzymes are biological catalysts that speed up chemical reactions in living organisms without being used up in the process."	Enzymes act as catalysts inside living cells - they increase the rate of chemical reactions but are not consumed during the reaction itself.

Referencing

Whenever you use information from a source, you must say where it came from. A simple format to use is:

Harvard-Style Reference (simplified)

Author surname, Initial. (Year). Title of article or page. Website name. [URL]

Example:
NHS. (2023). How vaccines work. nhs.uk. [https://www.nhs.uk/conditions/vaccinations/how-vaccines-work/]

Task 2 - Paraphrase and Reference

Read the passage below, then complete both tasks underneath it.

Passage to paraphrase:

"Mitosis is a type of cell division that results in two daughter cells, each with the same number and kind of chromosomes as the parent nucleus. It is used for growth and repair of tissues in multicellular organisms."

Part A - Rewrite the passage above in your own words:

Part B - Write a simple reference for the following source:

Author: Khan Academy | Year: 2022 | Title: Mitosis | URL: khanacademy.org/science/biology/cellular-molecular-biology/mitosis/a/mitosis

Section 3 - Science Communication: Poster Task

Being able to communicate science clearly - to a non-specialist audience - is a key skill for scientists and is assessed throughout your course. This task asks you to produce an A4 science poster on one of the topics below.

Choose ONE topic for your poster:

- **How enzymes work (including the effect of temperature and pH)**
- **The carbon cycle and its link to climate change**
- **How vaccines trigger an immune response**
- **DNA structure and why it matters**

Poster criteria

Your poster must meet all of the criteria listed below. Tick each one when you are satisfied it is included.

Poster must include:	Mark yourself - did you include it? ✓/✗
A title clearly stating the topic	
At least one labelled diagram	
3 or more key scientific terms, defined	
A brief explanation of the science (in your own words)	
At least one referenced source (author, year, URL)	
Neat layout - colour, sections, and visuals used well	

Tips for a strong poster

Use a clear heading so the topic is obvious at a glance
Diagrams should be labelled - not just decorative
Write for an intelligent non-scientist (e.g. a Year 9 student)
Avoid copying text from websites - use your own words
Your reference must include enough detail for someone to find the source

Attach your completed poster to this booklet, or clearly label it with your name if submitted separately.

Section 4 - Science Skills & Practical Terminology

Practical investigations are at the heart of Applied Science. You need to be confident using the correct terminology when planning, carrying out, and evaluating experiments.

Key terms - reference guide

Independent variable	The variable you deliberately change
Dependent variable	The variable you measure in response
Control variable	A variable kept constant to ensure a fair test
Accuracy	How close a measurement is to the true value
Precision	How consistent repeated measurements are with each other
Reliability	Whether the same results are obtained when repeated
Validity	Whether the experiment actually tests what it claims to test
Hypothesis	A testable prediction, usually written as an if…then… statement

Task 3 - Analysing a Method

Read the method below, then answer the questions in the table on the next page.

Method: Investigating the effect of temperature on enzyme activity

A student added 2 cm^3 of amylase solution to 10 cm^3 of starch solution in a test tube. The test tube was placed in a water bath set to 20°C. Every 30 seconds, the student used a glass rod to transfer a drop of the mixture to a spotting tile containing iodine solution. The colour of the iodine was recorded. The experiment was repeated at 30°C, 40°C, 50°C, and 60°C.

Question	Your answer
What is the independent variable in this investigation?	
What is the dependent variable?	
List two control variables.	
Identify one potential source of error.	
Suggest one improvement to make results more reliable.	

Section 5 - Maths for Science

Mathematical skills are assessed throughout your course. The questions below cover the core skills you will need from the start. Show all working. Answers are on the back page.

Quick reference

Percentage change	((New − Original) ÷ Original) × 100
Rearranging equations	To find x in: x = a × b, rearrange to: a = x ÷ b
Standard form	e.g. 0.0032 = 3.2×10^{-3}
Significant figures	3.456 to 2 s.f. = 3.5
Unit conversions	1 kg = 1000 g | 1 m = 100 cm | 1 dm^3 = 1 litre

Task 4 - Maths Questions

Q	Question	Your working / answer
1	Convert 4500 g into kilograms.	
2	Convert 0.35 m into centimetres.	
3	A reaction produces 12.4 g of product. Express this in standard form to 2 significant figures.	
4	The temperature of a water bath rises from 20°C to 35°C. Calculate the percentage change.	
5	Rearrange the equation for speed to find time: speed = distance ÷ time	
6	A student measures the volume of a gas as 0.00245 dm^3. Write this in standard form.	
7	In an experiment, the mean result is 48 and the range is 6. What is the upper and lower bound of the range?	
8	A solution contains 5 g of NaCl dissolved in 250 cm^3 of water. Calculate the concentration in g/dm^3.	
9	A scientist records these values: 12.3, 12.5, 12.4, 15.1, 12.3. Identify the anomalous result and calculate the mean of the remaining values.	
10	The half-life of a radioactive isotope is 3 days. A sample starts with 800 g. How much remains after 9 days?	

