



GCSE MARKING SCHEME

SUMMER 2025

**GCSE
PHYSICS – UNIT 1 (HIGHER TIER)
3420UA0-1**

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.

WJEC GCSE PHYSICS
UNIT 1 – ELECTRICITY, ENERGY AND WAVES
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)			a.c. changes but d.c does not Accept a.c. travels both ways and d.c. travels only one way [in a circuit]	1			1		
	(b)	(i)	I	$E = P \times t = 2200 \times 90$ (1) $E = 198\,000$ [J] (1)	1	1		2	2	
			II	% efficiency = $\frac{188\,100}{198\,000} \times 100$ (1) % efficiency = 95 (1) Award 1 mark for answer of 0.95 N.B. answers of greater than 100% award 1 mark for correct substitution that must be shown	1	1		2	2	
		(ii)	I	0.25 or $\frac{1}{4}$		1		1		
			II	Use of 2.4 in units used equation (1) Units used = 2.4×0.25 ecf = 0.6 (1) Cost = 0.6 ecf $\times 30 = 18$ [p] (1)		3		3	3	
		(iii)		Kettle Y has higher power OR uses more {energy / units / electricity} (1) So kettle Y will cost more (1) so the claim is not true Conclusion must be present to award both marks Accept the converse N.B. Treat calculations as neutral			2	2		
Question 1 total					3	6	2	11	7	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)			Fuel is burnt in the boiler or water is heated in the boiler (1) <u>Steam</u> {drives / turns} a turbine (1) Turbine { <u>drives</u> / <u>turns</u> } a generator (1) accept spins	3			3		
	(b)			Biomass does not add to the {greenhouse effect / global warming / climate change} (1) Don't accept reduces global warming Because it {produces less CO ₂ / is carbon neutral / is not a net producer of CO ₂ } (1) Don't accept: does not give out CO ₂ OR reference to habitats	1	1		2		
	(c)	(i)		Use of {air conditioners / electric fans} OR fridges have to work harder		1		1		
		(ii)		45 600 – 40 000 = 5 600 [MW] extra demand (1) $\frac{5\,600}{350} = 16$ [°C] rise (1) Temperature = 20 + 16 = 36 [°C] (1) so Ella is correct Conclusion must be present to award all marks Alternative: 45 600 – 40 000 = 5 600 [MW] extra demand (1) 350 × 16 (1) = 5600 [MW] (1) so Ella is correct Conclusion must be present to award all marks Alternative: 350 × 16 (1) = 5600 [MW] extra demand (1) 5600 + 40 000 = 45 600 (1) so Ella is correct Conclusion must be present to award all marks			3	3	3	
				Question 2 total	4	2	3	9	3	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			Convection	1			1		1
	(b)	(i)		Particles {gain kinetic energy / move faster} (1) Don't accept vibrate faster They move further apart (1) Don't accept volume increases	2			2		2
		(ii)		Hot water is less dense (1) Less dense water rises (1) Alternative: Cold water is more dense (1) More dense water sinks (1)	2			2		2
				Question 3 total	5	0	0	5	0	5

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
4				Indicative content P waves are longitudinal waves and can travel through solids and liquids. S waves are transverse and can only travel through solids. P waves travel faster than S waves. P and S waves travel through the mantle and the crust so they must be solid. The presence of the S wave shadow zone, where no S waves are detected, reveals that the core of the earth must be a liquid. P and S waves travel in curved paths due to refraction. 5 – 6 marks Describes fully the properties and the structure of the Earth. <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> 3 – 4 marks Describes either the properties or the structure of the Earth or a partial description of both. <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>	6			6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				1–2 marks Limited description of either the properties or the structure of the Earth. <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> 0 marks <i>No attempt made or no response worthy of credit.</i>						
				Question 4 total	6	0	0	6	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			$\frac{1}{R} = \frac{1}{10} + \frac{1}{10} + \frac{1}{20} (1)$ $\frac{1}{R} = 0.25 (1)$ $R = 4 \Omega (1)$	1	1		3	2	3
	(b)			4 (ecf) + 6 = 10 [Ω]		1		1		1
	(c)			$I = \frac{12}{10 \text{ ecf}} (1)$ $I = 1.2 \text{ [A]} (1)$	1	1		2	2	2
	(d)			$1.2 \text{ (ecf)} = \frac{\text{voltage}}{6} (1)$ Voltage = 6×1.2 OR voltage = current $\times$ resistance (1) Voltage = 7.2 [V] (1)	1	1		3	2	3
	(e)			Subtract the answer to (d) from 12 V OR 4.8 V ecf (1) Divide this voltage by 20Ω (1) Alternative: Current through the 20Ω resistor is one-fifth (1) Of the current through the { 6Ω resistor / ammeter} (1) To award the 2nd mark the 1st mark must be awarded	1	1		2		2
Question 5 total					4	7	0	11	6	11

