

Cambridge IGCSE™

PHYSICS**0625/32**

Paper 3 Core Theory

February/March 2024

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 February/March 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **11** printed pages.

PUBLISHED**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.

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.

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.

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.
<u>Underlining</u>	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., <u>not</u> treated as contradictory. Ignore is also used to indicate an insufficient answer not worthy of credit <u>on its own</u> .
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. <u>Always annotate with ECF</u>
cao	correct answer only

Question	Answer	Marks
1(a)	(walking with) constant/steady/uniform speed	B1
1(b)	2 (m/s)	A3
	$12 \div 6$	(C2)
	(speed =) gradient of distance-time graph	(C1)
1(c)	$(11(.0) - 6(.0) =) 5(.0)$ (s)	B1
1(d)	faster OR more (before talking to friends / in section AB) OR double / twice (the speed)	B1

Question	Answer	Marks
2(a)	$(42 - 30 =) 12$ (cm ³)	B1
2(b)	$(\rho =) 8(.0)$	A3
	$(\rho =) 320 \div 40$	(C2)
	(density =) mass \div volume OR $(\rho =) m / V$ in any form	(C1)
	g / cm ³	B1
2(c)(i)	friction / drag (upward arrow)	B1
	weight (downward arrow)	B1
2(c)(ii)	(falling with) {constant / steady / uniform} speed	B1

Question	Answer	Marks
3(a)	($P =$) 2.4 (N / cm ²)	A3
	($P =$) $48 \div 20$	(C2)
	($P =$) $F \div A$	(C1)
3(b)	(moment =) 380 (Ncm)	A3
	(moment =) 12×32	(C2)
	moment = force \times (perp.) distance from pivot	(C1)

Question	Answer	Marks
4(a)	chemical (potential energy)	B1
4(b)	63 (J)	A3
	(work done =) 14×4.5	(C2)
	(work done =) force \times distance (moved in direction of force)	(C1)
4(c)	180 (W)	A3
	(power input =) $5400 \div 30$	(C2)
	(power input =) energy input \div time OR $\Delta E \div t$	(C1)

Question	Answer	Marks
5(a)	any two from: <ul style="list-style-type: none"> (particles are;) random arrangement / pattern close together OR idea slightly further apart than in solid move randomly OR move around / about (freely) colliding with each other / walls have some vibrational energy / motion 	B2
5(b)	pressure increases	B1
	any two from: (because) <ul style="list-style-type: none"> particles move faster OR have increased kinetic energy more (frequent) collisions (with walls of container) harder collisions (with walls of container) 	B2
5(c)	infrared OR radiation (through space and atmosphere)	B1
	conduction (through the metal)	B1

Question	Answer	Marks
6(a)(i)	30 (mm)	B1
6(a)(ii)	10 (Hz)	A2
	idea of frequency = no. of waves per second	(C1)
6(b)(i)	electromagnetic wave(s) OR any named electromagnetic wave OR wave (on surface of) water OR (seismic) S-wave / secondary wave	B1
6(b)(ii)	(vibrations or they are) at right angles OR perpendicular	M1
	to direction of propagation OR direction of energy transfer	A1

Question	Answer	Marks
7(a)(i)	10 (cm)	A2
	(focal length =) 2×5	(C1)
7(a)(ii)	ray <u>continued in straight line</u> through centre of lens	B1
	ray parallel to axis continued to pass through focal point	B1
	(top of) image position indicated as where rays cross	B1
7(b)(i)	X-rays	B1
7(b)(ii)	security marker OR detecting fake bank notes OR sterilising food / water	B1
7(b)(iii)	damage to (surface) cells / skin / eyes OR (leading to) cancer / eye conditions	B1

Question	Answer	Marks
8(a)	use of compass to give direction of field lines first method (use of plotting) compass(es) idea of mark arrow position OR move compass in direction of arrow	B1
	start from different position(s) OR join up marks / draw lines (to show pattern) OR alternative method (use of plotting) compass(es) place number of compasses around magnet idea that arrows line up to show pattern	B3

Question	Answer	Marks
8(b)	steel	B1
8(c)	electric motors OR loudspeakers OR burglar alarms	B1

Question	Answer	Marks
9(a)	correct symbol for:	
	ammeter	B1
	lamp	B1
	thermistor	B1
	symbols connected in series circuit	B1
9(b)(i)	27 (Ω)	A3
	$5.4 \div 0.2(0)$	(C2)
	$(R=) V \div I$ OR $V = I \times R$ or in any form	(C1)
9(b)(ii)	32 (J)	A3
	$(E =) 5.4 \times 0.2 \times 30$	(C2)
	$(E=) VI$ OR $P \times t$ OR $I^2 \times R \times t$	(C1)
9(c)	current increases	B1
	(because) resistance (of thermistor) decreases	B1

Question	Answer	Marks
10(a)	electron	B1
	proton	B1
10(b)	any three from: 3 protons (in nucleus) 4 neutrons (in nucleus) 3 electrons outside nucleus nucleus labelled electron <u>orbits</u> seen	B3
10(c)	$(5700 \times 3 =) 17\ 100$ (years)	A2
	(from 120 mg to 15 mg takes) 3 half-lives	(C1)

Question	Answer	Marks
11(a)	Mercury	B1
	Mars	B1
11(b)	370 (s)	A3
	$1.1 \times 10^{11} \div 3.0 \times 10^8$	(C2)
	speed = distance \div time OR $(t =) d \div s$	(C1)
11(c)	value smaller than 9.8 (N / kg)	B1
	Venus has smaller <u>mass</u> ORA OR gravitational field strength depends on / proportional to <u>mass</u>	B1