GCSE

COMBINED SCIENCE: TRILOGY

Foundation Tier Biology Paper 2

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

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This mark scheme is an original resource written for sciencegcse.co.uk to accompany the Set 2 practice paper SGC/S2/B/2F. 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 05.1 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	Light → Cells in the eye Sound → Cells in the ear Change in temperature → Cells in the skin	three correct = **2** marks one or two correct = **1** mark if more than one line is drawn from a box, no mark for that box	2	AO1 4.5.2.1
01.2	Q → S → T → P → R	all five in the correct order = **2** marks three letters in the correct position = **1** mark	2	AO2 4.5.2.1
01.3	central nervous system	allow CNS	1	AO1 4.5.2.1
01.4	a reflex action is **automatic** / does not involve the conscious part of the brain	allow the cyclist has to think about / decide to brake allow a reflex is coordinated by the spinal cord / a relay neurone (not the brain)	1	AO2 4.5.2.1
	a reflex action is **faster**	allow a reflex does not need to be learned ignore reflexes protect the body	1	AO2 4.5.2.1
		Total	**7**	
02.1	an allele that is expressed / shows its characteristic even if only **one copy** is present	allow only one copy is needed for the characteristic to show	1	AO1 4.6.1.4
02.2	does not have polydactyly	allow has the normal number of fingers and toes / five fingers on each hand	1	AO2 4.6.1.4
02.3	partner's gametes: **D** and **d**		1	AO2 4.6.1.4 MS 2e
	offspring genotypes: DD, Dd, Dd, dd	allow ECF from incorrect gametes	1	AO2 4.6.1.4 MS 2e
02.4	0.25	allow 25% / 1 in 4 / ¼ do not accept 1 : 3 / 1 : 4 allow ECF from the Punnett square	1	AO2 4.6.1.4 MS 2e
02.5	23		1	AO1 4.6.1.2
02.6	**for:** any **one** from: prevents a child being born with the disorder / reduces suffering; reduces the cost of care; parents can make an informed decision		1	AO1 4.6.1.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	against: any **one** from: embryos are destroyed (ethical / religious objection); expensive; could lead to choosing embryos for other characteristics ('designer babies'); the test may give a false result		1	AO1 4.6.1.5
		Total	**8**	
03.1	FSH	if more than one box is ticked, no mark	1	AO1 4.5.3.3
03.2	the lining **breaks down** / is lost (as a period / menstruation)	allow it gets thinner ignore thickness values on their own	1	AO2 4.5.3.3
03.3	so that it is ready for a fertilised egg / embryo to **implant**	allow to prepare for pregnancy allow to supply the embryo with food / oxygen	1	AO2 4.5.3.3
03.4	progesterone **or** oestrogen		1	AO1 4.5.3.3
03.5	people may forget to change the patch / the patch may come off	allow the patch may be put on late / used incorrectly	1	AO3 4.5.3.4
03.6	the IUD is **more effective** (than the condom)		1	AO3 4.5.3.4 WS 3.5
	a comparison using data, e.g. the IUD gives 0.8 pregnancies (per 100 women per year) with typical use compared with 13 for the condom	allow comparisons of perfect use (0.6 and 2) allow the condom gives about 16 times as many pregnancies with typical use a comparison using data from the table is needed for this mark	1	AO3 4.5.3.4 WS 3.5
03.7	once the IUD is fitted, it does not depend on the user remembering to use it / using it correctly	allow it cannot be forgotten / used incorrectly	1	AO3 4.5.3.4
		Total	**8**	
04.1	all the populations of different species living in a habitat	allow all the organisms living in an area	1	AO1 4.7.1.1
04.2	stickleback **or** dragonfly larva		1	AO2 4.7.1.1
04.3	any **two** from: • light • mineral ions • carbon dioxide • space	allow nutrients for mineral ions ignore water / food / oxygen	2	AO1 4.7.1.1
04.4	the number of dragonfly larvae would **increase**		1	AO2 4.7.1.3

