# GCSE MARKING SCHEME

**SUMMER 2025**

**GCSE**
**PHYSICS – UNIT 1 (FOUNDATION TIER)**
**3420U10-1**

## 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 PHYSICS

## UNIT 1 – ELECTRICITY, ENERGY AND WAVES

## FOUNDATION TIER

## 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) | | 5 [V] | | 1 | | 1 | 1 | |
| | | (ii) | | Disagree **and** 0.2 | | | 1 | 1 | 1 | |
| | (b) | | | A to B | | | 1 | 1 | | |
| | (c) | (i) | | B | | | 1 | 1 | | |
| | | (ii) | | D | | | 1 | 1 | | |
| | | | | **Question 1 total** | **0** | **1** | **4** | **5** | **2** | **0** |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **2** | (a) | | | an alternating (1)<br>magnetic (1)<br>iron (1) | 3 | | | 3 | | |
| | (b) | (i) | I | 100 | | 1 | | 1 | 1 | 1 |
| | | | II | 1200 | | 1 | | 1 | 1 | 1 |
| | | (ii) | I | increases (1)<br>constant (1) | | 2 | | 2 | | 2 |
| | | | II | B | | | 1 | 1 | 1 | 1 |
| | | | III | B | | | 1 | 1 | 1 | 1 |
| | | | | **Question 2 total** | **3** | **4** | **2** | **9** | **4** | **6** |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **3** | (a) | (i) | | C | 1 | | | 1 | | 1 |
| | | (ii) | | A | 1 | | | 1 | | 1 |
| | (b) | (i) | | Aluminium→ copper → brass → steel<br>Accept 13→15→18→20 | | | 1 | 1 | | 1 |
| | | (ii) | | Table 2 shows copper → aluminium → brass → steel (1)<br>which is different to order from Table 1 results **OR** difference identified (1) [so disagree]<br>**Alternative:**<br>Copper is the best conductor in table 2 **OR** aluminium is the second best in table 2 (1)<br>But copper is {not the best / second best} in table 1 **OR** aluminium is the best in table 1 **OR** another named metal is the best in table 1 (1)<br><br>Aluminium and copper are the wrong way around award 2 marks<br>N.B. if no metals are named no marks can be awarded | | | 2 | 2 | | 2 |
| | (c) | | | Hotter / warmer<br>Don't accept heated | 1 | | | 1 | | |
| | | | | **Question 3 total** | **3** | **0** | **3** | **6** | **0** | **5** |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **4** | (a) | | | $L_2$ = 2 [A] (1)<br>$L_4$ = 6 [A] (1) | | 2 | | 2 | 2 | 2 |
| | (b) | | | $L_2$ = 6 [V] (1)<br>$L_4$ = 9 [V] (1) | | 2 | | 2 | 2 | 2 |
| | (c) | | | Substitution i.e. 9 × 6 (1)<br>= 54 (1)<br>W **or** watt (1) accept V A | 1<br><br>1 | 1 | | 3 | 2 | |
| | (d) | (i) | | Select and substitution:<br>$\frac{9}{6}$(1)<br>= 1.5 [Ω] (1) | | 2 | | 2 | 2 | |
| | | (ii) | | The resistance decreases (1)<br>so current increases (1) so disagree<br>Conclusion must be present to award both marks | | | 2 | 2 | | |
| | | | | **Question 4 total** | **2** | **7** | **2** | **11** | **8** | **4** |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **5** | (a) | (i) | | [Timing for 3 lengths] reduces [the effect of] timing errors | 1 | | | 1 | | 1 |
| | | (ii) | | Identified anomalies **OR** reduces the effect of random errors (1)<br>Giving a [more] accurate <u>mean</u> (1) | 2 | | | 2 | | 2 |
| | (b) | (i) | | Distance = $3 \times 40 = 120$ [cm] (1) | | 1 | | 1 | 1 | 1 |
| | | (ii) | | Substitution: $\frac{120\ \textbf{ecf}}{2.4}$ **OR** $\frac{40}{0.8}$ (1)<br>= 50 [cm/s] (1) | 1<br>1 | | | 2 | 2 | 2 |
| | | | | **Question 5 total** | **4** | **2** | **0** | **6** | **3** | **6** |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| 6 | | | | **Indicative content:**<br><br>**How they transmit information:**<br>Light travelling inside glass towards air i.e. from a more dense to less dense medium.<br>Beyond a certain angle, called the **critical angle**, all the waves reflect back into the glass and no refraction occurs.<br>This is known as **total internal reflection.**<br><br>**Advantages:**<br>• **Bandwidth and data rates:** optical fibre supports higher bandwidth and data rates as compared to satellite.<br>• **Reliability**: optical fibre communication is more reliable than satellite.<br>• **Terrain**: optical fibre is more suitable for urban areas<br>• **Time delay**: optical fibre has a shorter delay<br>• **Interference**: optical fibre has less or no electromagnetic interference or not affected by the weather<br>• **Cost**: satellite has higher costs than optical fibre communication<br>• **Security**: signals cannot be intercepted | 6 | | | 6 | | |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| | | | | **5 – 6 marks**<br>Comprehensive description of how they transmit information with advantages.<br>*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.*<br><br>**3 – 4 marks**<br>Limited description of how they transmit information with advantages **OR** comprehensive description of either.<br>*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.*<br><br>**1–2 marks**<br>Limited description of how they transmit information **OR** the advantages.<br>*There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure*.<br>*The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.*<br><br>**0 marks**<br>*No attempt made or no response worthy of credit.* | | | | | | |
| | | | | **Question 6 total** | **6** | **0** | **0** | **6** | **0** | **0** |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **7** | (a) | | | Straight line to A (1)<br>D similar to C (1) i.e. single smooth curve<br>N.B. Ignore arrow heads | 2 | | | 2 | | |
| | (b) | (i) | | S **or** secondary<br>Don't accept transverse or surface | | 1 | | 1 | | |
| | | (ii) | | {Thin / solid} crust (1)<br>Solid mantle (1)<br>Liquid core (1)<br>Identification of crust, mantle and core only award 1 mark<br>Treat as neutral reference to inner and outer for the core | 3 | | | 3 | | |
| | | | | **Question 7 total** | **5** | **1** | **0** | **6** | **0** | **0** |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **8** | (a) | (i) | | 20 [kPa] | | 1 | | 1 | 1 | |
| | | (ii) | | 100 (1)<br>– 20 **ecf** = 80 [kPa] (1) | | 2 | | 2 | 2 | |
| | (b) | (i) | | 0.40 × 0.25 (1)<br>= 0.1 [$m^2$] (1) | | 2 | | 2 | 2 | |
| | | (ii) | | Conversion of 80 **ecf** to 80 000 (1)<br>Substitution: 80 000 × 0.1 **ecf** (1)<br>= 8 000 [N] (1)<br>Award 2 marks for an answer of 8 [N]<br>Award 2 marks for an answer of $8 \times 10^n$ where $n$ is not 3 | 1 | 1<br>1 | | 3 | 3 | |
| | (c) | | | Air pressure decreases as height increases (1)<br>Temperature decreases (1)<br>Air molecules {move / collide} slower **OR** air molecules have less kinetic energy (1) | 1 | 1<br>1 | | 3 | | |
| | | | | **Question 8 total** | **2** | **9** | **0** | **11** | **8** | **0** |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **9** | (a) | | | a.c. changes but d.c does not<br>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 × 90 (1)<br>$E$ = 198 000 [J] (1) | 1 | 1 | | 2 | 2 | |
| | | | II | % efficiency = $\frac{188\,100}{198\,000\ \textbf{ecf}} \times 100$ (1)<br>% efficiency = 95 (1)<br>Award 1 mark for answer of 0.95<br>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)<br>Units used = 2.4 × 0.25 **ecf** = 0.6 (1)<br>Cost = 0.6 **ecf** × 30 = 18 [p] (1) | | 3 | | 3 | 3 | |
| | | (iii) | | Kettle Y has higher power **OR** uses more {energy / units / electricity} (1)<br>So kettle Y will cost more (1) so the claim is not true<br>Conclusion must be present to award both marks<br>Accept the converse<br>N.B. Treat calculations as neutral | | | 2 | 2 | | |
| | | | | **Question 9 total** | **3** | **6** | **2** | **11** | **7** | **0** |

