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CAMBRIDGE
International Education

Cambridge IGCSE™

PHYSICS **0625/41**

Paper 4 Extended Theory **October/November 2025**

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2025 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

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GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	<u>'List rule' guidance</u> For questions that require ***n*** responses (e.g. State **two** reasons …): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked *ignore* in the mark scheme should not count towards ***n***. • Incorrect responses should not be awarded credit but will still count towards ***n***. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should **not** be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first ***n*** responses may be ignored even if they include incorrect science.

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6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

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Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standard isation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	correct point or mark awarded
	incorrect point or mark not awarded
^	information missing or insufficient for credit
A	allow or accept
AE	evaluation attempted
I	incorrect or insufficient point ignored while marking the rest of the response
CON	contradiction in response, mark not awarded
BOD	benefit of the doubt given
ECF	error carried forward applied
NAQ	response has not answered question

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Annotation	Meaning
RE	rounding error
SEEN	point has been noted, but no credit has been given or blank page seen
SF	error in number of significant figures
TE	transcription error
TV	response is too vague or there is insufficient detail in response
T	answer outside the tolerance of the mark scheme
	used to highlight parts of an extended response
	used to highlight parts of an extended response
MO	mandatory mark not awarded
SC	special case

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Specific Instructions for Marking 0625 / Paper 4

Preparation for Marking

Instructions and handbooks, for markers using RM Assessor 3 can be found at RM support portal.

Marking

M1. Blank pages, additional objects and marking outside the question zone.

Blank pages will be attached to the first part of **Q1** and should be annotated with SEEN on all scripts.
Annotate any blank Additional Objects with SEEN.
Link any other additional objects to the question or questions applicable.
Examiners must ensure that they view the whole exam paper for each candidate. This will sometimes mean scrolling through a large zone to ensure that no working relevant to either the current or any other question is missed.
Where a candidate's answer extends beyond the marking zone, examiners must view the whole page (or link to other pages) to annotate and mark the whole answer. To view the whole page, deselect any annotation tool from the mouse, then click in the bottom right-hand corner of the marking zone where "view whole page" appears. For instructions to link to other pages see above.

M2. Use of Annotation stamps.

Examiners annotate scripts to explain their reasons for awarding or not awarding marks, noting:

- for **all** questions with **two** or **more** marks, it is **mandatory** to annotate with ticks placed to indicate where each mark is awarded. In a calculation where the final answer (A) mark is awarded all the ticks should be placed near to the final answer.
- annotations and comments must never suggest or imply that a mark has been deducted e.g. –1
- annotation stamps and their uses are published with the mark scheme and visible on scripts returned to centres. It is therefore vital that examiners apply them to scripts in a manner consistent with their published meaning.

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M3. Acronyms and shorthand in the mark scheme.

acronym / shorthand	**Explanation**
A mark	Final answer mark which is awarded for fully correct final answers including the unit.
C mark	Compensatory mark which may be scored when the final answer (A) mark for a question has not been awarded.
B mark	Independent mark which does not depend on any other mark.
M mark	Method mark which must be scored before any subsequent final answer (A) mark can be scored.
Brackets ( )	Words not explicitly needed in an answer, however if a contradictory word / phrase / unit to that in the brackets is seen the mark is not awarded.
Underlining	The underlined word (or a synonym) must be present for the mark to be scored. If the word is a technical scientific term, the word must be there.
/ or **OR**	Alternative answers any one of which gains the credit for that mark.
ORA	Or reverse argument
owtte	Or words to that effect.
Ignore	Indicates either an incorrect or irrelevant point which may be disregarded, i.e., not treated as contradictory.
Insufficient	an answer not worthy of credit on its own.
CON	An incorrect point which contradicts any correct point and means the mark cannot be scored.
ecf [question part]	Indicates that a candidate using an erroneous value from the stated question part must be given credit here if the erroneous value is used correctly here.
cao	correct answer only

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M4. Miscellaneous

Equations and formulae.

