GCSE

COMBINED SCIENCE: TRILOGY

Higher Tier Biology Paper 2

Mark scheme Practice Paper Series – Set 2 SGC/S2/B/2H

Version 1.1 - reviewed 26 October 2026

This mark scheme is an original resource written for sciencegcse.co.uk to accompany the Set 2 practice paper SGC/S2/B/2H. It is not an AQA mark scheme and has not been produced or endorsed by AQA. It follows the structure and conventions of AQA GCSE science mark schemes so that students and teachers can mark the practice paper in the same way that a real paper is marked.

Marking should be carried out using the Information to Examiners on the following pages. The paper has not been standardised, so raw marks should not be converted into grades using any published grade boundaries.

Specification references are to the AQA GCSE Combined Science: Trilogy (8464) specification, Biology section 4.5–4.7. AO = assessment objective; WS = working scientifically; MS = mathematical skills; RP = required practical.

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 answer(s) expected, including alternative acceptable wording, in the **Answers** column
- guidance on which answers are and are not creditworthy in the **Extra information** column
- the assessment objective (AO) and specification reference for each marking point.

Award marks positively. Do not deduct marks for incorrect additional material unless it contradicts a correct answer (see 3.1). Marks are awarded for what the student has written, not for what they might have meant.

2. Emboldening and underlining

2.1 Where a list of acceptable answers is given and more than one mark is available, **any two from** (or similar) is used, followed by the acceptable answers.

2.2 A bold **and** indicates that both parts of the answer are needed to gain the mark.

2.3 Alternative answers acceptable for the same mark are separated by **or**. Different words that are acceptable within a marking point are separated by a forward slash (/).

2.4 Words in bold in the Answers column are the essential words that must be present, or their equivalent, for the mark to be awarded.

3. Marking points

3.1 Marking of lists
When a fixed number of responses is requested but extra responses are given, consider the whole list. Each incorrect response or contradiction cancels one otherwise available correct response, up to the mark limit; the score cannot fall below zero. Neutral material identified by **ignore** does not cancel a correct response. Do not apply this rule as a penalty for extra relevant detail in an extended answer.

3.2 Marking procedure for calculations
A correct final answer can receive the marks indicated in the question-specific scheme without every intermediate step being written. Do not award full marks if the working shown contradicts that answer. Where the question specifically requires a method, demonstration or working, apply that requirement. Credit correct stages when the final answer is wrong, including consequential steps where permitted. A printed unit may only be replaced by another unit when the numerical value is converted consistently.

3.3 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.

3.4 Errors carried forward
Use an earlier incorrect value in a later part where ECF is allowed by the question-specific scheme. Within a calculation, credit later correct stages that use an earlier incorrect value consistently, subject to any stated limits. Do not repeatedly penalise the same error.

3.5 Phonetic spelling
Accept a misspelling when the intended scientific term is clear, including when a term is being recalled. Do not accept wording that could instead name a different scientific term.

3.6 Brackets
Words shown in brackets in the Answers column are not required to gain the mark but help to set the context.

3.7 Allow
Answers that are acceptable but which would not normally be expected are shown as **allow**.

3.8 Ignore
Statements shown as **ignore** are neither creditworthy nor penalised. Mark the rest of the answer normally.

3.9 Do not accept
Statements shown as **do not accept** are incorrect and, where they contradict or replace the expected answer, mean the mark is not awarded.

4. Level of response marking instructions

Extended-response questions (question 07.2 in this paper) are marked using a level of response mark scheme. The scheme has three levels, each covering two marks, plus a level descriptor and indicative content.

Step 1 – Determine a level. Read the whole answer and decide which level descriptor best fits it. Use a 'best-fit' approach: an answer does not need to meet every part of a descriptor to be placed in that level, and a weak part of the answer need not prevent it from reaching the higher level if the overall quality matches the descriptor.

Step 2 – Determine a mark within the level. Award the higher mark in the level if the answer meets the descriptor fully and the points made are well linked; award the lower mark if the answer only just meets the descriptor or contains minor errors or omissions.