Section 6 - Science in the News

Science is constantly evolving and its impact on society is enormous. Part of being a successful Applied Science student is being aware of real-world science and being able to think critically about it.

Task 5 - News Article Response

Find a recent science news article published within the last 12 months. Good sources include:

- BBC Science & Environment (bbc.co.uk/news/science-environment)
- New Scientist (newscientist.com)
- Science Daily (sciencedaily.com)
- The Guardian Science (theguardian.com/science)

Suitable topics include: new medical treatments, climate science, genetic research, space exploration, environmental issues, new technologies in biology or chemistry.

Complete the response table below. Write in full sentences.

Article title	
Source / website	
Date of article	
What is the article about? (2–3 sentences)	
What science is involved? Name any key concepts.	
Why is this important or interesting?	
Your opinion on the topic	

What makes a good critical response?

Go beyond simply describing the article - explain the science behind it
Think about who benefits from this research, and who might not
Consider whether there are any limitations or risks mentioned
Your opinion should be backed up with a reason, not just a feeling

Section 7 - Knowledge Check

Answer the multiple-choice questions below. Circle or write the letter of your chosen answer. Mark yourself using the answer key on the back page.

Q	Question	Options
1	What is the role of an enzyme in a chemical reaction?	A Reactant B Catalyst C Product D Inhibitor
2	Which variable is deliberately changed in a controlled experiment?	A Dependent B Control C Independent D Fixed
3	A pH of 7 is described as:	A Acidic B Alkaline C Neutral D Saturated
4	Which of the following is NOT a component of DNA?	A Deoxyribose sugar B Phosphate group C Amino acid D Nitrogenous base
5	What does the term ‘precision’ mean in the context of measurements?	A Close to the true value B Consistent when repeated C Free from error D Whole number results
6	What is the unit of concentration used in chemistry?	A g/cm B mol/dm^3 C kg/m^2 D cm^3/g
7	In chromatography, what causes different substances to separate?	A Density B Boiling point C Different speeds of travel through a medium D Electrical charge

Q	Question	Options
8	Which of the following describes a hypothesis?	A A conclusion drawn from results B A testable prediction C A description of equipment used D A table of results
9	What is the half-life of a radioactive substance?	A Time to fully decay B Time for half the atoms to decay C Half the mass of the sample D Time to emit half its energy
10	Which type of bond involves the sharing of electrons between atoms?	A Ionic B Metallic C Covalent D Hydrogen
11	What does a standard deviation tell you about a data set?	A The middle value B The range C The spread of data around the mean D The most common value
12	During aerobic respiration, glucose is broken down to produce:	A Lactic acid only B CO_2, water and ATP C Oxygen and glucose D Ethanol and CO_2
13	A titration is used to:	A Separate mixtures by density B Determine the concentration of a solution C Measure radioactivity D Identify proteins
14	Which of the following correctly describes osmosis?	A Movement of solute from high to low concentration B Active transport of water against a gradient C Movement of water from high to low water potential across a semi-permeable membrane D Diffusion of oxygen into cells
15	Which instrument is used in colorimetry?	A Thermometer B Colorimeter C Burette D Potometer

Answer Keys

Section 5 Task 4 — Maths Answers

Q1: 4.5 kg	Q2: 35 cm	Q3: 1.24×10^{1}	Q4: 75%	Q5: time = distance ÷ speed
Q6: 2.45×10^{-3} dm^3	Q7: Upper: 51, Lower: 45	Q8: 20 g/dm^3	Q9: Anomaly: 15.1; Mean = 12.375	Q10: 100 g

Section 7 — Knowledge Check Answers

Q1: B	Q2: C	Q3: C	Q4: C	Q5: B
Q6: B	Q7: C	Q8: B	Q9: B	Q10: C
Q11: C	Q12: B	Q13: B	Q14: C	Q15: B

Bring to Lesson 1 — Checklist

Tick each item once completed. Bring this booklet to your first lesson in September.

☐	Section 1 — Source evaluation table completed
☐	Section 2 — Paraphrase and reference tasks completed
☐	Section 3 — Poster attached or submitted separately
☐	Section 4 — Variables table completed
☐	Section 5 — Maths questions answered (10 questions)
☐	Section 6 — News article response table completed
☐	Section 7 — Knowledge check completed and self-marked
☐	Equipment ready: folder, calculator, pens/pencils, ruler, highlighters

Total score on Knowledge Check (*out of 15*): _____

Any topics to revisit before September: