

**232/3**  
**PHYSICS**  
**MARKING SCHEME**  
**PAPER 3**

**QUESTION 1**

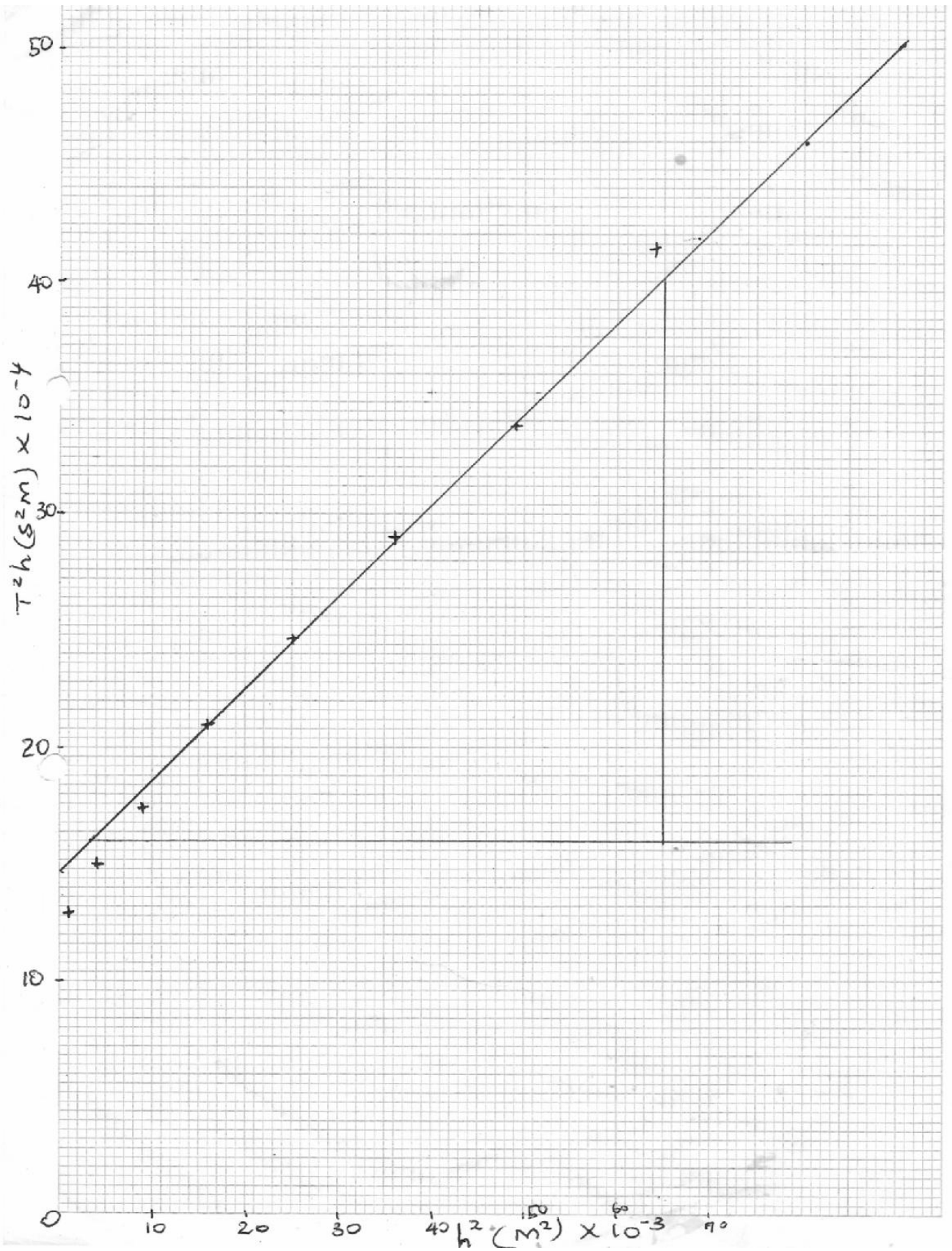
a)  $r = 0.085 \pm 0.002 \text{ m}; \checkmark 1$

