Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/62**

Paper 6 Alternative to Practical **October/November 2021**

MARK SCHEME

Maximum Mark: 40

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 2021 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 descriptors 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	‘List rule’ guidance 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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Examples of how to apply the list rule
State **three** reasons…. [3]

A

1	Correct	✓	**2**
2	Correct	✓	
3	Wrong	×	

B
(4 responses)

1	Correct, Correct	✓, ✓	**3**
2	Correct	✓	
3	Wrong	ignore	

C
(4 responses)

1	Correct	✓	**2**
2	Correct, Wrong	✓, ×	
3	Correct	ignore	

D
(4 responses)

1	Correct	✓	**2**
2	Correct, CON (of 2.)	×, (discount 2)	
3	Correct	✓	

E
(4 responses)

1	Correct	✓	**3**
2	Correct	✓	
3	Correct, Wrong	✓	

F
(4 responses)

1	Correct	✓	**2**
2	Correct	✓	
3	Correct CON (of 3.)	× (discount 3)	

G
(5 responses)

1	Correct	✓	**3**
2	Correct	✓	
3	Correct Correct CON (of 4.)	✓ ignore ignore	

H
(4 responses)

1	Correct	✓	**2**
2	Correct	×	
3	CON (of 2.) Correct	(discount 2) ✓	

I
(4 responses)

1	Correct	✓	**2**
2	Correct	×	
3	Correct CON (of 2.)	✓ (discount 2)	

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RM Assessor 3 annotations:

annotation	suggested use
tick	mark awarded (note the ticks are added up next to the tick annotation, check the total you enter agrees)
cross	no mark awarded
SEEN	indicates page seen
BOD	benefit of doubt given
NBOD	no benefit of doubt given
on page comment	gives a text box to write comment –much easier to use than in the previous version of RM assessor
ECF	error carried forward
^	omission mark
?	unclear
U UU	unit penalty applied unit penalty not applied because already applied earlier in same question

annotation	suggested use
wavy line (horizontal or vertical)	used to highlight a particular point
CON	contradiction
NAQ	not answered question
PD	poor diagram
SF SFSF	error in number of significant figures significant figure error not penalized.
POT POT POT	power-of-ten error POT penalty not applied as already applied
TV	too vague
I	ignore
SC	special case

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NOTES ABOUT MARK SCHEME SYMBOLS AND OTHER MATTERS

Brackets ( )	Brackets around words or units in the mark scheme are intended to indicate wording used to clarify the mark scheme, but the marks do not depend on seeing the words or units in brackets, e.g. 10 (J) means that the mark is scored for 10, regardless of the unit given. However, if a word in brackets is replaced with another word that is clearly wrong then the mark should not be awarded.
Underlining	Underlining indicates that this **must** be seen in the answer offered, or something very similar.
OR / or	This indicates alternative answers, any one of which is satisfactory for scoring the marks.
eeoo.	This means "each error or omission".
owtte.	This means “or words to that effect”.
Ignore	This indicates that something which is not correct or irrelevant i.e. it is not a contradiction (CON) is to be disregarded and does not incur a penalty.
Spelling	Be generous about spelling and use of English. If an answer can be understood to mean what we want, give credit. However, do not allow ambiguities, e.g. spelling which suggests confusion between reflection / refraction / diffraction or thermistor / transistor / transformer.
Not/NOT	This indicates that an incorrect answer is not to be disregarded, but cancels another otherwise correct alternative offered by the candidate, i.e. right plus wrong penalty applies.
ecf	meaning "error carried forward" is mainly applicable to numerical questions, but may in particular circumstances be applied in non-numerical questions. This indicates that if a candidate has made an earlier mistake and has carried an incorrect value forward to subsequent stages of working, marks indicated by ecf may be awarded, provided the subsequent working is correct, bearing in mind the earlier mistake. This prevents a candidate from being penalised more than once for a particular mistake, but **only** applies to marks annotated ecf in the mark scheme. **Always annotate ecf if applied.**
cao	correct answer only
Use of **NR**	(# or / key on the keyboard). Use this 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)(i)	l = 5.1 (cm) and w = 4.7 (cm)	**1**
1(a)(ii)	V = 95.88 (cm^3)	**1**
1(a)(iii)	64 (g)	**1**
1(a)(iv)	ρ to 2 or 3 significant figures	**1**
	unit g / cm^3	**1**
1(b)(i)	estimate of V_1 given to the nearest cm^3 and > ½V < V	**1**
1(b)(ii)	m_W numerically equal to V_1	**1**
1(c)(i)	d = candidate's **(a)(iii)** – **(b)(ii)** correct	**1**
1(c)(ii)	YES/NO and suitable comparison of d with m or m_W	**1**
1(d)	(float wood and) mark water level / remove and mark the water level	**1**
	measure submerged depth and multiply by the cross-sectional area	**1**
	OR	
	measure height of block that is not submerged	(1)
	multiply by the cross-sectional area then subtract from total volume of block.	(1)
	OR	
	use of a measuring cylinder / displacement can	(1)
	measure the volume of water displaced (by the floating block)	(1)

