MARK SCHEME for the May/June 2015 series

5054 PHYSICS

5054/32   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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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

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**