Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/33**

Paper 3 Core Theory **October/November 2020**

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 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U 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.

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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.

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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NOTES ABOUT MARK SCHEME SYMBOLS AND OTHER MATTERS

B marks	are independent marks, which do not depend on other marks. For a B mark to be scored, the point to which it refers must be seen specifically in the candidate's answer.
M marks	are method marks upon which accuracy marks (A marks) later depend. For an M mark to be scored, the point to which it refers **must** be seen in a candidate's answer. If a candidate fails to score a particular M mark, then none of the dependent A marks can be scored.
C marks	are compensatory marks in general applicable to numerical questions. These can be scored even if the point to which they refer are not written down by the candidate, **provided subsequent working gives evidence that they must have known it.** For example, if an equation carries a C mark and the candidate does not write down the actual equation but does correct substitution or working which shows he knew the equation, then the C mark is scored. A C mark is not awarded if a candidate makes two points which contradict each other. Points which are wrong but irrelevant are ignored.
A marks	A marks are accuracy or answer marks which either depend on an M mark, or which are one of the ways which allow a C mark to be scored. A marks are commonly awarded for final answers to numerical questions. If a final numerical answer, eligible for A marks, is correct, with the correct unit and an acceptable number of significant figures, all the marks for that question are normally awarded. It is very occasionally possible to arrive at a correct answer by an entirely wrong approach. In these rare circumstances, do not award the A marks, but award C marks on their merits. An A mark following an M mark is a dependent mark.
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.
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.
e.e.o.o.	This means 'each error or omission'.
o.w.t.t.e.	This means 'or words to that effect'.
Ignore	This indicates that something which is not correct or irrelevant is to be disregarded and does not cause a right plus wrong penalty.

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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.
Significant	Answers are normally acceptable to any number of significant figures ≥ 2. Any figures exceptions to this general rule will be specified in the mark scheme.
Arithmetic errors	Deduct one mark if the **only** error in arriving at a final answer is clearly an arithmetic one. Regard a power-of-ten error as an arithmetic error.
Transcription errors	Deduct one mark if the only error in arriving at a final answer is because previously calculated data has clearly been misread but used correctly.
Fractions	Allow these only where specified in the mark scheme.
Crossed out work	Work which has been crossed out **and not replaced but can easily be read**, should be marked as if it had not been crossed out.
Use of **NR**	Use this if the answer space for a question is completely blank or contains no readable words, figures or symbols.

Marking points specific to Paper 33

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Question	Answer	Marks
1(a)(i)	1000 + 500 OR 1500 OR 1500 – 1500 OR 1500 – their '1500' OR 1500 – 1000 OR 1500 – 500	**C1**
	0 / zero	**A1**
1(a)(ii)	2nd box (speed stays the same)	**B1**
1(b)(i)	(15 + 38) = 53 (m)	**B1**
1(b)(ii)	reduced friction / wet / icy (conditions) / worn tyres tiredness / drugs / alcohol / higher speed / going down hill	**B1**

Question	Answer	Marks
2(a)(i)	$W = mg$ OR $W = 10 \times m$	**C1**
	12.5	**A1**
	kg	**B1**
2(a)(ii)	250×0.5 OR $X \times 125$	**C1**
	clockwise moment = anticlockwise moment	**C1**
	(X=) 1.0 (m)	**A1**
2(b)	air resistance / drag	**B1**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(a)(i)</td><td>(gravitational) potential (energy)</td><td>B1</td></tr>
<tr><td>3(a)(ii)</td><td>the same</td><td>B1</td></tr>
<tr><td>3(b)</td><td><table>
<tr><td>A child is sitting at the top of the stairs.</td><td></td></tr>
<tr><td>A picture is hanging on a wall.</td><td></td></tr>
<tr><td>A student is stretching a spring.</td><td>✓</td></tr>
<tr><td>A person is moving a chair.</td><td>✓</td></tr>
</table></td><td>B1</td></tr>
<tr><td rowspan="3">3(c)</td><td>torch – light</td><td>B1</td></tr>
<tr><td>radio – sound</td><td>B1</td></tr>
<tr><td>fan - kinetic</td><td>B1</td></tr>
</table>