- Where a C, B or M mark is available for quoting a formula or equation this can be done in any form and in words, symbols or numbers unless the mark scheme specifies otherwise.
- Where a C mark is available for quoting an equation and another C mark is available for rearranging and/or substituting numbers into an equation, a candidate who only writes down the equation in the rearranged (and/or numerical) form in one step gains both C marks.

Use of ecf. The mark scheme notes where ecf is applicable, in the guidance section of the final answer mark. However, it should be applied for all relevant C marks as well. **Always annotate ecf if applied.** See Science specific Marking point 4 above.

Units.

- A numerically correct final answer without a unit is awarded the final answer (A) mark if the unit is shown correctly in the candidate's working.
- A numerically correct answer with a missing or incorrect unit is not awarded the final answer (A) mark. C (B or M) marks are awarded from the candidate's working.
- A units with incorrect use of upper-case and lower-case symbols, e.g. pA for Pa.

- Unless the mark scheme for a specific question part states otherwise, the only permitted derived units are:

Unit	permitted derived units
W	J / s or N m / s
Pa	N / m^2
Momentum	N s or kg m / s
Impulse	N s or kg m / s
J	N m

- Note: J is **not** permitted as the unit for moments.

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Significant Figures.

Numerical answers are expected to be given to the number of significant figures given in the final answer in the mark scheme.

- Answers given to **more** SFs than expected are awarded the A mark if, when rounded to the correct number of SF, the answer matches the mark scheme answer (allowing for ECF).
- Where a final answer is given to **too few** SF, and the mark scheme answer **has been seen** in the working to at least the expected number of SF, this is penalised once only on the whole paper, with SF annotation and A mark is not awarded. Subsequent occurrences of this are ignored and the A mark is awarded.
- Where a final answer is given to **too few** SF, and the mark scheme answer **has not been seen** in the working to at least the expected number of SF, this is treated as an arithmetic error, and the A mark is not awarded.

Arithmetic errors and Transcription errors. Where a (probable) transcription error or arithmetic error is identified in working, ignore the error when awarding C marks.

Fractions. An answer expressed as a fraction is not a numerically correct final answer unless the fraction is explicitly stated in the mark scheme.

Crossed out work. When only part of an answer is crossed out the crossed-out work must be ignored. However, work which has been **wholly** crossed out and **not replaced** and can easily be read, should be marked as if it had not been crossed out**.** Look to see if it has been replaced on a blank page or another part of the same page before attempting to mark the crossed-out work.

Marking diagrams on-screen. Differences in magnification and / or individual computer screen settings can alter the appearance of diagrams. If it is necessary to check line lengths or angles use the ruler and protractor tools provided within RM Assessor 3 to ensure consistency across all examiners.

NR. (# or / key on the keyboard). Use this (instead of giving 0 marks) if the answer space for a question is completely blank or contains no readable words, figures or symbols.

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Question	Answer	Marks
1(a)	the velocity is the speed in a particular direction **OR** velocity has a direction **OR** velocity is 56 m / s in a certain direction velocity is a vector **OR** speed is a scalar	**B1**
1(b)	6.9×10^8 J **OR** 690 000 000 J **OR** 690 MJ	**A2**
	(KE =) ½ mv^2 **OR** $0.5 \times 440\,000 \times (56)^2$	C1
1(c)(i)	5.3×10^5 N **OR** 530 000 N	**A2**
	(F =) ma **OR** $440\,000 \times 1.2$	C1
1(c)(ii)	1300 m **OR** 1.3 km	**A3**
1(c)(ii)	(d =) W / F **OR** (Δ)t = $\Delta v / a$ **OR** 56 / 1.2 **OR** (Δ) t = change of momentum / force	C1
	(distance =) 6.9×10^8 / 530 000 **OR** (distance =) average velocity × time taken **OR** 1.3×10^N	C1

