GCSE

COMBINED SCIENCE: TRILOGY

Foundation Tier Physics Paper 1

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

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/P/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, Physics section 6.1–6.4. 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 07.1 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	Elastic potential	if more than one box is ticked, no mark	1	AO1 6.1.1.1
01.2	extension = 10.0 − 6.0 = 4.0 (cm)	an answer of 0.040 (m) scores **2** marks	1	AO2 6.1.1.2 MS 1a
	= **0.040** (m)	allow 0.04 (m) allow ECF from an incorrect extension in cm correctly converted to metres	1	AO2 6.1.1.2 MS 1a
01.3	$E_e = 0.5 \times 250 \times 0.040^2$	an answer of 0.20 (J) scores **2** marks allow ECF from 01.2	1	AO2 6.1.1.2 MS 3c
	E_e = **0.20** (J)	allow 0.2 (J) an answer of 2000 (J) (extension in cm) scores 1 mark	1	AO2 6.1.1.2 MS 3c
01.4	0.05 (J)	allow ECF: their 01.3 − 0.15 correctly calculated	1	AO2 6.1.2.1
01.5	work is done against friction (between the wheels and the floor) / air resistance	allow friction / air resistance slows the car down	1	AO1 6.1.2.1
	(so) energy is transferred to the thermal energy store of the car and the surroundings	allow the energy is dissipated / wasted (as heat) to the surroundings allow the car / the floor / the air warms up ignore sound do not accept the energy is destroyed / used up	1	AO1 6.1.2.1
		Total	**8**	
02.1	**A** → Light-dependent resistor (LDR)	if more than one line is drawn from a symbol, no mark for that symbol	1	AO1 6.2.1.1
	B → Thermistor		1	AO1 6.2.1.1
02.2	decreases		1	AO1 6.2.1.4
	increases		1	AO2 6.2.1.3, 6.2.1.4
02.3	2.0 = I × 500	an answer of 0.0040 (A) scores **2** marks allow I = 2.0 ÷ 500	1	AO2 6.2.1.3 MS 3c
	I = **0.0040** (A)	allow 0.004 (A) / 4.0 × 10^{-3} (A) an answer of 1000 (A) scores 0 marks	1	AO2 6.2.1.3 MS 3c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.4	(between) 20 (°C) and 30 (°C)	both temperatures are needed for the mark answers can be in either order	1	AO3 6.2.1.4
		Total	**7**	
03.1	arrangement: the particles in a liquid are close together but the particles in a gas are far apart	allow both are randomly arranged / have no regular pattern	1	AO1 6.3.1.1
	movement: the particles in a liquid move around each other / slide past each other but the particles in a gas move quickly in all directions	allow gas particles move faster / more freely than liquid particles ignore vibrate	1	AO1 6.3.1.1
03.2	(104 − 98) ÷ 104 × 100	an answer of 5.8 (%) scores **2** marks allow 6 ÷ 104 for 1 mark	1	AO2 6.3.3.1 MS 1c
	= **5.8** (%)	allow 5.77 (%) / 6 (%) an answer of 6.1 (%) (divided by 98) scores 1 mark an answer of 94.2 (%) scores 0 marks	1	AO2 6.3.3.1 MS 1c
03.3	the particles lose (kinetic) energy / move more slowly	allow the particles have less kinetic energy do not accept the particles shrink / get smaller	1	AO1 6.3.3.1
	the particles collide with the walls (of the jar) less often	allow fewer collisions with the walls per second do not accept the particles collide with each other less often	1	AO1 6.3.3.1
	the particles hit the walls with less force	allow the force on the walls decreases (so the pressure decreases)	1	AO1 6.3.3.1
03.4	stays the same		1	AO2 6.3.1.1
	the mass and the volume of the air do not change	the reason mark depends on stays the same being chosen allow the jar is sealed so no air can get in or out, and the volume of the jar does not change	1	AO2 6.3.1.1
03.5	50 (g)		1	AO1 6.3.1.2
03.6	ρ = 50 ÷ 62.5	an answer of 0.80 (g/cm^3) scores **2** marks allow ECF from 03.5	1	AO2 6.3.1.1 MS 3c

