
PHYSICS**5054/31**

Paper 3 Practical Test

May/June 2016

MARK SCHEME

Maximum Mark: 30

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(Ω) to 26.5(Ω) *ignore –ve sign* A1
- (ii) V in the range $0.80 V_0$ to $1.20 V_0$. B1