

MARK SCHEME for the October/November 2006 question paper

5054 PHYSICS

5054/04 Paper 4 (Alternative to Practical), maximum raw mark 30

This mark scheme is published as an aid to teachers and students, 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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

The grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

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Penalise incorrect or missing units once per question

- 1 (a) (i) 27.8 cm³ indicated in some way
- (ii) parallax error (not in length) / splashing / misreading scale / incorrect recording / finger in water / initial water in container [1]
- (iii) Any evidence of averaging given volumes seen
24.65 (cm³) accept 24.6 / 24.7 ignore sf ecf (a) (i) [2]
- (b) $t^3 = \text{average } V/0.433$ or $t = \sqrt[3]{(V/0.433)}$
3.85 cm 3 sf only ecf (a) (iii) [2]

[Total 6]

- 2 (a) (i) h marked from bench to rod [1]
- (ii) eye indicated between bench and rod viewed from side on RH diagram or on string/bob/rod on LH diagram [1]
- (b) (i) measures height from bench at both ends / uses ruler and set square / uses protractor or set square and string / uses (spirit) level [1]
- (ii) makes h or t or experiment more accurate [1]
- (c) measures n or more oscillations ($n \geq 10$) (and $t = \text{total time}/n$)
not repeating experiment [1]
- (d) axes: correct way round, labelled quantity and unit
scales: more than $\frac{1}{2}$ grid, sensible, linear
points: plotted accurately (within $\frac{1}{2}$ square) and neat
line: best fit smooth curve within range of points, neat [4]
- (e) as h increases, t increases
at a decreasing rate / gradient decreases / not (directly) proportional / not linear [2]
- (f) 16.5 cm \pm 0.5 cm ecf (d) [1]

[Total 12]

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- 3 (a) (i) $8 \pm 0.5 \text{ V}$ [1]
- (ii) measurement of more than one cycle seen / 3.2 to 3.4 seen
 $6.7 \pm 0.2 \text{ ms}$
- (b) 150 Hz or 0.15 kHz ecf (a) (ii) [1]
- (c) (i) Answer must be consistent with (b):
 period too large / waves too spread out / less than one wave on
 screen / compares 15 Hz to (b) or to time-base settings
 NB ecf (b) may give converse [1]
- (ii) 10 (ms/div) cao [1]
- [Total 6]
- 4 (a) table drawn with correct headings with units
 4 length values correct only
 resistance values correct (allow 2 for 2.0) [3]
- (b) any two from:
 length values should be evenly spaced
 more readings
 repeat readings
 larger range / longer wire / shorter wire
 do not allow improved accuracy of original readings e.g. parallax errors,
 tapping meters etc [2]
- (c) graph line does not pass through origin / ratio R/l or l/R not constant [1]
- [Total 6]
- [Paper Total 30]