The indicative content is not a checklist: students need not include every point to reach the top level, and other relevant, correct points should be credited. An answer that lists points without linking them into a coherent answer should be placed in a lower level than one that develops and connects them.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	to see how the plantain cover changes with distance from the path	allow to sample along a gradient / to see how distribution changes	1	AO1 4.7.2.1 RP
01.2	18 (%)	allow 15 to 21 (%)	1	AO2 4.7.2.1 RP MS 1c
01.3	20 (%)	(22 + 18 + 20) ÷ 3	1	AO2 4.7.2.1 MS 2b
01.4	both points plotted correctly (3 m, 20%) and (5 m, 8%)	allow ± half a small square allow ECF for the 3 m point from 01.3	1	AO2 4.7.2.1 MS 4a, 4c
	a single straight line of best fit through the points	the line should have points on either side	1	AO2 4.7.2.1 MS 4a, 4c
01.5	as the distance from the path increases, the percentage cover of plantain decreases	allow negative correlation	1	AO3 4.7.2.1 WS 3.5
01.6	any **one** from: • plantain is not damaged by **trampling** (because its leaves are flat on the ground) • taller plants near the path are trampled, so there is less **competition** (for light) for the plantain	ignore plantain likes paths	1	AO3 4.7.1.2
01.7	any **one** from: • light intensity • soil moisture / water content • soil pH • soil temperature • soil compaction	ignore biotic factors	1	AO3 4.7.1.2 WS 2.2
		Total	**8**	
02.1	180 ÷ 1200 × 100	an answer of 15 (%) scores **2** marks	1	AO2 4.6.2.2 MS 1c
	= **15** (%)	allow 1 mark for 0.15 allow 1 mark for 85 (%)	1	AO2 4.6.2.2 MS 1c
02.2	there was **variation** in beak depth (between the finches)		1	AO2 4.6.2.2
	finches with deeper beaks could eat the large / hard seeds so were more likely to **survive**		1	AO2 4.6.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	more shallow-beaked finches died, so a larger proportion of the survivors had deeper beaks and the mean increased	allow differential survival changed the mean of the surviving population do not award this mark for passing alleles to offspring: no new finches hatched in this interval do not accept individual birds developed deeper beaks to survive	1	AO2 4.6.2.2
02.3	the mean beak depth **decreased**		1	AO3 4.6.2.2
	finches with smaller beaks could feed on the small seeds more efficiently / were no longer at a disadvantage, so more of them survived and bred	allow natural selection no longer favoured deep beaks	1	AO3 4.6.2.2
		Total	**7**	
03.1	A evaporation		1	AO1 4.7.2.2
	B precipitation	allow rain / rainfall	1	AO1 4.7.2.2
	C transpiration	allow evaporation from leaves	1	AO1 4.7.2.2
03.2	it provides **fresh water** (as salt is left behind when sea water evaporates)		1	AO1 4.7.2.2
	precipitation / rain brings water to the land for plants and animals to use	allow water is needed for photosynthesis / for cells to function	1	AO1 4.7.2.2
03.3	420 − 315 = 105	an answer of 25 (%) scores **2** marks	1	AO2 4.7.2.2 MS 1c
	105 ÷ 420 × 100 = **25** (%)	allow 1 mark for 75 (%)	1	AO2 4.7.2.2 MS 1c
03.4	any **one** from: • more evaporation (because it is warmer) • less rain • more water taken up by plants / lost by transpiration		1	AO2 4.7.2.2
		Total	**8**	
04.1	arrival of the impulse causes a chemical (neurotransmitter) to be released from the end of the first neurone	allow neurotransmitter released from vesicles	1	AO1 4.5.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	the chemical **diffuses** across the synaptic gap		1	AO1 4.5.2.1
	the chemical stimulates a new electrical impulse in the next neurone	allow binds to receptors on the next neurone and starts an impulse	1	AO1 4.5.2.1
04.2	mean with music = (0.27 + 0.25 + 0.25 + 0.28 + 0.27) ÷ 5 = 0.264 (s)	an answer of 10 (%) scores **3** marks	1	AO2 4.5.2.1 MS 1c, 2b
	increase = 0.264 − 0.240 = 0.024 (s)		1	AO2 4.5.2.1 MS 1c, 2b
	0.024 ÷ 0.240 × 100 = **10** (%)	allow ECF from an incorrect mean	1	AO2 4.5.2.1 MS 1c, 2b
04.3	any **two** from: • volunteer C had a shorter reaction time with music • only five volunteers were tested • the differences are small compared with the differences between volunteers		2	AO3 4.5.2.1 WS 3.7
04.4	the second set of tests may have been affected by practice (faster) or tiredness / boredom (slower)	allow the order of the tests is a variable that was not controlled	1	AO3 4.5.2.1 RP WS 2.7
	half the volunteers should do the test with music first / the order should be random	allow rest between the two sets of tests	1	AO3 4.5.2.1 RP WS 2.7
		Total	**10**	
05.1	it makes ecosystems more stable (because species depend on each other for food, shelter and maintaining the physical environment)	allow so that species are not too dependent on one another allow plants and animals may provide medicines / food in the future	1	AO1 4.7.3.1
05.2	7	21 ÷ 3	1	AO2 4.7.3.6 MS 1c
05.3	the margins provide more **food** for birds, e.g. insects / seeds		1	AO2 4.7.3.6
	the margins provide **habitats** / nesting sites / shelter		1	AO2 4.7.3.6
05.4	the number of bumblebees active changes during the day (e.g. with temperature / light), so it is a fair comparison	allow so that time of day is a control variable	1	AO2 4.7.2.1 WS 2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	any **two** from: • bees / insects pollinate the crops, so the yield increases • predators of crop pests live in the margins, so less damage / less pesticide needed • the farmer may receive a payment / grant for the margins • margins reduce soil erosion / run-off of fertiliser		2	AO3 4.7.3.6 WS 1.4
05.6	any **two** from: • breeding programmes for endangered species • protecting and regenerating rare habitats • reintroducing hedgerows • reducing deforestation • reducing carbon dioxide emissions • recycling resources rather than dumping waste in landfill	ignore field margins	2	AO1 4.7.3.6
		Total	**9**	
06.1	(without FSH) **eggs do not mature** (in the ovaries)		1	AO1 4.5.3.4
	so no eggs are released, so fertilisation cannot happen	allow no ovulation	1	AO1 4.5.3.4
06.2	any **three** from: • oestrogen causes the lining of the uterus to **thicken** / build up • oestrogen **stimulates** the release of LH • oestrogen **inhibits** the release of FSH • LH stimulates the **release of an egg** (ovulation)	allow at about day 14 for ovulation max **2** marks if only one hormone is described	3	AO1 4.5.3.3 (HT)
06.3	3 (times)	12 ÷ 4	1	AO2 4.5.3.4 MS 1c
06.4	the diaphragm is a **barrier** that stops sperm reaching the egg	allow covers the cervix	1	AO1 4.5.3.4
	the spermicide **kills** / disables sperm		1	AO1 4.5.3.4

