Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICS **0625/62**

Paper 6 Alternative to Practical **March 2020**

MARK SCHEME

Maximum Mark: 40

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 March 2020 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.

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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 (see examples below)

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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ANNOTATION

Please annotate as you would normally do to explain marks.
Where items have 2 marks or more, overlays have been published. The overlay points correspond to mark scheme order. Please enter ticks for correct responses on the appropriate point of the overlay. The other points can be left blank if a mark has not been awarded but you may wish to add a cross or other annotation if you think it would be helpful.
You should add ticks and crosses please, as you would normally do, for **Question 3(c)** (the graph) and **Question 4**.
In order to avoid confusion, if a marking frame contains the answers to more than one question, the appropriate answer has been overlaid with a box.
The overlay for **Q4** marks has been divided between 2 pages to minimise scrolling.

BLANK PAGES
There is **one** blank page on this paper which has been attached at the front. Please check before starting marking as answers to **Question 4** may be continued here. Please mark as 'SEEN' and check nothing has been added to Fig.1.1 or Fig.1.2 as you scroll past them.
The LINK device can be used to refer the answer to the correct question if necessary.
Please ensure that nothing has been written in the blank spaces below the Questions on pages 3, 7, 8, 10 and 13.

IGNORE / NOT
Where more answers than required have been given for a question:
- if an answer is shown as IGNORE in Additional Guidance, another correct answer can be accepted,
- if an answer is shown as NOT, it negates any other correct answer.

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Question	Answer	Marks
1(a)(i)	l = 4.5 (cm) and d = 2.0 (cm)	1
	both to 1 decimal place	1
1(a)(ii)	method outlined /	1
	how diameter determined accurately e.g. use of string wrapped round rod and measured / several turns and calculate diameter from circumference, OR use of rod between two blocks and measure gap / in at least 2 places and take average, OR means of measuring diameter across ends / at several places and take average, OR use of micrometer, (vernier) callipers / at various points (along length or across ends) and take average	1
1(b)	m present and ρ_1 = 0.55 / ecf	1
	correct unit (g / cm^3)	1
1(c)	V_1 = 144 (cm^3) and V_2 = 152 (cm^3)	1
1(d)	ρ_2 = 0.57 / ecf	1
	ρ_1 and ρ_2 to consistent 2 or consistent 3 significant figures	1
1(e)	straight arrow perpendicular to measuring cylinder	1

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Question	Answer	Marks
1(f)	suitable source of inaccuracy e.g.: measuring cylinder scales less precise / accurate, water lost on transfer / droplets on clay, wood might absorb water	**1**

Question	Answer	Marks
2(a)	θ_R = 21 (°C)	**1**
2(b)(i)	s, °C both correct in heading	**1**
2(b)(ii)	suitable precaution e.g.: line of sight perpendicular to scale wait until reading stops rising (at start) stir before reading keep thermometer at same depth	**1**
2(c)(i)	x_1 = 0.18	**1**
2(c)(ii)	unit °C / s, seen in **(c)** and not contradicted	**1**
2(c)(iii)	x_3 = 0.07 and x_2 = 0.12	**1**
2(d)(i)	cooling rate decreases (over time) and justified by comparative values of cooling rate over suitable periods of time	**1**
2(d)(ii)	$\theta_F = \theta_R$	**1**

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Question	Answer	Marks
2(e)(i)	suggestion matching results	1
	explanation matching suggestion: EITHER: SUGGESTION: smaller cooling rates (at equivalent times) EXPLANATION: reference to cooling rate being smaller at lower temperatures and values stated OR SUGGESTION: smaller difference(s) in cooling rates (between equivalent times) EXPLANATION: clear reference to ($x_2 - x_3$) being smaller than ($x_1 - x_2$)	1
2(e)(ii)	suitable control: (same) volume of water, (same) material of beaker, (same) duration of experiment, (same) room temp / named appropriate environmental condition	1

Question	Answer	Marks
3(a)(i)	V = 2.1 (V) and I = 0.26 (A)	1
3(a)(ii)	R_0 = 8.1 / ecf	1
3(b)	1 / I = 2.86	1

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Question	Answer	Marks
3(c)	graph:	
	• axes labelled with quantity and unit	1
	• appropriate scales (plots occupying at least ½ grid)	1
	• plots all correct to ½ small square and precise plots	1
	• well judged line and thin line	1
3(d)(i)	*G* present and triangle method seen on graph line	1
3(d)(ii)	*E* in range 2.0 (V) to 2.9 (V)	1
3(e)	l = 30(.0) cm	1
	reference to ammeter forming greater proportion of total resistance	1

Question	Answer	Marks
4	**MP1** **circuit diagram:** ammeter in series with resistor and circuit correct	1
	MP2 **apparatus:** ammeter and means of measuring candidate's independent variable if other than air speed e.g. (metre) rule if distance is independent variable, protractor if angle of air flow is independent variable	1

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Question	Answer	Marks
4	**MP3** **control variable** (one from)**:** speed of fan (if distance / angle varied) or distance / angle between fan and turbine (if fan speed varied), height of fan / turbine, angle of air flow	**1**
	MP4 **method:** measure / record independent variable (allow turbine to turn and) measure / record current,	**1**
	MP5 repeat for different value of independent variable	**1**
	MP6 **analysis:** compare readings (in a table) to see if change in independent variable produces change in current / plot line graph (with correct axes specified)	**1**
	MP7 **additional point** (one from)**:** at least 5 sets of data taken, repeat each measurement and take average, 2nd valid control variable stated, repeat for different resistor and compare pattern preliminary experiment to determine suitable range for independent variable measure air speed at same point each time	**1**

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