

AIMING FOR AN A IN BIOLOGY

A-level

MASTER THE
SKILLS YOU
NEED FOR
AN **A GRADE**

BIOLOGY

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Writing skills

Learning objectives

- To write clear, concise responses demonstrating knowledge and understanding
- To plan and structure longer answer questions
- To create synoptic links within course content
- To produce detailed essay plans
- To write balanced, well-structured essays

Your entire A-level grade is dependent on your ability to express yourself through your written work. It does not matter if you understand all of the content and can answer every question that your teacher asks you, if you do not write a clear answer in the exam, you will not get the mark. The examiner does not 'know what you mean' — you have to write it.

This chapter addresses the skills needed to succeed in the exams, with a focus on the different styles of exam question, including short-answer, extended-response and essay questions. For each style of question there is guidance on how to structure your responses and worked examples.

Study skills

Understanding command words

Many exam questions are short-answer questions worth 1–3 marks. Some of these questions require very brief responses of one word or phrase, with no requirement for a full sentence. This type of question usually starts with one of these command words:

- ➔ Give
- ➔ Identify
- ➔ Label
- ➔ Name
- ➔ State

For example, you could be told that a student is investigating the effect of temperature on the rate of an enzyme-controlled reaction and asked to '*Give two variables that the student should control*'.

The command word here is 'give' and a suitable response would be:

- ➔ pH
- ➔ substrate concentration

There is no need to 'explain' *why* the variables were controlled or to 'describe' *how* the student controlled the variables, just *give* the variables.

✓ Exam tip

Exam questions may ask for a specific number of examples, for example, name *two* products of lipid hydrolysis. Check that you have included the correct number of examples; there is no need to add extra ones.

✓ Exam tip

Beware of the 'list rule' in exams: if you write two correct answers followed by an extra incorrect one, the incorrect answer will cancel out one of the correct answers. For example: 'Name *two* factors that affect the rate of photosynthesis':

- ➔ temperature ✓
- ➔ light intensity ✓
- ➔ oxygen concentration ✗

Only 1 mark out of 2 is awarded despite the first two answers being correct.

3 WRITING SKILLS

Some exam questions require you to write in sentences, including those that start with the command words:

- Compare
- Contrast
- Define
- Describe
- Evaluate
- Explain
- Suggest

These questions require you to demonstrate your knowledge and understanding of the subject. You need to write your answer using the correct technical language so that it sounds like you know what you are talking about. Biology requires the use of very specific terminology. An A-grade student will use the correct scientific terms as part of a fluent and concise answer.

Table 3.1 Some commonly used command words and their meanings

Command word	Meaning
Compare	Identify similarities and/or differences. You may need to include comparative terms such as: faster/slower; higher/lower; more/less.
Contrast	Identify the differences between the items.
Define	Give the meaning of the term. Try to learn definitions as they are given in the specification.
Describe	Describing data requires you to give the overall pattern or trend and use the data. For example: 'the rate increases steadily and then plateaus at $3.2\text{ cm}^3\text{ min}^{-1}$ '. Describing a method or process means giving the main steps or features.
Evaluate	Make a judgement using the available evidence. You may need to consider pros and cons.
Explain	Use your scientific understanding to give reasons for results or biological phenomena.
Justify	Use the information given and support a case with reference to the evidence.
Suggest	Give a possible cause or a reasonable explanation of the information. There may be more than one correct response.

✓ Exam tip

Check that your answer does not repeat information given in the stem of the question because there will be no mark available for this. For example: 'Humans have millions of alveoli to provide a large surface area for rapid gas exchange. Give two other features that cause rapid gas exchange in humans.' There is no mark available for repeating 'millions of alveoli' or 'large surface area'.

Worked example 3.1

You may be asked to describe experimental techniques that you have followed in class. This type of response must be sequenced logically. Try to imagine yourself completing the practical activity, then write a set of instructions that another student could use to replicate the practical. Use imperative ('bossy') verbs at the start of your sentences to give instructions, for example, measure, heat, add.

Describe how you could show that a sample of cheese contains lipid. (2)

Crush the cheese and shake it with ethanol, then add water. ✓ A white emulsion ✓ will appear if lipid is present.

This question is asking you to describe a procedure that you may have completed during a practical session. The order in which these steps are completed is important because you will not obtain the correct result if water is added first.

The difference between...