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td></td><td>because fewer would be eaten by sticklebacks</td><td>allow fewer predators
allow other sensible effects, e.g. then decrease because there is less food (mayfly larvae) if explained</td><td>1</td><td>AO2
4.7.1.3</td></tr>
<tr><td>04.5</td><td>protects the snail from predators / from being eaten</td><td>allow protects it from damage</td><td>1</td><td>AO2
4.7.1.4</td></tr>
<tr><td>04.6</td><td>producers make biomass / food by photosynthesis, providing food or energy for consumers</td><td>allow they produce the food that supports the food chain</td><td>1</td><td>AO1
4.7.2.1</td></tr>
<tr><td colspan="3">Total</td><td>8</td><td></td></tr>
<tr><td>05.1</td><td colspan="2"><table>
<tr><td>Level 3
(5–6 marks)</td><td>A clear, detailed and logical description of selective breeding, including choosing parents with the desired characteristic, breeding them, selecting offspring and repeating over many generations.</td></tr>
<tr><td>Level 2
(3–4 marks)</td><td>A description that includes choosing sheep with thick wool and breeding them, with some idea of selecting offspring. Repeating over generations may be missing.</td></tr>
<tr><td>Level 1
(1–2 marks)</td><td>Simple statements, for example breed the sheep with the thickest wool.</td></tr>
<tr><td>0 marks</td><td>No relevant content.</td></tr>
</table></td><td>6</td><td>AO1
4.6.2.3</td></tr>
<tr><td></td><td colspan="2">Indicative content
• measure the thickness of the wool of each sheep
• choose a ram (male) and ewes (females) with the thickest wool
• breed these sheep together
• measure the wool of the offspring
• choose the offspring with the thickest wool
• breed these together
• repeat for many generations
• until all the offspring have thick wool
• also select for other useful characteristics, e.g. good health
• avoid breeding closely related sheep (to reduce inbreeding)
To reach Level 3 the answer must include selecting the offspring and repeating over many generations.</td><td></td><td></td></tr>
<tr><td>05.2</td><td>inbreeding reduces the variation (the number of different alleles) in the population</td><td>allow the animals are very similar genetically</td><td>1</td><td>AO1
4.6.2.3</td></tr>
<tr><td></td><td>so there is a greater chance of inherited defects / of all the animals being affected by the same disease</td><td>allow harmful recessive alleles are more likely to be inherited from both parents</td><td>1</td><td>AO1
4.6.2.3</td></tr>
<tr><td colspan="3">Total</td><td>8</td><td></td></tr>
</table>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	to calculate a mean	allow to identify anomalous results allow to make the results more repeatable / reduce the effect of random errors ignore fair test / accurate	1	AO3 4.5.2.1 RP WS 2.2
06.2	(0.312 + 0.298 + 0.305 + 0.301) ÷ 4	an answer of 0.304 (s) scores **2** marks	1	AO2 4.5.2.1 MS 2b
	= **0.304** (s)	allow 0.30 (s) allow 1 mark for 0.327 (s) (anomalous result included)	1	AO2 4.5.2.1 MS 2b
06.3	practice **decreased** the reaction time	allow reaction time decreased from 0.304 s to 0.266 s allow she reacted faster	1	AO3 4.5.2.1 WS 3.5
06.4	0.012 (s)	0.272 − 0.260	1	AO2 4.5.2.1 MS 1a
06.5	any **two** from: • the computer measures the time more precisely / to 0.001 s • there is no need to convert a distance on the ruler into a time • there are no errors in reading the scale on the ruler • the stimulus is the same every time / the person dropping the ruler cannot give a clue when it will drop	ignore more accurate unless explained	2	AO3 4.5.2.1 RP WS 2.3
06.6	any **one** from: • the same hand used to click • the same computer / mouse / program • the same size / colour of square • the same time of day • the same surroundings / level of distraction • no caffeine / the same amount of sleep	ignore the same person	1	AO2 4.5.2.1 RP WS 2.2
		Total	**8**	
07.1	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
07.2	18 (%)	allow 15 to 21 (%)	1	AO2 4.7.2.1 RP MS 1c
07.3	20 (%)	(22 + 18 + 20) ÷ 3	1	AO2 4.7.2.1 MS 2b

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.4	both points plotted correctly (3 m, 20%) and (5 m, 8%)	allow ± half a small square allow ECF for the 3 m point from 07.3	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
07.5	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
07.6	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
07.7	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**	
08.1	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
08.2	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
	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
08.3	the mean beak depth **decreased**		1	AO3 4.6.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	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**	
09.1	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
09.2	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
09.3	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
09.4	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**	
		TOTAL FOR PAPER	**70**	