



GCSE MARKING SCHEME

SUMMER 2025

**GCSE
SCIENCE (DOUBLE AWARD) – UNIT 3
PHYSICS
FOUNDATION TIER
3430U30-1**

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

GCSE SCIENCE (Double Award) – Unit 3 – Physics 1

FOUNDATION TIER

SUMMER 2025 MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statement.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only

ecf = error carried forward

bod = benefit of doubt

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)		0.2 [m]		1		1		
		(ii)		8 [m]		1		1		
	(b)	(i)		$\frac{2.4}{8 \text{ ecf}}$ (1) = 0.3 [Hz] (1)	1	1		2	2	
		(ii)		Distance = 2.4×50 (1) = 120 [m] (1)	1	1		2	2	
	(c)			number of cycles	1			1		
				Question 1 total	3	4	0	7	4	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2		(i)		0.2×6 (1) $= 1.2$ [V] (1)	1	1		2	2	2
		(ii)	I	0.3 [A]		1		1		1
			II	$V = IR = 0.3 \text{ ecf} \times 2 = 0.6$ [V]		1		1	1	1
		(iii)		0.6 ecf + 1.2 ecf (1) $= 1.8$ [V] (1)	1	1		2	1	2
				Question 2 total	2	4	0	6	4	6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			C, A, D 3 correct award 2 marks 1 or 2 correct award 1 mark	2			2		
	(b)	(i)		50 000, 400 000 and 230 clockwise 3 correct award 2 marks 1 or 2 correct award 1 mark Allow power of 10 slip on 50 000 and 400 000	2			2		
		(ii)	I II III	step-up (1) step-down (1) efficiently (1) No ecf from (b)(i)	3			3		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
		(iii)	<p>Advantage of nuclear: (1)</p> <ul style="list-style-type: none"> – {no / less} {CO₂ / SO₂ / carbon} emissions – reduction in transport of fuel – larger {energy / power / electricity} output per {kg of fuel / small amount of fuel} – less pollution – doesn't contribute to global warming <p>Disadvantage of nuclear: (1)</p> <ul style="list-style-type: none"> – waste is radioactive OR mention of nuclear waste – need for long term storage – building time of station – decommissioning takes a long time <p>Don't accept reference to cost Don't accept no pollution, {no / reduces} global warming Don't accept effect on habitats Don't accept reference to nuclear accident Don't accept reference to efficiency Don't accept gives off radiation unless linked to waste</p>	2			2		
	(c)	(i)	<p>4 629 + 681 + 120 (1) = 5 430 [MW] (1)</p>		2		2	2	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		$\frac{15\,000}{5000} = 3 \text{ (1)}$ $3 \times 1000 = 3000 \text{ [kg] (1)}$ this can imply the 1 st mark Comparison to 2000 [kg] (1) no ecf so agree 3 rd mark can only be awarded if the 1 st 2 marks have been awarded Alternative: $\frac{15\,000}{5000} = 3 \text{ (1)}$ $\frac{2000}{3} = 667 \text{ (1)}$ this can imply the 1 st mark Comparison to 1000 [kg] (1) no ecf so agree 3 rd mark can only be awarded if the 1 st 2 marks have been awarded			3	3	3	
				Question 3 total	9	2	3	14	5	0

Question				Marking details	Marks available																								
					AO1	AO2	AO3	Total	Maths	Prac																			
4	(a)	(i)		density (1) rises (1)	2			2																					
		(ii)		Conduction – Thermalite and fibre-glass ticked (2) Radiation – Shiny outer layer and shiny inner layer ticked (2) Deduct one mark in each row for any additional tick <table border="1"><thead><tr><th rowspan="2">Method of heat loss</th><th colspan="4">Feature that reduces heat loss</th></tr><tr><th>Insulating Thermalite® concrete block</th><th>Fibre-glass</th><th>Shiny outer layer</th><th>Shiny inner layer</th></tr></thead><tbody><tr><td>Conduction</td><td>✓</td><td>✓</td><td></td><td></td></tr><tr><td>Radiation</td><td></td><td></td><td>✓</td><td>✓</td></tr></tbody></table>	Method of heat loss	Feature that reduces heat loss				Insulating Thermalite® concrete block	Fibre-glass	Shiny outer layer	Shiny inner layer	Conduction	✓	✓			Radiation			✓	✓		4		4		
Method of heat loss	Feature that reduces heat loss																												
	Insulating Thermalite® concrete block	Fibre-glass	Shiny outer layer	Shiny inner layer																									
Conduction	✓	✓																											
Radiation			✓	✓																									
	(b)			Less gas {burned / used} (1) accept heating used less Less CO ₂ produced OR reduce carbon footprint OR less gas extracted (1) Reduces the [increase] of {global warming / greenhouse effect / climate change / ice caps melting / oceans warming up} OR less habitats destroyed (1)	3			3																					
				Question 4 total	5	4	0	9	0	0																			