Students frequently lose marks because of poor use of terminology when answering exam questions about enzymes, for example when writing about the effect of a non-competitive inhibitor:

A-grade response	C-grade response
<p>The non-competitive inhibitor binds to an allosteric binding site away from the active site, causing the active site to change shape. The active site no longer has a complementary shape to the substrate, so the substrate cannot bind and an enzyme–substrate complex does not form.</p> <p><i>The A-grade answer is clearly written with excellent use of terminology, such as 'allosteric', 'complementary' and 'enzyme–substrate complex'.</i></p>	<p>A non-competitive inhibitor binds away from the active site. This changes the active site, so the substrate no longer fits.</p> <p><i>The C-grade answer shows clear understanding of non-competitive inhibitors and their effect on enzymes, but lacks the correct scientific terms.</i></p>

An important consideration when answering an exam question is how much to write. You will be given a lot of space to answer your question because the exam board wants your answer to fit into the box. This does not mean that you have to fill all of the available space. It is important to know when to *stop* writing.

A 2-mark question should not require more than two sentences. In some cases, one perfect sentence could be worth 2 or 3 marks. For example, if you were answering a question about the human breathing system and were asked to describe how oxygen from the air reaches a red blood cell in the capillaries surrounding the alveoli:

Oxygen in the air moves down a pressure gradient ✓ through the trachea, bronchi and bronchioles ✓ to the alveoli, then crosses the alveolar epithelium ✓ and capillary endothelium ✓ to reach the red blood cell.

This one sentence could be worth up to 4 marks.

Quality of written communication

A high standard of written communication is expected from A-level students. Some sections of the exam paper may specifically award a mark for your quality of written communication (QWC).

You are expected to use scientific terminology correctly, and you should learn the spellings and definitions of key terms as part of your revision because you will not have access to spell check in the exam! Phonetic misspellings of many key words would be accepted — for example, students often misspell protein as 'protien', but it is obvious what is meant. Certain terms must be spelt correctly, however, because they could be confused with similar words. For example, 'meitosis' would not be accepted because it is an amalgamation of meiosis and mitosis.

Correctly used punctuation helps to structure your ideas and makes it easier for the examiner to understand your point. A poor standard of written work detracts from the content, so decide what you are going to write before you start writing. This is especially important when writing the essay — a full description of how to plan your essay is given later in this chapter. The examiners want to give you marks, so write your answer clearly and make the examiners' job easier.

✓ Exam tip

As a general rule, you have between 1 and 1.5 minutes per mark in the exam, so keep an eye on the time. If a question is taking too long, write a brief answer, then put an asterisk next to the question and come back to it at the end if you have time.

Planning and structuring answers

There are many different types of exam question so knowing how to answer each type of question is the key to exam success. Some questions require calculations and mathematical skills; this type of question is discussed in chapter 1 (Quantitative skills).

The main types of question requiring writing skills include:

- short-answer structured questions
- extended-response questions
- essay questions

The types of question and suggested methods for approaching them are described in this section.

Short-answer structured questions

Short-answer questions generally account for the majority of the marks in a written exam, and may assess:

- factual recall
- knowledge and understanding of the specification
- ability to apply knowledge

Your understanding of command words is essential when determining what you need to write and how much to write.

Little planning is required for this type of question because your answer will be 2–3 sentences at most.

Worked example 3.2

Explain how tissue fluid is formed.

(2)

Once you have identified that an explanation is required to answer this question, make sure that you do not add additional information beyond the *formation* of tissue fluid. No marks will be available for describing the return of tissue fluid to the capillary.

The hydrostatic pressure at the artery end of the capillary is high ✓ and this forces small molecules out of the capillary ✓ to form tissue fluid.

Some students would focus on the phrase 'tissue fluid' and then write down everything that they know about tissue fluid.

Worked example 3.3

Explain how high blood pressure can lead to an accumulation of tissue fluid.

(3)

This example is more demanding than worked example 3.2 because it is asking you to *apply* your knowledge to a novel situation — a person with *high* blood pressure. Throughout your answer, you need to focus on what would be *different* about tissue fluid formation in a person with high blood pressure that would lead to tissue fluid accumulating. Your answer needs to include comparative terms such as *more*, *higher* and *increased*.

High blood pressure causes a *higher* hydrostatic pressure ✓ in the capillary. This leads to an *increased* outward pressure ✓ from the capillary at the artery end, so *more* tissue fluid is formed. Tissue fluid is formed *faster* than it can be reabsorbed ✓, leading to an accumulation.