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	ρ = **0.80** (g/cm^3)	allow 0.8 (g/cm^3) an answer of 1.25 (g/cm^3) scores 0 marks	1	AO2 6.3.1.1 MS 3c
		Total	**12**	
04.1	• Earth wire → Green and yellow stripes • Live wire → Brown • Neutral wire → Blue	three correct lines scores **2** marks one or two correct lines scores 1 mark if more than one line is drawn from a wire, no mark for that wire	2	AO1 6.2.3.2
04.2	E = 240 × 230	an answer of 55 200 (J) scores **2** marks	1	AO2 6.2.4.2 MS 3c
	E = **55 200** (J)	allow 55 000 (J) alternative method: I = 240 ÷ 60 = 4 (A) and P = 230 × 4 = 920 (W) (1); E = 920 × 60 = 55 200 (J) (1) an answer of 0.96 or 1.04 (J) scores 0 marks	1	AO2 6.2.4.2 MS 3c
04.3	the live wire is still at a high potential / at 230 V (even though the toaster is switched off)	allow the live wire is still live ignore it is still plugged in / connected to the mains (repeats the question)	1	AO1 6.2.3.2
	a current would flow through the person (to earth), causing an electric shock	allow there is a large potential difference between the live wire and the person / earth ignore shock / electrocuted unless linked to a current through the body	1	AO1 6.2.3.2
		Total	**6**	
05.1	(fit / use thicker) loft insulation	allow a named insulating material in the loft, e.g. mineral wool allow use a roof material with a lower thermal conductivity ignore double glazing / curtains (not the roof)	1	AO1 6.1.2.1
05.2	polystyrene		1	AO3 6.1.2.1
	it has the lowest (relative) thermal conductivity	the reason mark depends on polystyrene being chosen allow 0.033 is the lowest value allow it gives the lowest rate of energy transfer (by conduction)	1	AO3 6.1.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	point plotted correctly at (10, 11)	allow ± half a small square	1	AO2 6.1.2.1 MS 4a, 4c
	point plotted correctly at (20, 8)	allow ± half a small square	1	AO2 6.1.2.1 MS 4a, 4c
	a smooth curve of best fit passing through or close to all the points	do not accept a straight line or points joined dot to dot	1	AO2 6.1.2.1 MS 4a, 4c
05.4	12 (mm)	allow a value from 11.5 to 12.5 (mm) allow a correct reading from the student's curve	1	AO2 6.1.2.1 MS 4a
05.5	the student must choose two thicknesses where one is double the other, e.g. 10 mm and 20 mm	allow 5 mm and 10 mm	1	AO3 6.1.2.1 WS 3.5
	and show that the decrease does not halve, e.g. 11 °C falls to 8 °C, not to 5.5 °C	allow from 5 mm to 10 mm the decrease falls from 15 °C to 11 °C, not to 7.5 °C allow 5 mm to 20 mm: 15 °C falls to 8 °C, not to 3.75 °C a correct general statement without data, e.g. doubling the thickness reduces the temperature decrease by less than half, scores 1 mark do not accept the graph is a curve / levels off	1	AO3 6.1.2.1 WS 3.5
		Total	**9**	
06.1	alpha radiation would be absorbed / stopped by the paper (so none would reach the detector)	allow alpha would not pass through the paper	1	AO3 6.4.2.1
	gamma radiation would pass through the paper (whatever its thickness), so the count rate would not change when the thickness changes	allow gamma is too penetrating allow beta radiation is partly absorbed by the paper, so the count rate depends on the thickness, for 1 mark if neither of the above marks is scored	1	AO3 6.4.2.1
06.2	the paper is (too) thick / has become thicker	allow more radiation is being absorbed by the paper ignore the paper is denser	1	AO3 6.4.2.1
06.3	90 (top number)		1	AO2 6.4.2.2
	39 (bottom number)		1	AO2 6.4.2.2