|                                |       |       |       |       |       |       |       |       |                  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------------------|
| h(m)                           | 0.01  | 0.02  | 0.03. | 0.04  | 0.05  | 0.06  | 0.07  | 0.08  | $\checkmark 1$   |
| Time t (s)                     | 11.33 | 8.68  | 7.65  | 7.24  | 7.01  | 6.97  | 6.95  | 7.03  | $\checkmark 2$   |
| T (s)                          | 1.133 | 0.868 | 0.765 | 0.724 | 0.701 | 0.697 | 0.695 | 0.03  | $\checkmark$ all |
| T2 ( s)                        | 1.284 | 0.753 | 0.585 | 0.524 | 0.491 | 0.486 | 0.483 | 0.494 | $\checkmark$ all |
| $T^2 h ( S^2m) \times 10^{-3}$ | 12.84 | 15.06 | 17.55 | 20.96 | 24.55 | 29.16 | 33.81 | 39.52 | $\checkmark$     |
| $h^2 (m^2) \times 10^{-4}$     | 1     | 4     | 9     | 16    | 25    | 36    | 49    | 64    | $\checkmark$     |

TOTAL 7

- c) i) Scale  $\checkmark$   
 Plotting ( 6 -7 Pts)  $\checkmark \checkmark$  ( 4 – 5 pts) $\checkmark$   
 Line $\checkmark$   
 Axes ( Labelled) $\checkmark$

Total 5



$$\text{ii) Slope} = \Delta \frac{T^2 h}{h^2} = \frac{(40.0 - 16.0) \times 10^{-3}}{65 - 3 \times 10^{-4}}$$

$$= 3.871 \text{ S}^2 \text{m}^{-1} \checkmark 1$$

$$\text{d) } T^2 h = \frac{P}{39.5} + \frac{100R}{15}$$

$$\text{i) Slope} = \frac{P}{39.5} \checkmark 1$$

$$4.033 = \frac{P}{39.5}$$

$$P = 3.871$$

$$= 10.204 \text{ m} \cdot \text{s}^{-2}; \checkmark 1$$

$$\text{ii) } y - \text{intercept} = \frac{15}{100 R} \quad 14.6 \times 10^3 = \frac{15}{100 R}$$

