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Cambridge Ordinary Level

MARK SCHEME for the May/June 2015 series

5054 PHYSICS

5054/31 Paper 3 (Practical Test), maximum raw mark 30

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1 **(a)** Sensible values for m_E, m_T and m, with m numerically greater than V. All values to be recorded to the nearest gram or better and unit seen somewhere. B1

V with unit and $90\,cm^3 < V \leqslant 100\,cm^3$. B1

(b) Diagram showing meniscus with eye level with the bottom of the meniscus. B1

(c) Correct calculation of density with unit with density in the range $1.0 < \rho < 1.2\,g\,cm^{-3}$ to > 1 s.f. B1

(d) Large volume also gives a large mass and the 2 together give a more accurate value for the density. B1

2 **(a)** V_{AC} measured to 0.1 V or better with unit seen here or in **(b)** and in the range 3.5 V to 5.5 V.
and
V_{BC} measured to 0.1 V or better with unit seen here or in **(b)** and in the range 1.7 V to 2.8 V. M1

F_1 calculated correctly to 2 or more s.f. with no unit and in the range 0.45 to 0.55. A1

(b) V_{AC} measured to 0.1 V or better with unit seen here or in **(a)** and in the range 3.5 V to 5.5 V.
and
V_{BC} measured to 0.1 V or better with unit seen here or in **(a)** and in the range 1.1 V to 1.7 V. M1

F_2 calculated correctly to 2 or more s.f. with no unit and in the range 0.28 to 0.34. A1

(In **(a)** and **(b)** penalise, missing unit of V once only, unit of F once only, incorrect precision of V once only and incorrect s.f. for F once only.)

(c) Sensible statement, e.g.
higher resistance in circuit, so lower current, hence V_{BC} decreases / larger resistance between A and B so its share of the voltage increases hence V_{BC} decreases. B1

3 **(a)** V in the range $20\,cm^3$ to $60\,cm^3$ with unit and corresponding m_W with unit. B1

(b) Sensible θ_1 with unit in the range 15 °C to 35 °C. B1

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(c) $\theta_2 > \theta_1$ by between 2 °C and 10 °C with unit. B1
(In **(b)** and **(c)** penalise missing or wrong unit once only)

(d) Correct substitution of all values. M1

Correct calculation of c_B with unit with
$0.40 \leqslant c_B \leqslant 3.00$ J / (g °C). A1

4 Preliminary results

(a) u and v both recorded to the nearest mm with unit on one of the quantities with 40.0 cm < v < 90.0 cm and 19.5 cm < u < 20.5 cm. B1

Repeat measurements of sensible v seen with mean value found. B1

Value in the range 45.0 cm < v < 80.0 cm. B1

(b) Approach the focus position from both directions.
(Leave screen in the same position and move the lens in both directions) B1

Table

(c) Column headings for u, v, $u\,v$ and $u + v$ and units for $u\,v$ and $u + v$. and results from **(a)** included. B1

Correct calculation of $u + v$ and $u\,v$. B1
(Check one set of data that yields a point that is not on the straight line)

1 result for $u + v \leqslant 70.0$ cm. B1

1 result for $u + v \geqslant 95.0$ cm. B1

At least 5 points with correct trend.
(As u increases v decreases). B1

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Graph

(d) 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 plotted data occupying ⩾ half the page in both directions. B1
(Expect the scale not to start at the origin particularly in the $u + v$ direction).

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
(Line thickness to be no greater than the thickest lines on the grid)

Calculations.

(e) Correct calculation. M1

Use of a triangle that uses more than half the drawn line, answer to 2 / 3 s.f. and in the range 13.0 cm to 17.0 cm with unit. A1

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