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>06.4</td><td>the count rate / activity of the source stays (almost) constant while it is being used</td><td>allow so that a change in count rate is only caused by a change in the thickness of the paper
allow the source does not need to be replaced often / lasts a long time</td><td>1</td><td>AO2
6.4.2.3</td></tr>
<tr><td>06.5</td><td>lead absorbs (most of) the radiation</td><td>allow lead stops the radiation escaping</td><td>1</td><td>AO1
6.4.2.4</td></tr>
<tr><td></td><td>so workers are not irradiated / receive a lower dose of radiation</td><td>allow reduces the risk of damage to cells / of cancer for workers
ignore contamination
ignore so it is safe</td><td>1</td><td>AO1
6.4.2.4</td></tr>
<tr><td colspan="3">Total</td><td>8</td><td></td></tr>
<tr><td>07.1</td><td colspan="2"><table>
<tr><td>Level 3
(5–6 marks)</td><td>The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.</td></tr>
<tr><td>Level 2
(3–4 marks)</td><td>The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.</td></tr>
<tr><td>Level 1
(1–2 marks)</td><td>The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.</td></tr>
<tr><td>0 marks</td><td>No relevant content.</td></tr>
</table></td><td></td><td>6</td><td>AO1
6.2.1.4
RP</td></tr>
<tr><td></td><td colspan="2">Indicative content
• close the switch
• adjust the variable resistor to change the potential difference across the diode
• record the potential difference (voltmeter reading) and the current (ammeter reading)
• take readings over a range of potential differences, e.g. from 0 V to 0.8 V
• take small steps, e.g. 0.1 V, / more readings where the current starts to increase (0.4–0.8 V)
• reverse the diode (or the battery) and repeat to obtain readings in the reverse direction
• record the reverse readings as negative values
• the resistor protects the diode from too large a current
• open the switch between readings so the components do not heat up
• repeat the readings and calculate mean values
• plot a graph of current (y-axis) against potential difference (x-axis)
To reach Level 3 the method must change the potential difference with the variable resistor, record pairs of readings over a range and include either the reverse direction or plotting the characteristic graph.</td><td></td><td></td></tr>
<tr><td>07.2</td><td>there is no current / almost no current until the potential difference is about 0.4 V</td><td>allow no current up to 0.2 V
allow very little current below 0.5 V</td><td>1</td><td>AO3
6.2.1.4
RP</td></tr>
</table>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
	then the current increases rapidly / by larger and larger amounts as the potential difference increases	allow the current increases non-linearly allow the current increases, but not in direct proportion to the potential difference	1	AO3 6.2.1.4 RP
07.3	$0.70 = 0.0200 \times R$	an answer of 35 (Ω) scores **2** marks allow $R = 0.70 \div 0.0200$	1	AO2 6.2.1.3 MS 3c
	R = **35** (Ω)	an answer of 0.035 (Ω) scores 1 mark (current not converted to amperes)	1	AO2 6.2.1.3 MS 3c
07.4	It has a very high resistance in the reverse direction.	if more than one box is ticked, no mark	1	AO1 6.2.1.4
07.5	the current may be smaller than 0.1 mA / smaller than the resolution of the ammeter (so it is too small for this ammeter to measure)	allow the ammeter is not sensitive enough ignore the ammeter is faulty	1	AO3 6.2.1.4 WS 3.7
		Total	**12**	
08.1	most of the atom is empty space	allow most of the alpha particles do not come close to any charge / mass	1	AO3 6.4.1.3
	the mass (and the positive charge) of the atom is concentrated in a (very) small region / nucleus	allow there is a tiny nucleus	1	AO3 6.4.1.3
	the nucleus is positively charged (so it repels the positive alpha particles)	allow positive charge at the centre of the atom	1	AO3 6.4.1.3
08.2	**A** absorbed		1	AO1 6.4.1.1
	B emitted		1	AO1 6.4.1.1
08.3	it loses (one or more outer) electrons	do not accept it gains protons do not accept it gains electrons	1	AO1 6.4.1.2
08.4	$1.2 \times 10^{-10} \div 6.0 \times 10^{-15}$	an answer of 20 000 scores **2** marks	1	AO2 6.4.1.1 MS 1b
	= **20 000** (times)	allow 2×10^4 / 2.0×10^4 an answer of 5×10^{-5} scores 0 marks	1	AO2 6.4.1.1 MS 1b
		Total	**8**	
		TOTAL FOR PAPER	**70**	