Question	Answer	Marks
2(a)	(gravitational field strength is) force per unit mass (on an object in a gravitational field)	**B1**
2(b)(i)	16 N	**A2**
	$W = mg$ **OR** (m =) $W \div g$ **OR** 42 / 9.8 **OR** (mass of object =) 4.3 (kg)	C1
2(b)(ii)	1.6×10^{20} m^3	**A2**
	(V =) m / ρ **OR** (V =) 6.4×10^{23} / 3900	C1
2(c)(i)	arrow parallel to driving force **AND** pointing to the right	**B1**

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Question	Answer	Marks
2(c)(i)	(arrow pointing to the right) labelled 30 N	**B1**
2(c)(ii)	1 (resultant force) increases **OR** there is a resultant force (in the direction of the driving force) **OR** 2 resultant force = driving force – resistive force(s)	**B1**

Question	Answer	Marks
3(a)	(electromagnetic) radiation / light (from the Sun)	**B1**
	(produces) electrical (work done)	**B1**
3(b)	(black) is a good absorber / poor reflector (of radiation) owtte	**B1**
3(c)(i)	0.54 kW **OR** 540 W	**A2**
	(output power =) total power input × efficiency (÷100) **OR** (output power =) 0.72 × 75 ÷ 100 **OR** 5.4×10^{N}	C1
3(c)(ii)	the amount of (electrical) energy transferred by a 1 kW appliance in 1 hour owtte **OR** energy transferred in one hour at a rate of transfer of 1 kW	**B1**
3(c)(iii)	7	**A3**
	Any **one** from: • $E = Pt$ • energy produced by one cell per year **OR 3(c)(i)** × 6 × 365 • total power output required **OR** 7400 ÷ {365 × 6} • household energy used per day **OR** 7400 ÷ 365 • energy produced by one cell per day **OR 3(c)(i)** × 6	C1

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Question	Answer	Marks
3(c)(iii)	Any **one** from: • household energy used per year ÷ energy produced by one cell per year • total power output required ÷ power output of one cell • household energy used per day ÷ energy produced by one cell per day	C1

Question	Answer	Marks
4(a)	24 000 J **OR** 2.4×10^4 J	**A3**
	(ΔE =) $mc\Delta\theta$ **OR** (ΔE =) $0.15 \times 4200 \times \{58 - 20\}$	C1
	($\Delta\theta$ =) 58 – 20 **OR** 38 (°C) seen	C1
4(b)	(temperature of point X) on metal rod increases faster ORA	**A2**
	(temperature of point X) increases (with time)	C1
	thermal energy is transferred) by conduction	**B1**
	metal rod (transfers thermal energy through movement of) delocalised / free electrons. ORA	**B1**

Question	Answer	Marks
5(a)	(speed of sound in air =) 330 m / s ⩽ value ⩽ 350 m / s **AND** (speed of sound in water) is faster	**B1**
5(b)	Yes **AND** (normal) human hearing range is 20 Hz to 20 kHz (and all dolphin sounds lie in this range)	**A2**
	Yes **AND** all the dolphin sounds are in the range of human hearing	C1

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>5(c)</td><td>
<table>
<tr><td>Frequency kHz</td><td>amplitude</td><td>loudness</td><td>pitch</td></tr>
<tr><td>14</td><td>Large</td><td>loud</td><td>high</td></tr>
<tr><td>8</td><td>small</td><td>soft / quiet</td><td>low</td></tr>
</table>
one mark for each column correct</td><td>B2</td></tr>
<tr><td>5(d)</td><td>Particles</td><td>B1</td></tr>
<tr><td rowspan="2">5(d)</td><td>high pressure
AND
low pressure</td><td>B1</td></tr>
<tr><td>Parallel</td><td>B1</td></tr>
</table>

