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Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/32**

Paper 3 Core Theory **February/March 2023**

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.

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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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Acronyms and shorthand in the mark scheme.

acronym/shorthand	**explanation**
A marks	Final answer marks which are awarded for fully correct final answers.
C marks	Compensatory marks which may be scored to give partial credit when final answer (A) marks for a question have not been awarded.
B marks	Independent marks which do not depend on other marks.
M marks	Method marks which must be scored before any subsequent final answer (A) marks 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.
owtte	Or words to that effect
ignore	identifies incorrect or irrelevant points which may be disregarded, i.e., not treated as contradictory. Ignore is also used to indicate an insufficient 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. Cf. SSMP 4. Always annotate with ECF
cao	correct answer only

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Question	Answer	Marks	Guidance
all			Any correct final answer, to the number of significant figures given in the mark scheme or more, scores all A marks even if reached by wrong Physics.
			Any numerically correct final answer with a unit error scores all marks except the last A mark, even if reached by wrong Physics. Annotate U.
			Where a C, B or M mark is available for quoting a formula or equation this can be written in any form and in words, symbols or numbers unless the mark scheme specifies otherwise.
			Where an equation is quoted in numerical values from the question, a C, B or M mark is awarded even if the substituted values are incorrect by a power-of-ten.

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Question	Answer	Marks
1(a)	(average thickness =) 1.4 (mm)	**A2**
	(average thickness =) 56 ÷ 40	**(C1)**
1(b)	any **three** from: measuring cylinder (partially) filled with water (initial) volume measured / noted strip submerged in water owtte (new / 2nd) volume (of strip and water) measured	**B3**
	volume of strip = difference in volumes	**B1**
1(c)	(ρ =) 8.92	**A3**
	(ρ =) 296 ÷ 33.2	**(C2)**
	(density =) mass ÷ volume OR *(ρ =) m / V* in any form	**(C1)**
	g / cm^3	**B1**

Question	Answer	Marks
2(a)(i)	(length of spring with 8.0 N load =) 20 (cm)	**B1**
2(a)(ii)	(load for length of 21 cm =) 9.3 (N)	**A2**
	(extension of 7 cm = length of) 21 cm	**(C1)**
2(b)	shape	**B1**

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Question	Answer	Marks
2(c)	(m =) 0.88 (kg)	**A3**
	(m =) 8.6 ÷ 9.8	**(C2)**
	W = mg OR (m =) W ÷ g	**(C1)**

Question	Answer	Marks
3(a)(i)	(speed =) 25 (m / s)	**A3**
	(speed =) 250 ÷ 10	**(C2)**
	(speed =) gradient of d-t graph OR d ÷ t in any form	**(C1)**
3(a)(ii)	(QR –) at rest or stationary	**B1**
3(b)	any **two** from (wide tyres have) large (contact) area (so) less pressure (on ground) so less likely to sink (into soft ground)	**B2**

Question	Answer	Marks
4(a)(i)	any **two** from: high speed moving freely random (motion) OR (moving in) any / all directions	**B2**
4(a)(ii)	collisions (of particles with walls of cylinder OR surface)	**B1**

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Question	Answer	Marks
4(b)	any **three** from: pressure increases (because) molecules are closer together / more densely packed OR area of cylinder decreases (so there are) more collisions per unit area (with walls of cylinder) pressure = force ÷ area	**B3**

Question	Answer	Marks
5(a)	(work done =) 60 (J)	**A3**
	(work done =) 12 × 5(.0)	**(C2)**
	(work done =) force × distance in any form	**(C1)**
5(b)	chemical store (in candle) decreases	**B1**
	energy is transferred by radiation / light / em / IR waves	**B1**
	thermal store of surroundings has increased owtte	**B1**

Question	Answer	Marks
6(a)(i)	2.0 (cm)	**B1**
6(a)(ii)	(so frequency =) 5.0 (Hz)	**A2**
	(frequency =) number of waves (sent out) per s / unit time OR time for 1 wave = 0.2 s OR 2 waves in 0.4 s	**(C1)**
6(b)	vibrations OR oscillations (of particles)	**B1**
	at right angles OR perpendicular	**B1**
	to direction of propogation	**B1**

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Question	Answer	Marks
6(c)	(v =) 360 (m / s)	**A3**
	(v =) 400 × 0.90	**(C2)**
	$(v =)\ f\lambda$	**(C1)**

Question	Answer	Marks
7(a)	same size (as object / book)	**B1**
	same distance <u>from mirror</u> (as book / object)	**B1**
	virtual	**B1**
7(b)	(use:) security marking OR detecting fake bank notes OR sterilising water	**B1**
	(harmful effect:) damage to surface cells / skin OR eyes OR damage to cells / genes / DNA OR skin cancer	**B1**

Question	Answer	Marks
8(a)	negative charges OR electrons	**B1**
	move from rod OR move to cloth	**B1**
8(b)	(ball Q is) positive	**B1**
	(ball R is) negative	**B1**
8(c)	(free) electrons	**B1**

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Question	Answer	Marks
9(a)(i)	(I =) 6.8 (A)	**A4**
	(I =) 1500 ÷ 220	**(C2)**
	P = I × V OR (I =) P ÷ V	**(C1)**
	1.5 kW = 1500 W	**(C1)**
9(a)(ii)	(cost of energy =) 84 (p)	**A3**
	(cost of energy =) 1.5 × 4(.0) × 14	**(C2)**
	(cost of energy =) power × time × cost of 1 kW h OR number of kW h × cost of 1 kW h	**(C1)**
9(b)	large current (in extension lead / socket)	**B1**
	(can cause) overheating / fire	**B1**

Question	Answer	Marks
10(a)	**any three from** (when switch S closed) current in coil P coil P has (changing) magnetic field magnetic field (from P) links with / cuts coil Q e.m.f. / voltage / current induced / produced / generated in coil Q	**B3**
10(b)	two coils (of copper wire)	**B1**
	(wrapped around / linked by soft) iron core	**B1**
	more turns on secondary coil **OR** less turns on primary coil	**B1**

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Question	Answer	Marks
11(a)	95	**B1**
	146	**B1**
11(b)	(amount remaining =) 3(.0) (mg)	**A3**
	(amount remaining =) 12 × ½ × ½ OR 12 × 1/4	**(C2)**
	860 years is 2 half-lives	**(C1)**

Question	Answer	Marks
12(a)	(closest to Sun) Mercury Venus (furthest from Sun) Earth	**B2**
12(b)	distance	**M1**
	travelled by light (in the vacuum of space) in one year	**A1**
12(c)	2.6×10^3 (s) OR 2600 (s)	**A2**
	time = distance ÷ speed OR $7.8 \times 10^{11} \div 3.0 \times 10^8$ OR 780 000 000 000 ÷ 300 000 000	**(C1)**

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