



GCSE MARKING SCHEME

SUMMER 2025

**GCSE
SCIENCE (DOUBLE AWARD) – UNIT 3
PHYSICS
HIGHER TIER
3430UC0-1**

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**HIGHER 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)		$25 - 3 = 22$ [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)		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: $5 \times 52 \times 1.34 \times 30 = 10\,452 \text{ [p]}$ <u>and</u> $5 \times 52 \times 1.04 \times 30 = 8112 \text{ [p]} \text{ (1)}$ Difference in cost = $10\,452 - 8112 = 2340 \text{ [p]} = £23.40 \text{ (1)}$ 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] Alternative (1) - Cost of each in 12 years $5 \times 52 \times 12 \times 1.34 \times 30 = 125\,424 \text{ [p]} \text{ (1)}$ $5 \times 52 \times 12 \times 1.04 \times 30 = 97\,344 \text{ [p]} \text{ (1)}$ EITHER for the 3rd mark: Difference in cost = $125\,424 - 97\,344 = £280.80$ [which is less than £350 (or cost of new machine) so salesperson wrong] OR: Total cost of new machine = $£973.44 + £350 = £1\,323.44$ [which is more so disagree] 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 = $28\,080 \text{ [p]} = £280.80$ [which is less than £350 (or cost of new machine) so salesperson wrong] (1)			3	3	3	

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				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) 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) 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)						
				Question 1 total	2	7	6	15	11	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		The {vibrations / oscillations} are {at right angles / perpendicular / at 90°} to the direction of {energy transfer / the wave / travel}	1			1		
		(ii)		Only consider the 1st wave drawn Crest and trough at 8 mm (1) Wavelength from 0.0 to 4.0×10^{-7} m which crosses the axis at 2.0×10^{-7} m (1) If less than one wave drawn award maximum of 1 mark If straight lines drawn and not a curve award a max of 1 mark		2		2	2	
	(b)	(i)		Longest wavelength OR longer wavelength than X-rays and gamma rays (1) Lowest frequency OR lower frequency than X-rays and gamma rays (1)	2			2		
		(ii)		Selection of 1×10^{-16} (1) $3 \times 10^8 = \text{frequency} \times 1 \times 10^{-16}$ (allow ecf on 1×10^{-11}) (1) Frequency = $\frac{3 \times 10^8}{1 \times 10^{-16}} = 3 \times 10^{24}$ [Hz] (1) Answer only of 3×10^{19} [Hz] award 2 marks	1	1 1		3	3	
		(iii)		Transfer energy OR travel at the same speed in {a vacuum / space} OR travel through a vacuum Accept transfer information Don't accept air	1			1		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			$3 \times 10^8 = \frac{\text{distance}}{364} \text{ (1)}$ Distance = $3 \times 10^8 \times 364$ OR distance = speed $\times$ time (1) [= 1.092×10^{11} [m] Distance between Earth and Mars = $\frac{1.092 \times 10^{11}}{2} = 5.46 \times 10^{10}$ (1) [m] Alternative: Time from Earth to Mars = $\frac{364}{2} = 182$ (1) [s] $3 \times 10^8 = \frac{\text{distance}}{182} \text{ (1)}$ Distance = $3 \times 10^8 \times 182 = 5.46 \times 10^{10}$ (1) [m]	1	1 1		3	3	
				Question 2 total	6	6	0	12	8	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			Step-up (1) increases voltage and decreases current (1) to reduce {power / energy / heat} losses [in cables] (1) don't accept NO heat loss or stops heat loss	3			3		
	(b)	(i)		Total generated = $2.0 + 6.0 + 16.8 + 5.0 + 0.4 + 1.4 + 2.9 + 0.2 = 34.7(1)$ [GW] $35.9 - 34.7$ ecf = 1.2 [GW] (1) $\frac{1.2}{35.9} \times 100\% = 3.34$ [%] (1) Alternative: Total generated = $2.0 + 6.0 + 16.8 + 5.0 + 0.4 + 1.4 + 2.9 + 0.2 = 34.7(1)$ [GW] $\frac{34.7}{35.9}$ ecf $\times 100\% = 96.7$ (1) [%] $100 - 96.7 = 3.3$ [%] (1) Accept 3%	1	2		3	3	
		(ii)		Acts immediately OR quick start up time	1			1		
				Question 3 total	5	2	0	7	3	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4	(a)			Indicative content – Method Connect the circuit as shown. Adjust the variable resistor until the voltmeter reads e.g. 2 V. Record the readings of voltage from voltmeter and current from ammeter. Adjust the variable resistor to increase the voltmeter reading to 4 V. Record the readings of voltage and current. Repeat these steps, increasing the voltage by 2 V each time, until the voltmeter reads 12 V. Analysis Calculate resistance values using $R = \frac{V}{I}$ or plot a graph of current against voltage. 5 – 6 marks Detailed description of method and analysis. <i>There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured.</i> 3 – 4 marks Good description of method OR limited description of method and analysis. <i>There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure.</i> 1 - 2 marks Limited description of method OR analysis. <i>There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure.</i> 0 marks <i>No attempt made or no response worthy of credit.</i>	6			6		6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)		$4 = \frac{12}{\text{resistance}}$ (1) $R = \frac{12}{4} = 3$ (1) N.B. alternative pairs of values from resistor 1 line acceptable Unit = Ω or ohms (1)	1 1	 1		3	3	3
		(ii)		$V_1 = 8.4$ (1) [V] $V_2 = 3.6$ (1) [V] If V_1 and V_2 are the wrong way round award 1 mark		2		2	2	2
		(iii)	I	12 [V]	1			1		1
			II	Award 2 marks for answer of 10 [A] Award 1 mark for answers of 2, 4, 6 or 8 [A]		2		2		2
			III	{No current in resistor 1 / only current in resistor and lamp / circuit resistance increases} (1) so {current / ammeter} reading decreases (1) and George is not correct Conclusion must be present to award both marks Award 2 marks for answer of current is 6 A and George is not correct			2	2		
				Question 4 total	9	5	2	16	5	14

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)		$\frac{514 + 517}{2} (1)$ = 516 or 515.5 [mV] (1) Award 1 mark only for answer of 487.7 [mV] or 488 [mV] or 515 [mV]	1	1		2	2	2
		(ii)		$\frac{522 - 516}{2} (1)$ = 3 [mV] (1)	1	1		2	2	2
		(iii)		When angle is 45° (1) as the data has {smallest range / lowest uncertainty / values closest to each other} (1) accept all the numbers are within {2 [mV] of each other / 1 [mV] of the mean} OR uncertainty is 1 [mV] OR values are the most similar Don't accept consistent values		2		2	2	2
		(iv)		The maximum voltage is 550 [mV] (1) Which occurs at 40° not 50° [so disagree] (1) Alternative: The mean voltage at 50° is 533 ± 1 mV (1) Which is less than the voltage at 40° [so disagree] (1)			2	2	1	2
	(b)			Any 2 ×(1) from: – Lamps were different {brightnesses / powers / intensities} – Different distances from the PV cell – Some were closer to additional light sources e.g. window, ceiling lights – Elevation angle of the lamp wasn't set at 50° – Different PV cells used – Errors in measuring the angle of the PV cell			2	2		2
				Question 5 total	2	4	4	10	7	10

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	Total	Maths	Prac
1	2	7	6	15	11	0
2	6	6	0	12	8	0
3	5	2	0	7	3	0
4	9	5	2	16	5	14
5	2	4	4	10	7	10
Total	24	24	12	60	34	24