Question	Answer	Marks
6(a)	Any **two** from: • high rates (of data transmission) / faster (data transmission) • carry large amounts (of data / information) • secure • Little data / signal loss • glass is transparent to (some) infrared	**B2**
6(b)(i)	(c =) 46°	**A3**
	N = 1 / sin c, 1.4 = 1 / sin c **OR** (c =) $\sin^{-1}$ (1 / 1.4)	C1
	Equation in this form only (c =) $\sin^{-1}$ (1 / n) **OR** (c =) $\sin^{-1}$ (1 / 1.4) **OR** (c =) 46	C1
6(b)(ii)	angle of incidence (of light) at which the angle of refraction is (exactly) 90°	**B1**

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Question	Answer	Marks
6(b)(iii)	angle of incidence marked **AND** TIR of ray inside glass **AND** light ray leaves end of fibre after <u>two **or** three</u> reflections	**A2**
	angle of incidence marked **OR** TIR drawn until ray leaves end of fibre	C1

Question	Answer	Marks
7(a)	38 Ω	**A2**
	(R =) $V \div I$ **OR** (R =) 3 ÷ 0.08(0)	C1
7(b)(i)	Current in lower branch is 0.16(0) A	**B1**
	ammeter reading is sum of currents in each branch	**M1**
	(ammeter reading =) 0.24 A	**A1**
	OR	
	resistance in top branch = twice value in **7(a)**	**B1**
	formula for combined resistance of resistors in parallel	**B1**
	Correct current calculated from candidate's R1 in **7(a)**	**B1**
7(b)(ii)	potential difference (p.d.)(across R_3) is larger (than p.d. across R_1)	**B1**
	more <u>work done</u> (passing charge through R_3)	**B1**

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Question	Answer	Marks
8(a)(i)	field lines parallel inside solenoid	**B1**
	Minimum of 2 magnetic field lines, curved towards end of solenoid, around outside of solenoid	**B1**
	Correct symmetrical pattern above and below solenoid **AND** no field lines crossing **AND** At least 2 complete lines	**B1**
	At least one arrow on a field line outside the solenoid which is away from left end or towards right end of solenoid	**B1**
8(a)(ii)	B marked at a place where field lines are close together in Fig. 8.1 **AND** (magnetic) field lines are close(r) together	**B1**
8(b)(i)		**B1**
8(b)(ii)	Any **one** from: • solenoid becomes an (electro)magnet • there is a magnetic field (around solenoid)	**B1**
	Any **one** from: • attraction between solenoid and the (soft) iron (arm) • (soft) iron becomes an (induced) magnet	**B1**
8(b)(iii)	Any **one** from: • contacts are broken • circuit is broken (when striker hits bell) • there is no current (in the solenoid)	**M1**
	Any **one** from: • solenoid stops being a magnet • soft iron loses magnetism • soft iron stops being attracted to solenoid • Springy metal moves the soft iron back owtte	**A1**

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Question	Answer	Marks
9(a)	Any **three** from: • nucleus containing protons and neutrons • protons (in nucleus) • 2 neutrons (in nucleus) • 2 electrons outside the nucleus • Protons are positive (charges) **OR** electrons are negative (charges)	**B3**
9(b)(i)	hydrogen	**B1**
	(hydrogen) nuclei join (together)	**B1**
9(b)(ii)	Any **two** from: • infrared • visible • ultraviolet	**B2**
9(c)	• (the star) expands	**B1**
	Any **one** from: • (smaller star) forms a red giant • (more massive star) forms a red supergiant	**B1**

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Question	Answer	Marks
10(a)	B **AND** Sun is not at the centre of the orbit **OR** comets have an elliptical orbit	**B1**
10(b)	Comet travels faster when it is closer to the Sun **ORA**	**B1**
	GPE decreases **AND** KE increases as comet gets closer to the Sun **ORA**	**B1**
10(c)(i)	distance travelled (in the vacuum of space) by light in one year.	**B1**
10(c)(ii)	6.3×10^{10} (m) **OR** 63 000 000 000 (m)	**A2**
	(1 light-year =) 9.5×10^{15} (m) **OR** (1 light-year =) 9.5×10^{12} (km) **OR** SEEN (distance =) $6.6 \times 10^{-6} \times 9.5 \times 10^{N}$	C1

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