

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the October/November 2015 series

5054 PHYSICS

5054/32

Paper 3 (Practical Test), maximum raw mark 30

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- 1 (a)(i),(ii) $M = 500\text{ g}$ with unit **and** $150\text{ cm}^3 \leq V \leq 200\text{ cm}^3$ with unit seen here or in (b)(i). Allow cm^3 or ml. B1
- (iii) Do 2 or more fills of the measuring cylinder (and add the 2 together because the volume is greater than 100 cm^3)
OR 2 values seen in (a) (ii). B1
- (Beware of one reading taken from a line on the beaker)
- (iv) Any two from
 Read the volume from the bottom of the meniscus./
 Eye level with the meniscus when the reading is taken./
 Shake the masses whilst they are over the beaker./
 Do repeat measurements and average the results provided
 Repeats seen in (a)(ii). B2
 (Answer must explain how, so avoid water sticking to the masses is not enough).
- (b) (i) Volume of masses = $250\text{ cm}^3 - V$ with unit seen here or in (a)(i).
And
 (ii) Correct calculation of density with unit. (Ignore s.f.) B1 [5]
- 2 Throughout this question ignore missing arrows or arrows in the wrong direction on rays.
- (a) End X of line labelled X, AX at an angle of 30° to AB by eye, line L perpendicular to AB by eye and 3.0 cm from A. B1
- (b) Reflected ray heading downwards and to the right with one point between AX and AB and the other point to the right of B. B1
- (c) New line AX at an angle of 60° to AB **and** new position of the reflected ray to the right and towards the top of the page (should be parallel to AX). B1
- Both rays projected backwards towards the left of the page. M1
- θ in the range 55° to 65° from a generally correct diagram. A1 [5]
- 3 (a)(i),(ii) Sensible M and m in 10 g steps and within $\pm 20\text{ g}$ of M with unit seen somewhere **and** correctly evaluated ratio (allow 1 s.f.) with no unit. B1
- (iii) Measured height above the bench in 2 places/
 Aligned with horizontal object e.g. window frame. B1

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- (b) $20.0 \text{ cm} \leq h_2 - h_1 \leq 30.0 \text{ cm}$ and $49.0 \text{ cm} \leq l \leq 55.0 \text{ cm}$, all measured to the nearest mm with unit seen on one of the quantities. B1
- Correct substitution and R found (ignore unit). B1
- θ in the range 15° to 35° with unit. B1 [5]

4 Preliminary Results

- (a) (i) V_0 recorded to 0.1 V or better with unit seen here or in (a)(ii) and in the range 3.0 V to 5.5 V. B1
- (ii) V recorded to 0.1 V or better with unit seen here or in (a)(i) and in the range 1.5 V to 2.8 V. B1 [2]

Table

- (b) Table with units for R and V and the results from (a)(ii). Included. B1
(Ignore missing or wrong units for $1/V$ or $1/R$).
- Correct calculation of $1/V$ and $1/R$ (check the point that is furthest from the drawn line). B1
- In the following section V values must always follow the trend that as R increases V increases.
- V for 2.7 k Ω resistor in the range 2.0 V to 4.4 V. B1
- V correct for one series combination from the following three, $R = 2.0 \text{ k}\Omega$, 3.7 k Ω and 4.7 k Ω . B1
- V correct for two further series combinations from the following three $R = 2.0 \text{ k}\Omega$, 3.7 k Ω and 4.7 k Ω . B1

$R/\text{k}\Omega$	Voltage range/V
2.0	1.8 to 4.0
3.7	2.1 to 4.8
4.7	2.2 to 5.0

- V for 0.73 k Ω (parallel arrangement) in the range 1.1 V to 2.6 V and < (a)(ii) value. B1 [6]

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Graph

- (c) Axes labelled with units and correct orientation. B1
- Suitable scale, not based on 3, 6, 7 etc. with data occupying more than half the page in both directions. (Allow origin to be included.) B1
- All data plotted and the two points furthest from the line checked. This mark can only be scored if the scale is easy to follow. B1
- (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) Correct reading of the sides of the triangle used for the gradient determination from a reasonable scale. B1
- Triangle uses more than half the drawn line. B1
- (ii) Value of $V_0 G$ in range 0.9 (k Ω) to 1.1 (k Ω) to 2/3 s.f. (Ignore unit). B1 [3]