GCSE

COMBINED SCIENCE: TRILOGY

Foundation Tier Biology Paper 1

Mark scheme Practice Paper Series – Set 2 SGC/S2/B/1F

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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/1F. 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 4.1–4.4. 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 04.1 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	A **eyepiece** (lens)	allow ocular ignore lens on its own	1	AO1 4.1.1.5 RP
	B **objective** (lens)	ignore lens on its own	1	AO1 4.1.1.5 RP
01.2	Q → S → R → P	all four in the correct order = **2** marks two letters in the correct position = **1** mark	2	AO1 4.1.1.5 RP
01.3	To make the cell structures easier to see	if more than one box is ticked, no mark	1	AO1 4.1.1.5 RP
01.4	nucleus	do not accept nucleolus	1	AO1 4.1.1.2
01.5	(the onion bulb grows) **underground or** the cells do not receive **light** (so cannot photosynthesise)	allow the bulb is a storage organ so it does not photosynthesise ignore they do not photosynthesise unless a reason is given	1	AO2 4.1.1.2
01.6	30 ÷ 120	an answer of 0.25 (mm) scores **2** marks	1	AO2 4.1.1.5 MS 3c
	(real length =) **0.25** (mm)	allow 250 µm if the unit is changed	1	AO2 4.1.1.5 MS 3c
		Total	**9**	
02.1	The net movement of particles from an area of higher concentration to an area of lower concentration	if more than one box is ticked, no mark	1	AO1 4.1.3.1
02.2	24 (cm^2)	6 × (2 × 2)	1	AO2 4.1.3.1 MS 5c
02.3	3 (: 1)	24 ÷ 8 allow an answer consistent with the student's value of X, i.e. X ÷ 8	1	AO2 4.1.3.1 MS 1c
02.4	the **smaller** the surface area : volume ratio, the **longer** the time (to become colourless)	allow converse ignore references only to the size of the cube	1	AO3 4.1.3.1 WS 3.5
02.5	(the 3 cm cube) has the **smallest surface area : volume ratio**	allow smallest surface area compared with its volume	1	AO2 4.1.3.1
	so the acid has **further to diffuse** to reach the centre (of the cube)	allow so the acid takes longer to diffuse into the whole cube	1	AO2 4.1.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.6	any **one** from: • concentration of (hydrochloric) acid • volume of acid • temperature • concentration of the alkali or the indicator in the agar	allow amount of acid ignore time	1	AO2 4.1.3.1 WS 2.2
02.7	hard to see / judge exactly when all the pink colour has gone	allow the colour fades gradually allow the centre of the cube is hard to see allow had to watch three cubes at the same time ignore human error unqualified	1	AO3 4.1.3.1 WS 3.7
		Total	**8**	
03.1	chromosomes	in this order only	1	AO1 4.1.2.1
	genes		1	AO1 4.1.2.1
03.2	16	if more than one box is ticked, no mark	1	AO2 4.1.2.2
03.3	meristem (tissue)		1	AO1 4.1.2.3
03.4	any **one** from: • large numbers of plants can be produced quickly or cheaply • stops the rare plant becoming extinct • the clones have the same (useful) characteristics as the parent plant	allow many more plants can be produced than from two seeds ignore easy	1	AO2 4.1.2.3
03.5	the embryo is a potential human life / could have developed into a baby, so destroying it is considered wrong	allow an explained religious or ethical objection about the value or rights of the embryo ignore the embryo is destroyed on its own (given in the question) ignore wrong / unnatural without a reason	1	AO3 4.1.2.3 WS 1.3
		Total	**6**	

