Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

PHYSICS **5054/41**

Paper 4 Alternative to Practical **May/June 2018**

MARK SCHEME

Maximum Mark: 30

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.

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Question	Answer	Marks
1(a)	any two of: same length same thickness same amount of wax same size / mass / identical drawing pins same position in the flame / rods touching (in flame) / same distance from flame	**B2**
1(b)	the rod with the drawing pin that falls first / wax melts first is the best conductor	**B1**

Question	Answer	Marks
2(a)(i)	*h* shown clearly on diagram from bottom of left hand spring to bottom of right hand spring or equivalent distance.	**B1**
2(a)(ii)	any one: lengths of spring before and after stretching **and** values subtracted use metre rule to measure from floor to one point on one spring and also to same point on second spring **and** subtract the values use of metre rule and set squares clearly explained ruler close to springs / person	**B1**
2(b)(i)	ensures the load is evenly shared / both springs stretch same amount / *h* is the same	**B1**
2(b)(ii)	use of spirit level / measuring distance from floor to rod at two points	**B1**
2(b)(iii)	axes labelled quantity and unit and axes correct way round	**B1**
	scales linear and sensible	**B1**
	points plotted accurately to nearest $\frac{1}{2}$ square	**B1**
	best fit curve drawn	**B1**

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Question	Answer	Marks
2(b)(iv)	as N increases, h decreases / inverse relationship	**C1**
	inversely proportional / N doubles as h halves / $N \times h$ is constant	**A1**
2(c)	39.6 / 40 (cm)	**B1**

Question	Answer	Marks
3(a)(i)	micrometer / calipers / travelling microscope	**B1**
3(a)(ii)	**1** 3.4 (cm) cao	**B1**
	2 use of ruler and two set squares (or similar)/ use of 2 parallel / vertical lines at either end	**B1**
3(b)(i)	use of a measuring cylinder	**B1**
	volume of water with and without all beads subtract readings	**B1**
	Or displacement / eureka can **B1** filled to top of spout and all beads added **B1** measuring cylinder to measure displaced water **B1**	**B1**
3(b)(ii)	ensuring large enough measuring cylinder / water covering all the marbles when added / reading of measuring cylinder to avoid parallax error explained correctly / avoid water splashes	**B1**
3(b)(iii)	2.67g / cm^3 c.a.o.	**B1**

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Question	Answer	Marks
4(a)	raybox, (paper, pencil and) ruler Or pins, (pencil and) ruler	**B1**
4(b)	use of raybox and crosses to trace the incident ray (or alternative method using optics pins) / emergent ray	**B1**
	(remove the block) and join up the crosses to AB and CD	**B1**
	join the rays where they meet AB and CD	**B1**
4(c)	$i = 50° \pm 1°$	**B1**
	$r = 31° \pm 1°$	**B1**
4(d)	results table including *i, r, sin i and sin r (and n)* with ° symbol for *i* or *r*	**B1**
	at least 4 angles between 10°and 80°	**B1**

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