$$14.6 \times 10^{-3} = \frac{15}{100 R} \times \frac{1}{14.6 \times 10^{-3}}$$

$$= 10.274 \text{ m} \cdot \text{s}^{-2}; \checkmark 1$$

$$\text{e) } G = \frac{10.204 + 10.274}{2}$$

$$= 10.239 \text{ Ms}^{-2}; \checkmark$$

Total 20

## QUESTION 2

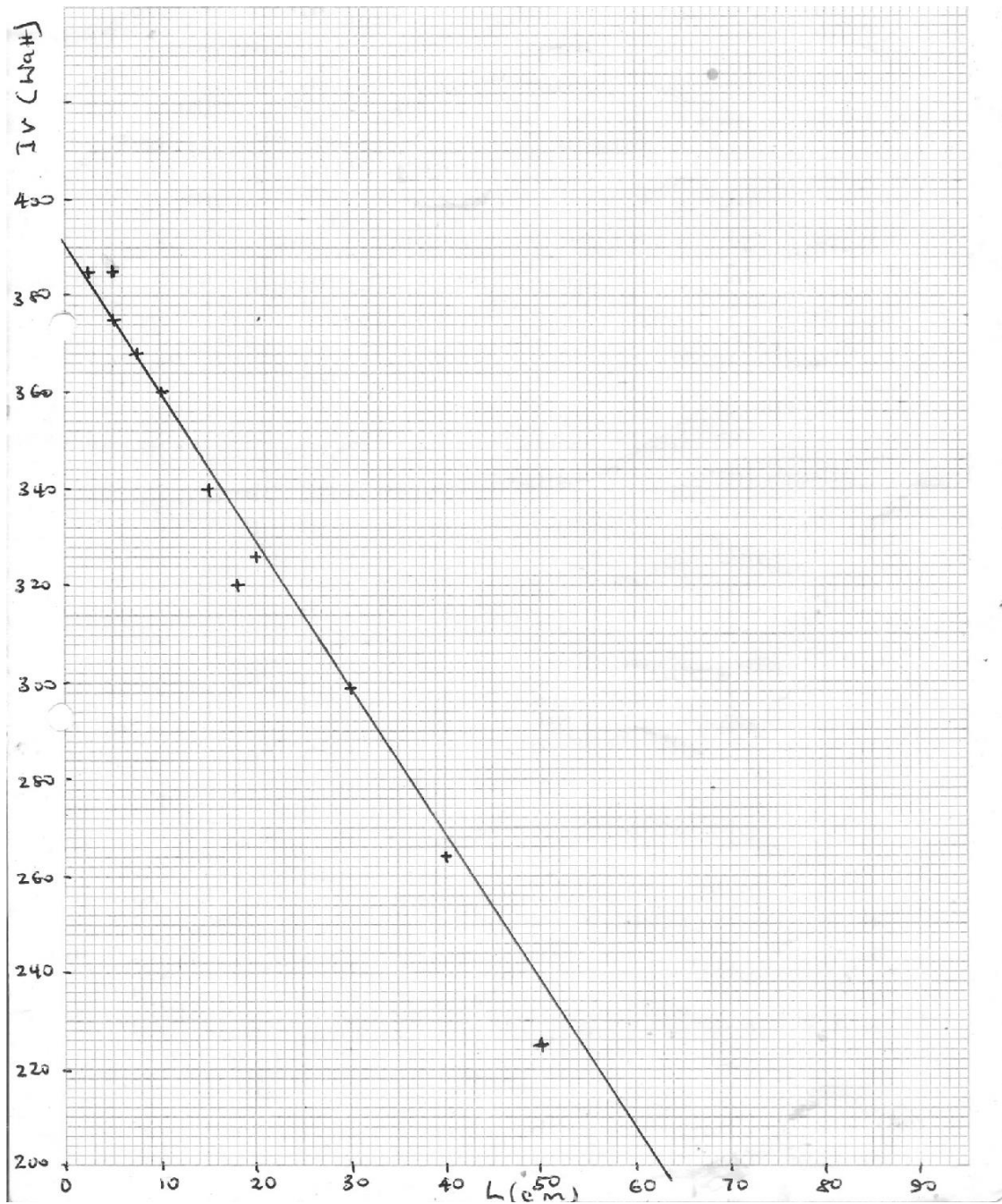
### PART A

|                |       |       |       |       |       |       |       |       |       |       |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L (cm)         | 2.5   | 5.0   | 7.5   | 10    | 15    | 18    | 20    | 30    | 40    | 50    |
| P.D V (Volts)  | 0.70  | 0.75  | 0.80  | 0.90  | 1.00  | 1.00  | 1.05  | 1.15  | 1.20  | 1.25  |
| Current, I (A) | 0.55  | 0.50  | 0.46  | 0.40  | 0.34  | 0.32  | 0.31  | 0.25  | 0.22  | 0.18  |
| IV (Watt)      | 0.385 | 0.375 | 0.368 | 0.360 | 0.340 | 0.320 | 0.326 | 0.289 | 0.264 | 0.225 |

Total ( 5mks)  
( 5mks)

- ii) Scale ✓  
Plots ✓  
Line ✓  
Axes ✓

- a) i)  $d = 0.35 \text{ min} = 3.5 \times 10^{-4} \text{ m}$   
ii)  $L^2 = 1.5 \text{ V} \pm \text{Vol}$



iii)  $L_0 = 63 \text{ cm}$  (students x - intercept Correctly read)

(1mk)

c) i)  $r = 1.30 \sqrt{\frac{1}{2}} \checkmark$

$I = 0.17 \sqrt{\frac{1}{2}} \checkmark$

ii)  $r = \frac{E - r}{I}$

$$= \frac{1.5 - 1.3}{0.17} = 1.176 \Omega \checkmark \quad (1) (1 \pm 0.2)$$

d)  $e = \frac{\pi \times 1.176 \times (3.5 \times 10^{-4})^2}{4 \times 0.63} \checkmark (1) = \frac{\pi r d^2}{4 L_0}$

$= 1.796 \times 10^{-8} \Omega m \checkmark (1)$

16 mks

**QUESTION 2**  
**PART B**

$$M_i = 40 \pm 1 \text{ cm} \quad (1\text{mk})$$

$$\text{OR } M_i = 0.40 \pm 0.01\text{m}$$

Penalize  $\frac{1}{2}$  mk for lack of units.

e) Radius of curvature. ( 1mk)

$$\begin{aligned} \text{f) } f &= \frac{M_i}{2} \\ &= \frac{40}{4} \\ &= 20 \text{ cm} \pm 0.5 \end{aligned} \quad \begin{array}{l} (1\text{mk}) \\ (1\text{mk}) \end{array}$$