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			<p>Indicative content:</p> <p>Graph A is the white test tube it has a temperature rise of 18 °C which is the lowest. So it is the poorest absorber / best reflector of heat radiation.</p> <p>Graph B is the grey test tube it has a temperature rise of 21.5 °C which is the middle one. So it is neither the best nor worst absorber / reflector of heat radiation.</p> <p>Graph C is the black test tube it has a temperature rise of 24.5 °C which is the largest. So it is the best absorber / worst reflector of heat radiation.</p> <p>Allow 0.5 °C tolerance on temperature readings.</p> <p>5 – 6 marks</p> <p>Correct identification of all graphs against the coloured tubes. Correct scientific language used in identifying absorption / reflection of heat radiation along with numerical analysis of the data.</p> <p><i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.</i></p>	3	3		6	3	6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				<p>3 – 4 marks Correct identification of all graphs against the coloured tubes. Either absorption / reflection of heat identified as being responsible OR some numerical data quoted in the answer. <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.</i></p> <p>1-2 marks Correct identification of some, or all, of the test tubes against the graph labels, with possibly some data or absorption / reflection stated in the answer. <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.</i></p> <p>0 marks <i>No attempt made or no response worthy of credit.</i></p>						
	(b)	(i)		<p>Any 2 × (1) from:</p> <ul style="list-style-type: none"> – {Colour / material / size} of test tube – Distance from heater – {Initial / starting} temperature – Time for heating 			2	2		2
		(ii)		Volume [of water in the test tube]			1	1		1
				Question 5 total	3	3	3	9	3	9

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)		$25 - 3 = 22$ [kg]	1			1	1	
		(ii)	I	22 (ecf) $\times 0.085 \times 35$ (1) $= 65.45$ [g] (1) accept 65 or 65.5 [g]		2		2	2	
			II	$\frac{3\,500\,000}{35} = 100\,000$ (1) 65.45 (ecf) $\times 100\,000$ no ecf $= 6\,545\,000$ [g] (1)	1	1		2	1	
	(b)			0.022×1000 (1) $= 22$ [kg] (1) { $22 + 3$ / total mass} $= 25$ [kg] (1) [so Evelyn is not correct]			3	3	2	
	(c)	(i)		[Washing machine from 1995] uses more {energy / kWh / units} (1) ORA so energy rating will be C or D (1) Accept no A+ rating available then Don't accept lower rating or less efficient		2		2		
		(ii)		$1.34 - 1.04 = 0.30$ (1) [kWh] $0.30 \times 30 = 9$ [p] (1) Alternative: $1.34 \times 30 = 40.2$ [p] <u>and</u> $1.04 \times 30 = 31.2$ [p] (1) $40.2 - 31.2 = 9$ [p] (1)		2		2	2	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		<p>For the 1st two marks either: $9 \text{ (ecf)} \times 5 \times 52 \text{ (1)}$ $= 2340 \text{ p} = £23.40 \text{ (1)}$ OR Cost of each in 1 year: $5 \times 52 \times 1.34 \times 30 = 10452 \text{ [p]}$ <u>and</u> $5 \times 52 \times 1.04 \times 30 = 8112 \text{ [p]} \text{ (1)}$ Difference in cost = $10452 - 8112 = 2340 \text{ [p]} = £23.40 \text{ (1)}$</p> <p>FOR THE 3RD MARK either: Payback time = $\frac{350}{£23.40} = 15 \text{ years}$ [is longer than the expected lifetime so salesperson wrong] OR: Saving in 12 years = $12 \times 23.40 = £280.80$ [which is less than £350 (or cost of new machine) so salesperson wrong]</p> <p>Alternative (1) - Cost of each in 12 years $5 \times 52 \times 12 \times 1.34 \times 30 = 125424 \text{ [p]} \text{ (1)}$ $5 \times 52 \times 12 \times 1.04 \times 30 = 97344 \text{ [p]} \text{ (1)}$ EITHER for the 3rd mark: Difference in cost = $125424 - 97344 = £280.80$ [which is less than £350 (or cost of new machine) so salesperson wrong] OR: Total cost of new machine = $£973.44 + £350 = £1323.44$ [which is more so disagree]</p> <p>Alternative (2) - Number of uses in 1 lifetime $5 \times 52 \times 12 = 3120 \text{ (1)}$ Cost = $3120 \times 9 \text{ ecf} \text{ (1)}$ Cost = $28080 \text{ [p]} = £280.80$ [which is less than £350 (or cost of new machine) so salesperson wrong] (1)</p>			3	3	3	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				<p>Alternative (3) - Difference in units used in 1 year $5 \times 52 \times 1.34 = 348.4$ $5 \times 52 \times 1.04 = 270.4$ Difference = $348.4 - 270.4 = 78$ (1) For 12 years = $78 \times 12 = 936$ (1) Cost = $936 \times 30 = 28\,080 = \text{£}280.80$ [which is less than £350 (or cost of new machine) so salesperson wrong] (1)</p> <p>Alternative (4) - Difference in units used in 12 years $5 \times 52 \times 12 \times 1.34 = 4180.8$ <u>and</u> $5 \times 52 \times 12 \times 1.04 = 3244.8$ (1) $4180.8 - 3244.8 = 936$ (1) Cost = $936 \times 30 = 28\,080 = \text{£}280.80$ [which is less than £350 (or cost of new machine) so salesperson wrong] (1)</p> <p>Alternative (5) – Payback time $5 \times 9 \text{ ecf} = 45$ [p] (1) $\frac{350}{0.45} = 777.8$ [weeks] (1) $\frac{777.8}{52} = 14.96$ years (1)</p>						
				Question 6 total	2	7	6	15	11	0

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SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

QUESTION	AO1	AO2	AO3	Total	Maths	Prac
1	3	4	0	7	4	0
2	2	4	0	6	4	6
3	9	2	3	14	5	0
4	5	4	0	9	0	0
5	3	3	3	9	3	9
6	2	7	6	15	11	0
Total	24	24	12	60	27	15