CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2012 series

5054 PHYSICS

5054/42 Paper 4 (Alternative to Practical), maximum raw mark 30

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.

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1 **(a)** time (for one length) is small/
reaction error large (compared with time)/
gives average — B1 [1]

(b) **(i)** distance (travelled by wave) / length of tray varies/
cannot place rule close to water — B1 [1]

(ii) clear sensible description, e.g.
ruler viewed from vertically above / perpendicularly
use tape measure (flexible)
answers may be on diagram, e.g.
ruler and eye above
ruler and set squares — B1 [1]

(c) **(i)** zero error / dead space at end of ruler/
zero on ruler not at end/base of tray — B1 [1]

(ii) use second ruler to measure length of dead space — B1
length of dead space added to ruler reading (of depth) — B1 [2]

(d) **(i)** axes: correct way round, labelled quantity and unit — B1

scales: more than ½ grid, linear, not awkward
e.g. *x*-axis: 2 cm ≡ 0.5 cm *y*-axis: 2 cm ≡ 5 cm/s — B1

points plotted accurately within ½ small square
neat crosses or small points (in circle) — B1

smooth curve of best fit drawn — B1 [4]

(ii) tray not deep enough/
water spills out (when wave made)/
time too small / wave travels too fast — B1 [1]

(iii) speed becomes constant / does not vary (with *d*)/
increase in speed becomes smaller (with increasing *d*)/
gradient decreases (with increasing *d*) — B1 [1]

[Total: 12]

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2 **(a)** 2755 used correctly or 34 seen — C1
4861.8… (any number of sf)
81 or 81.0 or 5290 or 5300 — C1
4860 / 4900 unit not required — A1 [3]

(b) **(i)** uniform temperature / heat distribution — B1 [1]

(ii) base kettle hotter than water — B1 [1]

(c) heat losses to kettle / surroundings / to evaporate water
power too large/
time too large/
mass too small/
temperature difference too small — B1 [1]

[Total: 6]

3 **(a)** table headings correct: *m* and *t* — B1
both units: g and s — B1

mass values correct in order (up or down) — B1 [3]

(b) **(i)** NO +
within experimental error / readings very close / no pattern — B1 [1]

(ii) check (at least) one reading (to check random/operator error)/
time more swings/
extend range of values of *m*/
take intermediate values/
repeat **experiment** with different length string — B1 [1]

[Total: 5]

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4 **(a)** **(i)** line correctly drawn through P_1 and P_2 and extended into prism B1 [1]

(ii) line correctly drawn through P_3 and P_4 and extended back to cross **(a)(i)** B1 [1]

(iii) correct construction lines **and** 36° ± 2° B1 [1]

(iv) path through prism correctly drawn B1 [1]

(b) spectrum formed/
dispersion occurs/
splits into colours B1 [1]

(c) **(i)** not perpendicular/at 90° to surface/prism/side of prism
normal is perpendicular to surface B1 [1]

(ii) correct normal seen and 32°± 2° B1 [1]

[Total: 7]

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