

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

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

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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  $90 \text{ cm}^3 < V \leq 100 \text{ cm}^3$ . 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  $1.0 < \rho < 1.2 \text{ g cm}^{-3}$  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  $20 \text{ cm}^3$  to  $60 \text{ cm}^3$  with unit and corresponding  $m_W$  with unit. B1
- (b) Sensible  $\theta_1$  with unit in the range  $15^\circ\text{C}$  to  $35^\circ\text{C}$ . B1

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(c)  $\theta_2 > \theta_1$  by between  $2^\circ\text{C}$  and  $10^\circ\text{C}$  with unit.  
(In (b) and (c) penalise missing or wrong unit once only) B1

(d) Correct substitution of all values. M1

Correct calculation of  $c_B$  with unit with  
 $0.40 \leq c_B \leq 3.00 \text{ J/(g } ^\circ\text{C)}$ . A1

#### 4 Preliminary results

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

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

Value in the range  $45.0 \text{ cm} < v < 80.0 \text{ cm}$ . 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  $u + v \leq 70.0 \text{ cm}$ . B1

1 result for  $u + v \geq 95.0 \text{ cm}$ . 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  $\geq$  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  $\frac{1}{2}$  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