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			$\lambda = 0.16 \text{ m}$ (1) $3.0 \times 10^8 = \text{frequency} \times 0.16$ ecf (1) $f = 1.88 \times 10^9 \text{ [Hz]}$ or $1.875 \times 10^9 \text{ [Hz]}$ or $1.9 \times 10^9 \text{ [Hz]}$ (1) N.B. Only allow ecf on λ values of 0.40 m or less			3	3	3	
	(b)			UV or ultraviolet		1		1		
	(c)			{Vibrations / oscillations} (1) {perpendicular / 90° / right angles} to direction of {wave [motion] / travel / energy transfer} in a transverse wave and {parallel / 180° / same direction} in a longitudinal wave (1)	2			2		
	(d)	(i)		Reduces the effect of timing errors (1) So more accurate (1)			2	2		2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)	I	At 2.5 cm, wave speed = 0.49 m/s (1) accept 0.48 m/s $0.49 \text{ ecf} = \frac{1.2}{\text{time}}$ (1) conversion and substitution $\text{time} = \frac{1.2}{0.49} = 2.45 \text{ [s]}$ (1) rearrangement and answer - accept 2.50 [s] So time $\left[= \frac{2.45}{3} \right] = 0.82 \text{ [s]}$ (1) accept 0.83 [s] Alternative: At 2.5 cm, wave speed = 0.49 m/s (1) accept 0.48 m/s One length = 40 cm (1) $0.49 \text{ ecf} = \frac{0.4}{\text{time}}$ (1) conversion and substitution Time = 0.82 [s] (1) accept 0.83 [s] N.B. Only allow ecf on speeds in the range of 0.30 – 0.70 m/s Answer of 8.2×10^n where n is not equal to -1 award 3 marks Answer of 2.45×10^n where n is not equal to 0 award 2 marks Answer of 240 [s] award 1 mark Answer of 0.80 [s] award 4 marks provided 0.5 not used, if so award 3 marks		4		4	2	4
			II	Pair of values of speed identified so 0.31 ± 0.01 and 0.43 ± 0.01 m/s (1) $\frac{0.43}{0.31} = 1.39$ which is not 4 [so disagree] OR $0.31 \times 4 = 1.24$ which is not 0.43 (1) [so disagree]			2	2	2	2

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(iii)		[True value] = $\sqrt{10 \times 0.025} = 0.5$ [m/s] (1) Comparison with {0.49 / graph value} (1) accept 0.48 so it is accurate Conclusion must be present to award both marks			2	2		2
				Question 6 total	2	5	9	16	7	10

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)		$Q = 0.9 \times 14\,650 = 13\,185 \text{ [J]}$		1		1	1	1
		(ii)		$\Delta\theta = 36 - 21 = 15 \text{ [}^\circ\text{C]} \text{ (1)}$ $c = \frac{13\,185 \text{ ecf}}{0.98 \times 15 \text{ ecf}} \text{ or } c = \frac{Q}{m\Delta\theta} \text{ (1)}$ $c = 897 \text{ or } 896.9[38] \text{ or } 900 \text{ [J/kg }^\circ\text{C]} \text{ (1)}$ Answer of 8.97×10^n where n is not equal to 2 award 2 marks Don't award ecf for $\Delta\theta$ if 36 or 21 used.	1	1 1		3	3	3
	(b)			Density of steel is {unknown / different} (1) Different density means a different volume [for the same mass] OR different mass for the same volume (1) [so disagree] Don't accept weight			2	2		2
				Question 7 total	1	3	2	6	4	6

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
8	(a)	(i)		{Coil / wire / conductor} <u>cuts</u> (1) through {magnetic field / field lines} (1) N.B. can only be awarded in the context of cutting or moving through the field Allow 1 mark for {produces / induces} a voltage	2			2		
		(ii)	I	From A to B OR clockwise		1		1		
			II	By using <u>Flemings</u> RH rule OR first finger in direction of field, thumb in direction of motion and second finger points in the direction of the current [all at right angles]	1			1		
	(b)	(i)		One rotation shown, with period 0.20 s crossing the axis 0.05 and 0.15 s (1) Max current shown at $t = 0$ s (1) Max and min current at 0.75 A $\pm$ small square (1) N.B. If starts at 0 graph will cross at 0.10 s award a max of 2 marks If straight lines drawn award a max of 2 marks		3		3		
		(ii)		Increasing field strength increases current (1) Coil spinning more slowly decreases current (1) Coil spinning more slowly {increases period / decreases frequency} (1)		3		3		
				Question 8 total	3	7	0	10	0	0

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
9	(a)			Any 3 × (1) from: – [particles] move slower OR lose kinetic energy – fewer collisions [with the walls per second] – force on the walls decreases – so pressure [inside the balloon] decreases	3			3		
	(b)	(i)		$\frac{100 \times 1.8}{278} = \frac{p_2 \times 133}{212} \text{ (1) N.B. 0.647}$ $p_2 \left[= \frac{0.647 \times 212}{133} \right] = 1.03 \text{ [kPa] (1) accept 1.04 [kPa]}$	1					
		(ii)		Altitude = 28 [km] ecf accept 25 – 30 [km]		1		1	1	
				Question 9 total	4	2	0	6	3	0

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	Total	Maths	Prac
1	3	6	2	11	7	0
2	4	2	3	9	3	0
3	5	0	0	5	0	5
4	6	0	0	6	0	0
5	4	7	0	11	6	11
6	2	5	9	16	7	10
7	1	3	2	6	4	6
8	3	7	0	10	0	0
9	4	2	0	6	3	0
Total	32	32	16	80	30	32