CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2012 series

5054 PHYSICS

5054/31 Paper 3 (Practical Test), 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.

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1 **(a)** **(i)** θ_1 sensible, to the nearest °C or better with unit. B1

(ii) θ_2 sensible (must be less than 15 °C), to the nearest °C or better with unit. B1
(penalise missing or wrong unit once only)

(b) Volume of ice = final volume – initial volume
mass numerically equal to volume
units of volume seen somewhere and units of mass. B1

(c) Q_1 (≈ 80 × 4.2 × 15 ≈ 5000) and Q_2 (≈ 15 × 4.2 × 15 ≈ 1000) calculated correctly. M1

(d) L calculated correctly (≈ 250 J / g) with unit. A1 [5]

2 All centres used constantan wire.

(a) Current in the range 0.08 A to 0.20 A, measured to a precision of 0.01 A or better with unit. B1

P.D. across the wire in the range 0.40 V to 0.90 V measured to a precision of 0.01 V or better with unit. B1

(b) Correct calculation of R_A using answers from **(a)** with unit and ⩾ 2 s.f. B1

(c) I < (I in **(a)**), V > (V in **(a)**) and correct calculation of R_B with unit and ⩾ 2 s.f. B1

(d) Correct calculation of resistance ratio and sensible comment, e.g. approximately equal to given ratio. B1 [5]

3 **(a)** **(i)** Approach sharply focussed image from both directions /
Description of how the most sharp image is obtained /
Centre of object and centre of lens co-linear and parallel. B1

(ii) $u + v = 100 \pm 1$ cm and $u > v$ with one quantity to nearest mm or better and with unit. B1

u in range 78.0 cm to 85.0 cm and v in the range 15.0 cm to 22.0 cm. B1

(b) $u + v = 100 \pm 1$ cm and $v > u$ with one quantity to nearest mm or better and with unit. B1

u in range 15.0 cm to 22.0 cm and v in the range 78.0 cm to 85.0 cm. B1 [5]

(In **(a)** and **(b)** penalise incorrect precision once only, and missing units once only)

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4 Preliminary Results

(a) Measured height of string above the bench at A and B
values should be equal /
Aligned with horizontal object, e.g. window sill. B1

(b) $h_2 > h_1$ with at least one result measured to the nearest mm or better and with unit on at least one result. B1

$x < 48.0$ cm and measured to the nearest mm or better with unit. B1

(In **(b)** penalise incorrect precision once only, and missing units once only)

(c) $y = h_2 - h_1$ (allow rounded to the nearest cm) and correct calculation of tan θ to $\geqslant$ 2 s.f.
(Ignore units and s.f.). B1 [4]

Table

(d) Table with units for m, h_1, h_2, x, and y and ignore units for tan θ or θ (if calculated). B1

In awarding the next marks good results should be judged by checking the correct trend.
As m increases, x increases, y decreases and tan θ increases (tan θ to $\geqslant$ 2s.f., else –1).
Ignore x or y values that are $\geqslant$ 48.0 cm.

4 good values for tan θ. B1

5 good values for tan θ. B1

6 good values for tan θ. B1 [4]

Graph

(e) Axes labelled with units for m and correct orientation. B1
(No e.c.f. from table if no unit given. Ignore units for tan θ or θ)

Suitable scale, not based on 3, 6, 7 etc. with data occupying more than half the page in both directions. B1

Two points plotted correctly – check the two points furthest from the line.
This mark can only be scored if the scale is easy to follow. B1
(Points must be within ½ small square of the correct position)

Best fit fine line and fine points or crosses. B1 [4]
(Line thickness to be no greater than the thickest lines on the grid)

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Calculations

(f) (i) Correct reading of the sides of the triangle used for the gradient determination and correct calculation. M1

Triangle uses more than half the drawn line. A1

(ii) Correct calculation of *M* and value in range 30 g to 80 g (Ignore s.f. and unit) B1 [3]

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