



**Cambridge International Examinations**  
Cambridge Ordinary Level

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**PHYSICS**

**5054/32**

Paper 3 Practical Test

**May/June 2016**

**MARK SCHEME**

Maximum Mark: 30

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**Published**

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- 1 (a)** Mark to the left of 0.0 cm and to the right of 30.0 cm M0
- Both spaces sensible and determined to the nearest mm with unit seen somewhere. M1  
 $2\text{ mm} \leq d_{12} \leq 8\text{ mm}$  (if OOR use SV  $\pm 2\text{ mm}$ )
- $L$  found correctly with unit seen somewhere A1  
The unit must appear at least once in **(a)**
- (b)**  $S_1$  in the range  $14.0\text{ cm} \leq S_1 \leq 15.0\text{ cm}$  to nearest mm with unit B1
- $S_2$  in the range  $27.5\text{ cm} \leq S_2 \leq 29.5\text{ cm}$  to nearest mm with unit and  $x$  and  $y$  determined correctly B1
- The unit must appear at least once in (b)*  
*Penalise nearest mm mark only once in (b)*
- (c)**  $M$  calculated correctly and in the region of 20 g B1  
(if OOR use in the region of SV)
- 2 (a)**  $d_1$  in the range  $86.0\text{ cm} \leq d_1 \leq 89.0\text{ cm}$  to the nearest mm with unit B1
- (b)** Sensible  $t_1$  with unit seen somewhere B1
- At least two values of  $t_1$  or two values of  $t_1$  within  $\pm 0.5\text{ s}$  of each other with correct average. B1
- $T_1$  calculated correctly to 2/3 s.f. with unit seen somewhere and in the range 1.5 s to 2.0 s B1
- (c)**  $t_2$  recorded M0
- $T_2$  calculated and  $T_2 < T_1$  B1  
The unit must appear at least once in **(b)** and **(c)**

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- 3 (a) sensible raw readings of  $h$  with at least one repeated measurement to the nearest mm with unit B1
- (c) Vertically above the line the pin and the line are in line M0  
Head above A (left of line) the pin is to the right of the line A1  
Head above B (right of line) the pin is to the left of the line A1
- (d) raw readings of  $d < h$ , found from at least 2 measurements to nearest mm with unit B1
- (e) Correct calculation of ratio in the range 1.20 to 1.45 with no unit B1

#### 4 Preliminary results

- (a)  $V_0$  in the range 3.5 V to 5.5 V, to 0.1 V or better with unit B1
- (b)  $V$  in the range 1.00 V to 1.80 V to 0.1 V or better with unit B1  
(penalise precision error once only and penalise unit error once only) .  
Correct calculation of  $I$  with unit. B1

#### Table

- (c) Unit headings for  $R$ ,  $V$  and  $I$  and results from (b) included B1
- Three single resistances showing correct trend in  $V$  B1  
( $V$  increases as  $R$  increases)
- Three series arrangements showing correct trend in  $V$  B1
- Correct calculation of parallel resistance ( $= 6.9\Omega$ ) and correct calculation of two more values of  $R$  B1  
(Condone any value rounding to 6.9)
- Parallel arrangement to give overall correct trend in  $V$ . B1  
(Resistance values, 6.9, 10, 22, 32, 39, 49, 61 and 71)

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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 (including the origin) B1
- 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) (i) Correct reading of sides of triangle M1
- Triangle uses more than half the drawn line and answer in the range 17.5 ( $\Omega$ ) to 26.5 ( $\Omega$ ) *ignore –ve sign* A1
- (ii)  $V$  in the range  $0.80 V_0$  to  $1.20 V_0$ . B1