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>04.1</td><td>
<table>
<tr><td>Level 3
(5–6 marks)</td><td>A detailed and coherent method that uses all three tests, with the correct reagents and the correct positive result for each test. The answer explains how the results identify all four solutions, including the water.</td></tr>
<tr><td>Level 2
(3–4 marks)</td><td>A method that includes at least two correct tests with the correct reagents and some correct results. The logic for identifying all four solutions may be incomplete, or some detail (such as heating with Benedict’s solution) is missing.</td></tr>
<tr><td>Level 1
(1–2 marks)</td><td>Simple statements about one or more food tests, for example a correct reagent or a correct colour, that are not linked into a method.</td></tr>
<tr><td>0 marks</td><td>No relevant content.</td></tr>
</table>
</td><td></td><td>6</td><td>AO1 (4)
AO2 (2)
4.2.2.1
RP</td></tr>
<tr><td></td><td>Indicative content
• put a small sample of each solution into a separate clean test tube for each test
• starch: add a few drops of iodine solution
• iodine solution changes from orange-brown to blue-black if starch is present
• glucose: add Benedict’s solution and heat in a (hot) water bath (at about 80 °C) for a few minutes
• Benedict’s solution changes from blue to green, yellow or (brick) red if glucose is present
• protein: add biuret reagent (or sodium hydroxide solution then copper sulfate solution)
• biuret reagent changes from blue to purple / lilac if protein is present
• carry out every test on each of the four solutions
• the solution that gives no positive result in any test is the water
• use the same volume of each solution and of each reagent
• safety: wear eye protection; use a water bath rather than heating directly with a flame
To reach Level 3 the answer must name all three reagents with the correct positive result for each, and show how the water is identified.</td><td></td><td></td><td></td></tr>
<tr><td>04.2</td><td>Starch</td><td>if more than one box is ticked, no mark</td><td>1</td><td>AO2
4.2.2.1
RP</td></tr>
<tr><td>04.3</td><td>Q and brick red shows more sugar (than green)</td><td>allow Q because the colour changed further from blue</td><td>1</td><td>AO3
4.2.2.1
RP</td></tr>
<tr><td colspan="3">Total</td><td>8</td><td></td></tr>
<tr><td>05.1</td><td>P artery
Q vein
R capillary</td><td>all three correct = 2 marks
two correct = 1 mark</td><td>2</td><td>AO1
4.2.2.2</td></tr>
<tr><td>05.2</td><td>(blood pressure) decreases</td><td>allow falls from 13.0 kPa to 1.0 kPa
ignore numbers on their own</td><td>1</td><td>AO3
4.2.2.2
WS 3.5</td></tr>
</table>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	blood in arteries is at a (much) **higher pressure** (than in veins)	allow 13.0 kPa compared with 1.0 kPa	1	AO2 4.2.2.2
	a thick (muscular / elastic) wall **withstands** the high pressure	allow stops the artery bursting	1	AO2 4.2.2.2
05.4	Plasma → Transports dissolved substances such as glucose Platelets → Helps the blood to clot Red blood cells → Carries oxygen	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 4.2.2.3
		Total	**7**	
06.1	palisade mesophyll	allow palisade (cells / layer)	1	AO1 4.2.3.1
06.2	control the **opening and closing** of the stomata	allow open and close stomata allow control gas exchange / water loss	1	AO1 4.2.3.2
06.3	250.0 − 235.6 = 14.4 (g)	an answer of 3.6 (g per hour) scores **2** marks	1	AO2 4.2.3.2 MS 1a
	14.4 ÷ 4 = **3.6** (g per hour)	allow ECF from an incorrect mass lost	1	AO2 4.2.3.2 MS 1a
06.4	to stop water **evaporating** from the surface of the water	allow so that all the mass lost is water lost from the shoot	1	AO2 4.2.3.2 WS 2.2
06.5	the rate of water loss would **decrease**		1	AO2 4.2.3.2
	(less air movement so) water vapour is **not removed** from around the leaves as quickly	allow the concentration gradient of water vapour is less steep, so water vapour diffuses out of the stomata more slowly	1	AO2 4.2.3.2
06.6	any **one** from: • only one shoot / one type of plant was tested • the investigation was not repeated • other plants may have different adaptations, for example fewer stomata	allow only one speed of moving air was tested	1	AO3 4.2.3.2 WS 3.7
		Total	**8**	
07.1	(the pondweed) **photosynthesised faster than it respired**	allow the pondweed photosynthesised (in the light) for this mark	1	AO2 4.4.1.1 4.4.2.1
	so the concentration of **carbon dioxide decreased**	allow carbon dioxide was used up / taken in	1	AO2 4.4.1.1 4.4.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2	**no light** so no photosynthesis		1	AO2 4.4.1.1 4.4.2.1
	respiration released carbon dioxide so its concentration increased		1	AO2 4.4.1.1 4.4.2.1
07.3	(as a control) to show that the colour change was caused by the pondweed	allow to show that the indicator does not change colour on its own (in the light) ignore to make it a fair test	1	AO3 4.4.1.2 WS 2.2
07.4	any **one** from: • temperature • type / species of pondweed • distance from the lamp • size of the tubes	ignore mass of pondweed, volume of indicator and time (these are given in the question) ignore amount of light	1	AO2 4.4.1.2 WS 2.2
07.5	any **one** from: • place the tubes in a water bath / tank of water (at a constant temperature) • put a (glass) tank / beaker of water between the lamp and the tubes • use an LED lamp	allow use a heat shield allow move the lamp further away	1	AO3 4.4.1.2 WS 2.7
07.6	any **two** from: • converted into starch (for storage) • used to make cellulose (for cell walls) • used to make amino acids / proteins • converted into fats / oils / lipids (for storage)	ignore energy	2	AO1 4.4.1.3
		Total	**9**	
08.1	to check that the drug is **safe** / not toxic		1	AO1 4.3.1.9
	to check that the drug **works** / is effective	allow to find a suitable dose	1	AO1 4.3.1.9
08.2	neither the patients **nor** the doctors know who is given the drug (or the placebo)		1	AO1 4.3.1.9
	so that the results are not **biased** (by the patients' expectations or the doctors' judgements)	allow so that the results are valid / fair	1	AO1 4.3.1.9
08.3	4.5	18 ÷ 4	1	AO2 4.3.1.9 MS 1c
08.4	**for:** the decrease in blood pressure was much greater than with the placebo (18 compared with 4 mmHg)	allow large number of patients / double-blind so the results are valid	1	AO3 4.3.1.9 WS 1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	against: a higher percentage of patients had side effects (12% compared with 9%)	allow long-term effects are not known (the trial lasted only 8 weeks)	1	AO3 4.3.1.9 WS 1.4
		Total	**7**	
09.1	a **mosquito** (vector) feeds on / bites an infected person and takes in the protist	allow mosquito is the vector	1	AO1 4.3.1.5
	the mosquito bites another person and passes the protist into their **blood**		1	AO1 4.3.1.5
09.2	any **two** from: • use (insecticide-treated) mosquito nets / bed nets • spray insecticide • remove / drain standing water (where mosquitoes breed) • use insect repellent • take antimalarial drugs • vaccination		2	AO1 4.3.1.5
09.3	250 − 70 = 180	an answer of 72 (%) scores **2** marks	1	AO2 4.3.1.5 MS 1c, 2c
	180 ÷ 250 × 100 = **72** (%)	allow 1 mark for 28 (%)	1	AO2 4.3.1.5 MS 1c, 2c
09.4	half of 250 is 125 (cases per 1000 people)		1	AO3 4.3.1.5 MS 2c
	yes (the target was met) because there were 100 cases (per 1000 people) in 2020, which is less than 125	the conclusion must be supported by data for this mark	1	AO3 4.3.1.5 MS 2c
		Total	**8**	
		TOTAL FOR PAPER	**70**	