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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 g with unit **and** 150 $cm^3 \leq V \leq$ 200 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 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 ± 20 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.
(Ignore missing or wrong units for $1/V$ or $1/R$). B1

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 kΩ 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 kΩ, 3.7 kΩ and 4.7 kΩ. B1

V correct for two further series combinations from the following three R = 2.0 kΩ, 3.7 kΩ and 4.7 kΩ. B1

R / kΩ	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 kΩ (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 ½ small square of the correct position)

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

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 (kΩ) to 1.1 (kΩ) to 2/3 s.f. (Ignore unit). B1 **[3]**

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