

AQA • GCSE COMBINED SCIENCE: TRILOGY 8464

Biology — Foundation Tier, Paper 1

June 2025 exam series

MARK SCHEME

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GCSE COMBINED SCIENCE: TRILOGY 8464/B/1F

Biology Paper 1F

Mark scheme

June 2025

Version: 1.0 Final



Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

Further copies of this mark scheme are available from aqa.org.uk

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the examiner make their judgement
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent (for example, a scientifically correct answer that could not reasonably be expected from a student's knowledge of the specification).

2. Emboldening and underlining

- 2.1** In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for a mark are indicated by the use of **or**.
Alternative words in the mark scheme are shown by a solidus eg allow smooth / free movement.
- 2.4** Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of errors / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name **two** magnetic materials.

[2 marks]

Student	Response	Marks awarded
1	iron, steel, tin	1
2	cobalt, nickel, nail*	2

3.2 Use of symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, or uses symbols to denote quantities in a physics equation, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. At any point in a calculation students may omit steps from their working. If a subsequent step is given correctly, the relevant marks may be awarded.

Full marks should be awarded for a correct numerical answer, without any working shown. Full marks are **not** awarded for a correct final answer from incorrect working.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

An error can be carried forward from one question part to the next and is shown by the abbreviation 'ecf'.

Within an individual question part, an incorrect value in one step of a calculation does not prevent all of the subsequent marks being awarded.

3.6 Phonetic spelling

Marks should be awarded if spelling is not correct but the intention is clear, **unless** there is a possible confusion with another technical term.

3.7 Brackets

(.....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

3.10 Do not accept

Do **not** accept means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

3.11 Numbered answer lines

Numbered lines on the question paper are intended to support the student to give the correct number of responses. The answer should still be marked as a whole.

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and, if necessary, annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1: Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level.

The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level.

Use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

Step 2: Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this. The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

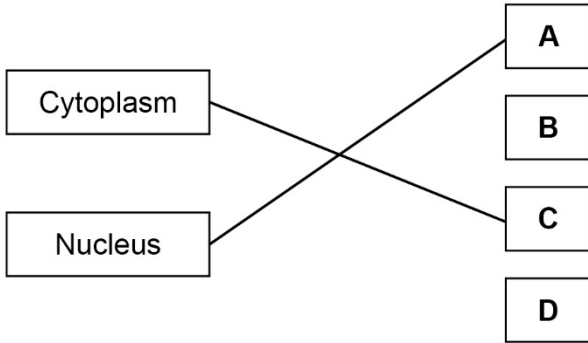
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question 1

Question	Answers	Mark	AO / Spec. Ref.
01.1	Part of muscle cell  do not accept more than one line from a box on the left	1 1	AO1 4.1.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	any one from: - carries / contains / has DNA - controls the cell	allow contains genetic material allow contains chromosomes / genes	1	AO1 4.1.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	(cell) membrane	allow B	1	AO1 4.1.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	a prokaryotic cell		1	AO1 4.1.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.5	bacterial cells contain a loop of DNA		1	AO1 4.1.1.1
	bacterial cells have a cell wall		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.6	adult stem cells		1	AO1 4.1.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.7	mitosis		1	AO2 4.1.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.8	any two from: - less need for blood donors - smaller sample needed (can produce) larger quantities / amount of (red) blood cells - less risk of infection - blood cells last longer (from stem cells) - rare / specific blood group / type can be produced	allow converse if clearly stated allow requires less blood to be taken from the donor allow only small sample needed allow (blood cells) will be the same blood type	2	AO3 4.1.2.3 4.2.2.3

Total Question 1	11
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Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	the length of the pondweed		1	AO1 4.4.1.2
	the temperature of the water		1	RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.2	as the distance increases the volume / oxygen decreases	allow as the light intensity decreases the volume / oxygen decreases ignore use of figures	1	AO2 4.4.1.2 RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.3	3.6 (cm ³)		1	AO2 4.4.1.2 RPA 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	accuracy		1	AO2 4.4.1.2 RPA5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.5	greater	no marks if incorrect word chosen	1	AO2 4.4.1.2
	(because) the rate of photosynthesis is higher	allow (because) photosynthesis would be faster / quicker allow (because) there is more photosynthesis allow (because) photosynthesis is controlled by enzymes allow (because) enzymes work faster allow (because) particles have more energy allow (because) the rate of reaction is faster / quicker	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	palisade mesophyll		1	AO1 4.2.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.7	chlorophyll		1	AO1 4.1.1.2 4.4.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.8	destroy the affected leaves		1	AO2 4.3.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.9	less / no light absorbed		1	AO2 4.3.1.4 4.4.1.2
	(so) less / no photosynthesis	allow (because) chloroplasts / chlorophyll is needed for photosynthesis	1	
	(so) less / no glucose / sugar (is made / produced)	allow (so) less / no protein / fat / starch / cellulose (is made / produced)	1	

