Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education (9–1)

PHYSICS (9–1) **0972/61**

Paper 6 Alternative to Practical **May/June 2018**

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 May/June 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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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.

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.

Question	Answer	Marks
1(a)	d = 5(.0) (cm)	**1**
1(b)(i)	D = 50 (cm)	**1**
1(b)(ii)	t = 14.06	**1**
1(b)(iii)	T = 1.406 (allow ecf from 1(b)(ii): t/10 (s))	**1**
1(b)(iv)	T^2 = 1.98 or 1.99 (allow ecf from 1(b)(iii))	**1**
1(b)(v)	g = 10.1 (allow ecf from 1(b)(iv))	**1**
1(c)(i)	Unit s^2	**1**
1(c)(ii)	g given to 2 or 3 significant figures	**1**
1(d)	Use of additional d values **OR** use a larger d value	**1**
	Count more swings	**1**
1(e)	Any **one** from: Perpendicular viewing of rule Counting beginning with zero (owtte) Use of fiducial mark (owtte) Use of set-square or horizontal rule to aid measurement of d Use rule close to/touching the bob Time taken from centre of swing, (not extremities) Measure length to top and bottom of bob and average Measure string length and add radius of bob measured with callipers or micrometer	**1**

Question	Answer	Marks
2(a)(i)	EITHER V_1 = 2.2 **OR** I = 0.46 correct	**1**
	Both values correct **and** correct units V and A	**1**
2(a)(ii)	R_1 = 4.78 (Ω) (allow ecf from 2(a)(i))	**1**
2(b)	Statement matches readings (Expect YES)	**1**
	Expect justification to include the idea of within the limits of experimental accuracy (but accept beyond limits, if ecf allowed for statement matching readings)	**1**
2(c)	R = 14.3 **OR** 14.4; 2 or 3 significant figures required	**1**
	Unit Ω	**1**
2(d)	$3V_1$	**1**
2(e)	3 resistors in parallel	**1**
	Correct variable resistor symbol	**1**
	Voltmeter symbol correct **and** circuit correct	**1**

Question	Answer	Marks
3(a)	*uv* values 1065, 1128, 1200, 1283, 1353	**1**
3(b)	Graph: (all marks are still available if *uv* values are wrong) Axes correctly labelled and right way round	**1**
	Suitable scales	**1**
	All plots correct to ½ small square	**1**
	Good line judgement, thin, continuous line	**1**
3(c)	Triangle method clearly shown on graph	**1**
	Triangle using at least half of candidate's line	**1**
3(d)	*G* in range 14.0 to 16.0	**1**
	f = *G* to 2 or 3 significant figures	**1**
3(e)	Any **two** from: Finding exact position that gives clearest image Measuring to centre of lens Room too bright/lamp too dim/image too faint	**2**

Question	Answer	Marks
4	Method to include: (Hot) water in copper can, time taken for temperature to drop	**1**
	Correct use of at least 3 larger outer containers, separately	**1**
	Some indication that size of air gap is measured	**1**
	Any **two** from: Use of something to cover air gap Use of lid on copper can Same starting temperature Same room temperature Same volume of hot water Use of 'control' with no outer container Inner container standing on an insulator Uniform air gap all round	**2**
	Table with clear columns for temperature and/or time (to match method) and air-gap, with appropriate units	**1**
	Conclusion: Least temperature drop **OR** longest time for temperature to drop shows lowest cooling rate **OR** best insulation **OR** plot temperature against time and least gradient shows lowest cooling rate (ora)	**1**