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>06.5</td><td>any one from:
• side effects (e.g. headaches, mood changes, weight gain)
• do not want to take hormones / medicines
• religious or personal reasons
• want to protect against sexually transmitted infections</td><td></td><td>1</td><td>AO1
4.5.3.4</td></tr>
<tr><td colspan="3">Total</td><td>9</td><td></td></tr>
<tr><td>07.1</td><td>the pancreas does not produce (enough) insulin</td><td></td><td>1</td><td>AO1
4.5.3.2</td></tr>
<tr><td></td><td>so the blood glucose concentration would be too high / could not be controlled</td><td></td><td>1</td><td>AO1
4.5.3.2</td></tr>
<tr><td>07.2</td><td colspan="2"><table>
<tr><td>Level 3
(5–6 marks)</td><td>A detailed and logical description of the main steps: isolating the gene, cutting with enzymes, inserting into a vector (plasmid), transferring the vector into the bacterium, and growing the bacteria to produce insulin.</td></tr>
<tr><td>Level 2
(3–4 marks)</td><td>A description that includes some of the main steps, for example cutting out the gene and putting it into a plasmid, but with some steps missing or out of order.</td></tr>
<tr><td>Level 1
(1–2 marks)</td><td>Simple statements about genetic engineering, for example the human insulin gene is put into bacteria.</td></tr>
<tr><td>0 marks</td><td>No relevant content.</td></tr>
</table></td><td>6</td><td>AO1
4.6.2.4 (HT)</td></tr>
<tr><td></td><td colspan="2">Indicative content
• the gene for insulin is identified in human DNA
• enzymes are used to cut out / isolate the insulin gene
• a plasmid is removed from a bacterium
• the same enzyme cuts open the plasmid (leaving matching ends)
• the insulin gene is inserted into the plasmid (vector)
• enzymes join the gene into the plasmid
• the plasmid is put back into a bacterium
• the genetically modified bacteria are grown / cloned in large numbers (in a fermenter)
• the bacteria use the gene to make human insulin
• the insulin is extracted and purified
To reach Level 3 the answer must include the use of enzymes and a vector, and growing the bacteria.</td><td></td><td></td></tr>
<tr><td>07.3</td><td>50 000 × 0.75 = 37 500 (g)</td><td>an answer of 3.75×10^4 (g) scores 2 marks</td><td>1</td><td>AO2
4.6.2.4
MS 1b</td></tr>
</table>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	= **3.75×10^4** (g)	allow 3.8×10^4 allow 1 mark for 37 500 not in standard form	1	AO2 4.6.2.4 MS 1b
		Total	**10**	
08.1	ff		1	AO2 4.6.1.4
08.2	persons 1 and 2 do not have CF but their child, person 3, has CF		1	AO3 4.6.1.5 WS 3.5
	so persons 1 and 2 must each carry the allele for CF, which is not expressed / is masked by the dominant allele	allow 1 and 2 are both carriers / both Ff	1	AO3 4.6.1.5 WS 3.5
08.3	gametes from both parents: **F** and **f**		1	AO2 4.6.1.4 (HT) MS 2e
	offspring genotypes: FF, Ff, Ff, ff	allow ECF from incorrect gametes	1	AO2 4.6.1.4 (HT) MS 2e
	probability = 0.25	allow 25% / 1 in 4 / ¼ allow ECF from the Punnett square do not accept 1 : 3 / 1 : 4 / 25 : 75	1	AO2 4.6.1.4 (HT) MS 2e
08.4	person 6 (her father) has CF / is ff, so he can only pass on the allele **f**		1	AO2 4.6.1.4
	she does not have CF, so she must also have inherited **F** (from person 5) / she is Ff	allow she has one dominant and one recessive allele	1	AO2 4.6.1.4
08.5	any **one** from: • they are genetically different (from each other and from the parent cell) • they have half the number of chromosomes / only one set of chromosomes	allow four cells are produced instead of two allow 23 chromosomes instead of 46	1	AO1 4.6.1.2
		Total	**9**	
		TOTAL FOR PAPER	**70**	