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Question	Answer	Marks
2(a)(i)	V_S = 1.8(0)	**1**
	I_S = 0.38	**1**
2(a)(ii)	R_S = 4.7 (4.7368)	**1**
	units Ω, V, A seen	**1**
2(b)	R_L = 4.86 (Ω)	**1**
	to 2 or 3 significant figures	**1**
2(c)	symbols correct	**1**
	resistor and lamp in series, with voltmeter in parallel with both	**1**
2(d)	R_C = 8.1 (8.0952) (Ω)	**1**
2(e)	statement to match results – expect NO	**1**
	explanation of idea of beyond limits of experimental accuracy (e.g., values not close (enough)/too far apart/> 10% difference	**1**

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Question	Answer	Marks
3(a)	u / v = 0.25	**1**
3(b)	axes correctly labelled with quantity and unit and right way round	**1**
	suitable scales with u axis starting at 15.0	**1**
	all plots correct to ½ small square	**1**
	good line judgement, thin, continuous line	**1**
3(c)	method clearly shown on graph	**1**
	value correct to within ½ small square	**1**
3(d)	Correct value for f – candidate's **(c)** ÷ 2	**1**
	to 2 or 3 significant figures	**1**

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Question	Answer	Marks
3(e)	**Read both parts of the answer together and award the marks in either order**	
	deciding the screen position for most clearly focused image	**1**
	move screen slowly / backwards and forwards	**1**
	OR	
	the image is difficult to see	(1)
	carry out in a darkened room / away from bright lights	(1)
	OR	
	(metre) rule moving	(1)
	clamp rule / tape rule to bench	(1)
	OR	
	the image is (small and) difficult to focus	(1)
	use a bigger object	(1)
	OR	
	difficult to find the centre of the lens	(1)
	use a marked lens holder	(1)
	OR	
	object, (centre of) lens (and screen) are not at the same height above the bench	(1)
	use a ruler / set-square to check	(1)

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Question	Answer		Marks
4	**MP1**	**method** names of at least three metals / named alloys suggested	**1**
	MP2	add loads / masses to test wire until it breaks	**1**
	MP3	repeat with the other metals	**1**
	MP4	repeat for each individual metal wire (and take an average)	**1**
	MP5	**control variable** diameter / cross-sectional area/thickness of the wire	**1**
	MP6	**table** columns for metal / wire and load / mass / weight, with unit	**1**
	MP7	**conclusion** compare breaking force / load / weight to metal OR plot a bar chart of metal and breaking force / load weight	**1**

Additional graph notes:

NOTE: The principle to apply here is 'could I draw a significantly better line, using these points, under examination conditions?' If the answer is definitely 'yes', do not award the mark.

NOTE: – If candidate's scale consists of actual readings at equal intervals this will produce a perfect straight line! The only mark available in this case is the first (axes right way round and labelled) So maximum 1.
– If axes are wrong way round, the other 3 marks are still available.

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