Total Question 2	13
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Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	any two from: • repeat (at each concentration) • use the same size cubes / potato • dry the cubes / potato (before weighing) • increase the number of concentrations • use the same volume of solutions • calculate a (percentage) change in mass • use more precise balance • control the temperature of the solutions	allow use the same mass of cubes / potato allow blot the cubes / potato dry with paper towel (before taking the mass) allow repeat at 1.5 mol/dm ³ allow ensure the cubes / potato are (fully) submerged allow use weighing scales / balance to 2 decimal places	2	AO3 4.1.3.2 RPA2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	0.5 mol/dm ³		1	AO3 4.1.3.2 RPA2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	osmosis		1	AO1 4.1.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	<i>calculation of area of one face</i> $(3 \times 3) = 9$		1	AO2 4.1.3.2
	<i>calculation of total surface area</i> $(9 \times 6) = 54$	allow incorrectly calculated area of one face $\times 6$	1	
	<i>unit</i> cm^2	allow correct unit regardless of working or answer	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	cut the potato (into smaller pieces)		1	AO3 4.1.3.2

Question	Answers	Mark	AO / Spec. Ref.
03.6	Carbohydrate Starch Sugar Chemical Benedict's reagent Biuret reagent Ethanol Iodine solution do not accept more than one line from a box on the left	1	AO1 4.2.2.1 RPA3
		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3.7	sugar and starch		1	AO3 4.2.2.1 RPA3

Total Question 3	11
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Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	glucose		1	AO2 4.4.2.1 4.4.2.2
	oxygen		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	40 – 15		1	AO3
	25 (minutes)		1	AO2 4.4.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3		allow a correct calculation given to 2 significant figures using person A for 2 marks		AO2 4.4.2.2
	$\frac{104 - 60}{60} \times 100$	allow $\frac{44}{60} \times 100$	1	
	73.3(3333333...)		1	
	73 (%)	allow 2 marks for $\frac{102 - 60}{60} \times 100 = 70$ (%) allow 1 mark for 0.73	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	any two from: person B • has a lower resting heart rate • has a smaller increase in heart rate • has a lower maximum heart rate • reaches their maximum heart rate later • has a shorter recovery time	answers must be comparative allow converse if clearly referring to person A allow takes longer to reach their maximum heart rate allow takes a shorter time to reach resting heart rate allow has a lower oxygen debt if no other marks awarded allow 1 mark for person B has lower heart rate	2	AO3 4.4.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	suitable scale for y-axis	a bar height must use at least half of graph paper	1	AO2 4.4.2.2
	bars plotted correctly	allow a tolerance of $\pm \frac{1}{2}$ small square the bars can be in any order ignore the width of the bar ignore if bars are touching	1	
	bars labelled correctly	allow the use of a correct key	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	$\propto$		1	AO1 4.4.2.2

Total Question 4	13
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Question 5

Question	Answers	Mark	AO / Spec. Ref.
05.1	Blood vessel Name do not accept more than one line from a box on the left	1 1	AO1 4.2.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	F		1	AO1 4.2.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	(more) respiration (in mitochondria)	do not accept anaerobic respiration	1	AO2
	(which) releases more energy	allow (muscles) need more energy do not accept energy produced / made / created do not accept provides more energy for respiration	1	AO2
	(so the heart) muscle <u>contracts</u>		1	AO1 4.2.2.2 4.4.2.1 4.1.1.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	any two from: - fast / increased heart rate - fast / increased breathing (rate) - tiredness - pale skin - heart attack - difficulty exercising - difficulty gaining weight	allow irregular heartbeat ignore shortness of breath allow fatigue allow blue skin (due to poor oxygenation) allow cold / cool skin (to the touch) allow cyanosis allow blood clots allow chest pain allow stroke allow increased sweating allow frequent chest infections allow swelling in legs / feet / abdomen	2	AO3 4.2.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	any two from: • heavy / internal bleeding • infection • damaging blood vessels • damaging the heart • risk from anaesthetic • risk of rejection (of the mesh / tube)	allow named infection e.g. MRSA ignore risk of disease allow blood clots allow stroke allow heart attack allow irregular heartbeat ignore damage unqualified	2	AO3 4.2.2.2

Total Question 5	10
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Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	touch / contact (with contaminated surfaces / skin / blisters)	allow through droplets / air / coughs / sneezes ignore sexual intercourse	1	AO2 4.3.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	(chickenpox) is caused by a virus	allow antibiotics (only) treat bacterial infections allow chickenpox is not caused by bacteria ignore antibiotic resistance	1	AO2 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	inactive / dead / weakened (named) pathogen	allow inactive / dead / weakened virus / bacteria / fungi / microorganism allow proteins / antigens (from the pathogen) allow the mRNA (from the pathogen)	1	AO1 4.3.1.7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	(for) toxicity or check not poisonous / harmful	allow check for side-effects allow to check it is safe	1	AO1 4.3.1.9
	(for) efficacy or to see if it works	ignore to check it is not dangerous	1	
	(for) dose or how much is needed	allow interaction with other drugs allow to find out when a booster vaccination would be needed allow to find out how long it offers protection against the pathogen for	1	

Question	Answers	Mark	AO / Spec. Ref.
06.5	Level 3: Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.2.2.3 4.3.1.6 4.3.1.7
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	
	Level 1: Points are identified, and stated simply but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	
	Indicative content how a vaccine works (primary): • white blood cells stimulated / respond • (by) producing antibodies • (antibodies) are specific to microorganism / microbe / virus / chickenpox • (antibodies) bind with antigens • reference to memory cells when chickenpox virus enters the body (secondary): ○ virus / pathogen is destroyed faster / quickly ○ (because) production of correct antibodies ○ (because) antibodies are produced sooner ○ (because) rate of antibody production is faster ○ (because) more antibodies produced It is acceptable for students to refer to virus / chickenpox / microorganism / microbe for pathogen throughout For Level 3 primary and secondary responses must be considered		

Total Question 6	12
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