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Question	Answer	Marks
4(a)	any **three** from: pressure = force ÷ area weight or force distributed / spread or wtte (over) larger area (so) lower pressure (on the ground) (vehicle) doesn't sink into the mud owtte	**B3**
4(b)(i)	vacuum	**B1**
4(b)(ii)	atmospheric / air	**B1**
	pressure	**B1**
4(c)(i)	(pressure at hole 2 is) less (than that at hole 3) ora	**B1**
4(c)(ii)	water from top hole not travelling further than from middle hole	**B1**

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Question	Answer	Marks
5(a)	arrangement: solid to 2nd box liquid to 3rd box 3 } correct – 2 marks: 2 or 1 correct – 1 mark gas to 1st box	**B2**
	movement: solid to 4th box liquid to 2nd box 3 } correct – 2 marks: 2 or 1 correct – 1 mark gas to 3rd box	**B2**
5(b)(i)	move faster / speed up / more (kinetic) energy or wtte	**B1**
5(b)(ii)	(pressure) increases	**B1**
5(c)(i)	(temperature) scale	**B1**
	bulb OR reservoir	**B1**
5(c)(ii)	mercury	**B1**
5(c)(iii)	(liquid / mercury / alcohol) expands	**B1**
	liquid level / meniscus moves along tube / scale	**B1**

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Question	Answer	Marks
6(a)	conduction from the element to the water	**B1**
	convection	**B1**
	warmer water less dense (than colder water) or ra	**B1**
	warm water rises / cool water falls	**B1**
6(b)(i)	dull black / can A	**M1**
	(dull black) better radiator / good radiator better emitter / gives out more radiant heat / emits more infra-red / loses more energy by radiation	**A1**
6(b)(ii)	Any **two** of following pairs: lag / wrap in (named) insulator / cotton wool / polystyrene reduces heat lost by conduction cover in foil reduces heat lost by radiation add lid reduces heat loss by convection / evaporation	**B4**

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Question	Answer	Marks
7(a)	electromagnetic	**B1**
	seven	**B1**
	red	**B1**
7(b)(i)	B	**B1**
7(b)(ii)	C	**B1**

Question	Answer	Marks
8(a)	1st box - thermistor	**B1**
	2nd box – fuse	**B1**
	3rd box -lamp	**B1**
8(b)(i)	$V = I \times R$	**C1**
	(p.d. =) 0.30×20	**C1**
	(p.d. =) 6.0 (V)	**A1**
8(b)(ii)	voltmeter	**B1**
8(b)(iii)	(voltmeter) in parallel with resistor or supply correct symbol for voltmeter	**B1**

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Question	Answer	Marks
9(a)	current (in coil / circuit)	**B1**
	magnetic (effect of current)	**C1**
	coil OR soft iron rod / bar (becomes a electro)magnet	**A1**
9(b)(i)	any **four** from: residual magnetism circuit broken OR no current in electromagnet / circuit electromagnet switched off / no longer attracts the (pivoted) arm (pivoted) arm falls current in bell OR alarm / bell circuit complete	**B4**
9(b)(ii)	bell rings	**M0**
	(because) electromagnet switched off / no longer attracts the (pivoted) arm / (pivoted) arm falls	**B1**

Question	Answer	Marks
10(a)	wire or rod positioned between magnetic poles	**B1**
	diagram or description of working circuit	**B1**
	current in circuit OR switch circuit on	**B1**
	wire / rod moves owtte	**B1**
10(b)	use resistor in series / only allow current to flow for a short time / use a smaller current / use a smaller p.d. / reduce the pd of the power supply	**B1**

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Question	Answer	Marks
11(a)	P AND R	**B1**
	same number of protons	**B1**
11(b)(i)	alters genes / DNA OR kills cells OR (cell) mutations OR cancer	**B1**
11(b)(ii)	stand behind a screen / wear a lead apron	**B1**
	screen / apron absorbs X-rays OR X-rays cannot penetrate screen / apron	**B1**
11(c)(i)	beta / β	**B1**
11(c)(ii)	background (radiation)	**B1**

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