| Question | | | | Marking details | Marks available | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AO1 | AO2 | AO3 | Total | Maths | Prac |
| **10** | (a) | | | Fuel is burnt in the boiler **or** water is heated in the boiler (1)<br>Steam {drives / turns} a turbine (1)<br>Turbine {drives / turns} 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<br>Because it {produces less $CO_2$ / is carbon neutral / is not a net producer of $CO_2$} (1)<br>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)<br>$\frac{5\,600}{350}$ = 16 [°C] rise (1)<br>Temperature = 20 + 16 = 36 [°C] (1) so Ella is correct<br>Conclusion must be present to award all marks<br><br>**Alternative:**<br>45 600 – 40 000 = 5 600 [MW] extra demand (1)<br>350 × 16 (1)<br>= 5600 [MW] (1) so Ella is correct<br>Conclusion must be present to award all marks<br><br>**Alternative:**<br>350 × 16 (1)<br>= 5600 [MW] extra demand (1)<br>5600 + 40 000 = 45 600 (1) so Ella is correct<br>Conclusion must be present to award all marks | | | 3 | 3 | 3 | |
| | | | | **Question 10 total** | **4** | **2** | **3** | **9** | **3** | **0** |

## FOUNDATION TIER

## SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

| Question | AO1 | AO2 | AO3 | Total | Maths | Prac |
|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 4 | 5 | 2 | 0 |
| 2 | 3 | 4 | 2 | 9 | 4 | 6 |
| 3 | 3 | 0 | 3 | 6 | 0 | 5 |
| 4 | 2 | 7 | 2 | 11 | 8 | 4 |
| 5 | 4 | 2 | 0 | 6 | 3 | 6 |
| 6 | 6 | 0 | 0 | 6 | 0 | 0 |
| 7 | 5 | 1 | 0 | 6 | 0 | 0 |
| 8 | 2 | 9 | 0 | 11 | 8 | 0 |
| 9 | 3 | 6 | 2 | 11 | 7 | 0 |
| 10 | 4 | 2 | 3 | 9 | 3 | 0 |
| **Total** | **32** | **32** | **16** | **80** | **35** | **21** |