CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2013 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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Section A

1 **(a)** d_1, d_2 and h all recorded to the nearest mm or better with unit seen somewhere. B1

At least 2 of d_1, d_2 and h repeated. B1 [2]

(b) Sensible precaution, e.g.
Measured diameters perpendicular to each other to check circular shape/
Measured diameters in more than one place/
(For the above precautions there must be evidence of more than 1 reading)/
Rotated rule about point on circumference to obtain largest reading/
Ensure centre of circle at edge of rule/
No parallax when taking scale readings explained e.g. stopper in contact with rule. B1 [1]

(c) m recorded with unit and correct calculation of density. M1

Density in the range 0.80 g/cm^3 to 2.0 g/cm^3, to 2/3 s.f. with unit. A1 [2]

2 **(a)** Sensible V with unit and correct m. B1 [1]

(b) Sensible θ_R recorded with unit seen somewhere. B1 [1]

(c) $\theta_H > \theta_R + 5°C$ and evidence of temperature recorded to better than 1°C either here or in **(b)**. B1 [1]

(d) Correct calculation of P with unit. B1 [1]

(e) The candle also heats up the beaker/
Heat lost to the surroundings/
Heat lost through evaporation. B1 [1]

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3 **(a)** *V* measured to 0.1 V or better and in the range 2.4 V to 3.3 V with unit seen here or in **(c)**. B1

I measured to 0.01 A or better and in the range 40 mA to 70 mA with unit seen here or in **(c)**. B1 [2]

(b) Correct calculation of *R* giving a value in the range 36.0 Ω to 66.0 Ω with unit seen here or in **(d)** (ignore s.f.). (Allow a power of 10 error as e.c.f.) B1 [1]

(c) Very small decrease in *V* (V_Y) and I_Y in the range 60 mA to 120 mA with units seen here or in **(a)**. B1 [1]

(d) Correct calculation of R_Y and R_X (= $R - R_Y$) and $R_X > 0$ with unit seen here or in **(b)**. Allow e.c.f. of incorrect, or no, conversion of mA to A. B1 [1]

Section B

4 **Preliminary Results**

(a) Sensible *M* recorded in kg. B1

M repeated and correctly averaged (allow *M* in grams). B1

W calculated correctly with unit. B1

Sensible improvement, e.g.
Oil the pulley to reduce friction/
Use smaller masses to obtain *W* more accurately/
Measure velocity at 2 places to check that it is constant/
Check masses with a top-pan balance/
Allow use a heavier wooden block or a rougher surface to increase friction/
Allow repeat the experiment **more** times. B1 [4]

Table

(b) Table with units for *P*, *M* and *W*. B1

Correct average values of *M* obtained for all results. B1

At least 4 sensible values of *P* (usually in 100 g increments) showing correct trend. (As *P* increases *M* increases). B1

At least 5 sensible values of *P* showing correct trend and correct calculation of W. B1 [4]

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Graph

(c) Axes labelled with units and correct orientation. B1
(Allow e.c.f. from wrong unit in table but not no units.)

Suitable scale, not based on 3, 6, 7 etc. with data occupying more than half the page in both directions. B1
(*P* axis must start at 0 and allow *W* axis to start at 0.)

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.)

Calculations

(d) (i) Triangle must use more than half the drawn line. B1

Correct calculation of gradient. (Ignore s.f. and missing or wrong unit). B1 [2]

(ii) Intercept correctly read off when $P = 0$, with unit. B1 [1]

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