



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

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**PHYSICS**

**0972/06**

Paper 6 Alternative to Practical

**For examination from 2018**

MARK SCHEME

Maximum Mark: 40

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**Specimen**

From 2018 the mark scheme design/layout has improved.  
The content and marks remain the same.

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This document consists of **5** printed pages and **1** blank page.

## mark scheme abbreviations

|                    |   |
|--------------------|---|
| ( )                | the word, phrase or unit in brackets is not required but is in the mark scheme for clarification  |
| accept             | accept the response   |
| AND                | both responses are necessary for the mark to be allowed   |
| c.a.o.             | correct answer only   |
| e.c.f.             | error carried forward; marks are awarded if a candidate has carried an incorrect value forward from earlier working, provided the subsequent working is correct |
| ignore             | this response is to be disregarded and does not negate an otherwise correct response  |
| NOT                | do not allow  |
| note:              | additional marking guidance   |
| / OR               | alternative responses for the same marking point  |
| owtte              | or words to that effect   |
| <u>underline</u>   | mark is not allowed unless the underlined word or idea is used by candidate   |
| units              | there is a maximum of one unit penalty per question unless otherwise indicated  |
| any [number] from: | accept the [number] of valid responses  |
| max                | indicates the maximum number of marks   |

- 1 (a) table:  
 at least 2  $d$  values correct: 30.0, 24.2, 19.8, 17.2, 15.0 (cm) to  $\pm 0.5$  cm [1]  
 (accept values 50– $d$ ) [1]  
 rule readings subtracted from 50 cm [1]  
 all 5  $d$  values correct: 30.0, 24.2, 19.8, 17.2, 15.0 (cm) to  $\pm 0.2$  cm [1]  
 $1/d$  values correct (note: at least 2 significant figures) [1]
- (b) any one difficulty and corresponding solution from:  
 difficulty obtaining balance as rule tips one way then the other  
 allow to tip one way then the other and take average  
  
 mass obscuring marks on rule  
 mark centre of the mass so it can be read against rule  
 OR take average of right hand and left hand readings for mass position  
  
 mass sliding off rule  
 OR rule sliding off pivot  
 suitable means for preventing mass or rule sliding [max 2]
- (c) graph:  
 axes labelled with quantity and unit [1]  
 scales suitable, plots occupying at least half grid [1]  
 plots all correct to  $\frac{1}{2}$  square (take centre of plot if large) [1]  
 well-judged thin line ( $\leq \frac{1}{2}$  square) [1]
- (d) triangle method used and shown (any indication on graph) using at least half line  
 (can be seen in calculation) [1]
- (e)  $\mu = 27 - 33$  (g) to 2 or 3 significant figures [1]
- 2 (a) 23 ( $^{\circ}\text{C}$ ) [1]
- (b) any one from:  
 wait for thermometer reading to stop rising  
 eye level with top of (mercury) thread owtte  
 stir water [max 1]
- (c) s,  $^{\circ}\text{C}$ ,  $^{\circ}\text{C}$ , words or symbols AND  
 30, 60, 90, 120, 150, 180 [1]
- (d) uninsulated (owtte) OR no significant difference [1]  
 justified by reference to temperature differences and time [1]  
 relevant science, consistent with readings and conclusion  
 (e.g. therefore cotton wool is a good/not a good insulator OR most cooling is due to  
 convection or radiation etc.) [1]

## 4

- (e) quality poor due to small temperature differences [1]
- any two improvements from:  
 increase initial temperature of water  
 ensure initial temperatures are identical  
 use a lid  
 stir to eliminate differences between top and bottom of the water  
 use thicker insulation  
 use more sensitive thermometer or datalogger [max 2]

- (f) any two from:  
 laboratory temperature  
 draughts/open windows  
 accept temperature of hot water source [max 2]

- (g) 5–50 cm<sup>3</sup> [1]

- 3 (a) correct symbol [1]  
 correct position [1]

- (b) table:  
 1.68 (V) [1]

- (c) (brightness) decreases (as length increases) [1]

- (d) statement: no [1]  
 justification matches statement and by reference to results  
 e.g.  $V/l$  not constant, as  $l$  increases  $V$  decreases,  $V$  does not double as  $l$  doubles [1]

- (e) any one from:  
 width of sliding contact  
 achieving exact same position on wire  
 accept heating changes resistance of wire  
 accept other sensible practical reason [max 1]  
 NOT human error

- (f) do not touch (bare/hot) wire  
 OR do not allow C to touch terminal between lamp and supply [1]

## 5

- 4 (a) apparatus:
- measuring cylinder/jug OR ruler OR balance (to measure amount of water) [1]
  - protractor OR rule to measure height of raised surface
  - OR other means of measuring angle of tilt
  - OR newtonmeter to apply variable force
  - OR other method of applying quantifiable force [1]
- instructions:
- method of tilting or applying variable force and measuring point at which bottle topples [1]
- attention to accuracy, any two from:
- just starts to topple
  - slowly
  - repeats / more than 10 values for quantity of water
  - very large protractor
  - or any other suitable precaution which would improve accuracy of data [max 2]
- values:
- at least 5 values with range at least 1500 cm<sup>3</sup> or 30 cm or 1500 g, approximately evenly spaced [1]
- graph:
- plot of measured variable (angle or height or force) against quantity of water (volume or height or mass) (accept vice versa) [1]
- (b) 20° [1]

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