



Cambridge IGCSE™

PHYSICS

0625/32

Paper 3 Core Theory

May/June 2021

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 May/June 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **10** printed pages.

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.

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.

Question	Answer	Marks
1(a)	(average thickness =) total thickness \div number of sheets	C1
	(average thickness =) $50 \div 200$	C1
	0.25 (mm)	A1
1(b)	density = mass \div volume OR (volume =) mass \div density	C1
	(volume =) $1377 \div 7.65$	C1
	180 (cm ³)	A1
1(c)	(top pan or chemical) balance	B1

Question	Answer	Marks
2(a)(i)	any indication on graph or in working of vertical line from 5.0 s	C1
	22.5 (m/s)	A1
2(a)(ii)	35 (m/s)	B1
2(b)	(speed of car) decreasing OR slows (down)	B1
	(until speed of car) is zero OR stops (moving)	B1
2(c)	(distance =) area under graph OR (distance =) speed \times time	C1
	20×35	C1
	700 (m)	A1

Question	Answer	Marks
2(d)	(average speed =) (total) distance ÷ (total) time	C1
	$226 \div 30(.0)$	C1
	7.53 (m/s)	A1

Question	Answer	Marks
3(a)	(moment of weight =) weight × (perpendicular) distance (of weight from pivot)	C1
	(moment of weight =) 150×1.8	C1
	270	A1
	Nm	B1
3(b)	barrier no longer balanced OR cannot be lowered (easily)	B1
	(more) force needed to lower barrier	B1
	(because) moment of heavy weight (has) increased	B1

Question	Answer	Marks
4(a)	any four from: <ul style="list-style-type: none"> • (gravitational) potential energy (of ball) • (is) transformed/transferred to OR becomes kinetic energy (of ball) • as it falls or moves <u>down slope</u> must be linked to energy (change) • kinetic energy transferred to (gravitational) potential energy • (as) ball rises or moves <u>up slope</u> must be linked to energy (change) • (transferred to) thermal energy (due to friction) 	B4

Question	Answer	Marks
4(b)	any two from: <ul style="list-style-type: none"> • some (of the initial) (G)PE/energy is transferred • (to) thermal energy • (due to) friction/air resistance • ball has less (G)PE/energy at stopping point 	B2

Question	Answer	Marks
5(a)(i)	(mercury) manometer	B1
5(a)(ii)	(pressure of gas in cylinder) is 14 cm of mercury (different to atmospheric pressure) owtte	C1
	(75 + 14 =) 89 (cm of mercury)	A1
5(b)	vertical tile (is more likely to sink)	B1
	any three from: <ul style="list-style-type: none"> • (because) tiles have same weight • pressure = force ÷ area • small(er) area (in contact with ground) for vertical tile ora • (so) greater/big pressure (exerted on ground) ora 	B3

Question	Answer	Marks
6(a)(i)	32 (°C)	B1
6(a)(ii)1	to enable rapid transfer of thermal energy to liquid in bulb	B1
6(a)(ii)2	idea: (small change in volume OR temperature) produces large movement of mercury along capillary owtte	B1

Question	Answer	Marks
6(b)	any four from: <ul style="list-style-type: none"> • line starting at 40 °C • line showing decreasing temp with time for 40 minutes • line becoming horizontal at –12 °C • horizontal line for about 20 mins (by eye) • line showing decreasing temp after horizontal section 	B4

Question	Answer	Marks
7(a)(i)	(1st box/next to visible) ultraviolet (rays)	B1
	(2nd box/next to gamma) X-rays	B1
7(a)(ii)	detection and treatment of cancer OR imaging/gamma photography OR (space) telescopes OR sterilisation of food/medical equipment	B1
7(a)(iii)	statement: (radiations arrive) at same time	M1
	reason: (because they have) same speed (in a vacuum)	A1
7(b)(i)	use of peaks to find time interval	C1
	0.2 (s)	A1
7(b)(ii)	frequency = number of pulses per s	C1
	5 (Hz)	A1

Question	Answer	Marks
8(a)(i)	normal drawn at X correct by eye	B1
8(a)(ii)	angle of refraction correctly labelled	B1

Question	Answer	Marks
8(a)(iii)	any one from: <ul style="list-style-type: none"> pin(s) OR ray box owtte OR (low voltage) power supply OR protractor OR ruler 	B1
8(b)	ray reflected from flat surface	M1
	ray reflected with angle $i = \text{angle } r$	A1

Question	Answer	Marks
9(a)(i)	electron(s)	B1
9(a)(ii)	(component X is a) <u>variable</u> resistor	B1
9(a)(iii)	$V = IR$ or $(R =) V/I$	C1
	$5.5 \div 0.05$ (0)	C1
	110 (Ω)	A1
9(b)	(current in circuit) increases	B1
	(because) resistance of LDR decreases	B1

Question	Answer	Marks
10(a)(i)	in any order:	
	increase current (in coil)	B1
	increase strength of magnet(s) or magnetic field(s)	B1
	increase the number of turns on the coil	B1

Question	Answer	Marks
10(a)(ii)	(direction of the) current (in the coil) is reversed	B1
10(b)	$(V_p/V_s) = (N_p/N_s)$ in any form	C1
	$234 \div 18 = 2470 \div N_s$ OR $N_s = 2470 \div (234 \div 18)$ OR $2470 \div 13$	C1
	(turns on secondary/output coil $N_s =$) 190	A1

Question	Answer	Marks
11(a)	line from A to middle box: nucleon number	B1
	line from Z to bottom box: proton number	B1
11(b)(i)	(from June 2004 to June 2014 =) 10 (years)	B1
	(decrease in activity from) 80 000 (Bq) to 20 000 (Bq) takes 2 half-lives	B1
	$10 \div 2 = (5 \text{ years})$	B1
11(b)(ii)	(decrease in activity from) 20 000 (Bq) to 10 000 (Bq) is one half-life	C1
	so half the time difference = 5 years OR 2019	A1