

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

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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) $\theta_H > \theta_R + 5^\circ\text{C}$ 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 $36.0\ \Omega$ to $66.0\ \Omega$ 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. B1
This mark can only be scored if the scale is easy to follow.
(Points must be within $\frac{1}{2}$ 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]