Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/31**

Paper 3 Core Theory **May/June 2020**

MARK SCHEME

Maximum Mark: 80

Published

Students did not sit exam papers in the June 2020 series due to the Covid-19 global pandemic.

This mark scheme is published to support teachers and students and should be read together with the question paper. It shows the requirements of the exam. The answer column of the mark scheme shows the proposed basis on which Examiners would award marks for this exam. Where appropriate, this column also provides the most likely acceptable alternative responses expected from students. Examiners usually review the mark scheme after they have seen student responses and update the mark scheme if appropriate. In the June series, Examiners were unable to consider the acceptability of alternative responses, as there were no student responses to consider.

Mark schemes should usually be read together with the Principal Examiner Report for Teachers. However, because students did not sit exam papers, there is no Principal Examiner Report for Teachers for the June 2020 series.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the June 2020 series for most Cambridge IGCSE™ and Cambridge International A & AS Level components, and some Cambridge O Level components.

[Turn over

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)(i)	(average thickness =) 3.8 ÷ 20	**C1**
	(average thickness =) 0.19 (cm) (which is about 0.2 cm)	**A1**
1(a)(ii)	any **one** from: wire(s) not touching OR wire stretched (in places) OR ruler not at zero (owtte) OR wire(s) overlapping OR eye not directly above ruler (owtte)	**B1**
1(b)	density = mass ÷ volume OR $\rho = \frac{m}{V}$ in any form.	**C1**
	(ρ =) 148 ÷ 16.6	**C1**
	(ρ =) 8.9 (g / cm^3)	**A1**
1(c)	measuring cylinder partially filled with water coil submerged in water (owtte) new volume noted volume of wire = difference or increase in volume(s)	**B4**

Question	Answer	Marks
2(a)(i)	6.0 (cm)	**B1**
2(a)(ii)	13.0 (cm)	**B1**
2(a)(iii)	(ii) – (i)	**B1**
2(b)	shape	**B1**
	size	**B1**

Question	Answer	Marks
3(a)(i)	high speed	**B1**
	(in) any or all directions or random (motion)	**B1**
3(a)(ii)	collisions	**M1**
	(of molecules) with walls of box	**A1**
3(b)	widely separated (owtte) in gas to very close / touching in solid	**B1**

Question	Answer	Marks
4(a)	(s =) d ÷ t in any form	**C1**
	(s =) 200 ÷ 6.4	**C1**
	(s =) 31 (m / s)	**A1**
4(b)	P – (constantly) accelerates (from 5 m / s)	**B1**
	Q – constant speed (of 17.5 m / s)	**B1**
	R – (non-constant) decelerates (from 17.5 m / s to rest)	**B1**
	S – at rest or stationary	**B1**
4(c)	(skis have) large (surface) area	**B1**
	(so) less pressure (on snow / ground)	**B1**

Question	Answer	Marks
5(a)	(moment =) force × distance (from pivot)	**B1**
	(moment =) 5.0 × 40	**B1**
5(b)	(sum of) clockwise moments = (sum of) anticlockwise moments	**C1**
	200 = (2.0 × 10) + (F × 60)	**C1**
	F = (200 – 20) ÷ 60 OR 180 ÷ 60	**C1**
	(F =) 3.0 (N)	**A1**

Question	Answer	Marks
6(a)(i)	°C or degrees celcius	**B1**
6(a)(ii)	arrow at 100 (labelled steam)	**B1**
6(b)	use OR consequence of thermal expansion identified	**B1**
6(c)(i)	black is better / best absorber	**B1**
	(so) temperature of wax rises faster on black plate	**B1**
6(c)(ii)	(for a valid comparison all independent) variables must be the same	**B1**
	plates / discs should be equal distances (from heater) (owtte)	**B1**

Question	Answer	Marks
7(a)(i)	60(°)	**B1**
7(a)(ii)	normal correctly positioned	**B1**
	correct reflected ray at 60° to normal	**B1**
	same value as (i)	**B1**
7(b)	horizontal ray drawn to continue through F	**B1**
	ray through principal focus continues parallel to axis	**B1**
	image indicated in correct position	**B1**
	image indicated with correct orientation	**B1**

Question	Answer	Marks
8(a)(i)	(wavelength =) 40 (cm)	**B1**
8(a)(ii)	wave drawn with greater amplitude	**B1**
8(b)	20 to 20 000	**B1**
	Hz or hertz	**B1**

Question	Answer	Marks
9(a)(i)	N and S poles correctly labelled N S	**B1**
9(a)(ii)	(iron bar and magnet) attract (each other)	**B1**
	(iron) bar becomes an induced magnet	**B1**
	with opposite pole next to pole of magnet	**B1**

Question	Answer	Marks
9(b)(i)	(charge on Q is) negative	**B1**
	(charge on R is) positive	**B1**
9(b)(ii)	(ball) Q is repelled (by negative charge on P)	**B1**
	has same charge (as on P)	**B1**

Question	Answer	Marks
10(a)(i)	thermistor	**B1**
10(a)(ii)	correct symbol for ammeter drawn	**B1**
	correct symbol for voltmeter drawn	**B1**
	both meters correctly positioned in circuit	**B1**
10(b)(i)	12 (Ω)	**B1**
10(b)(ii)	smaller (than A)	**B1**

Question	Answer	Marks
11(a)(i)	correct symbol for fuse drawn	**B1**
11(a)(ii)	a large current flows to earth / in the live wire OR fuse is connected into live wire OR fuse contains thin / low melting point wire	**B1**

Question	Answer	Marks
	any **two** from: current heats (fuse) wire fuse melts / blows (power supply circuit / metal case) is disconnected from mains (supply)	**B2**
11(b)	$V_s / V_p = N_s / N_p$ in any form	**C1**
	$(V_s =) (64 \times 240) \div 960$	**C1**
	16 (V)	**A1**

Question	Answer	Marks
12(a)	beta / β AND gamma / γ	**B1**
12(b)	$(137 - 56 =) 81$	**B1**
12(c)	idea of three half-lives	**C1**
	$36 \div 8$	**C1**
	4.5 (mg)	**A1**