

PHYSICS 232/3
MARKING SCHEME.
FORM THREE

Question 1

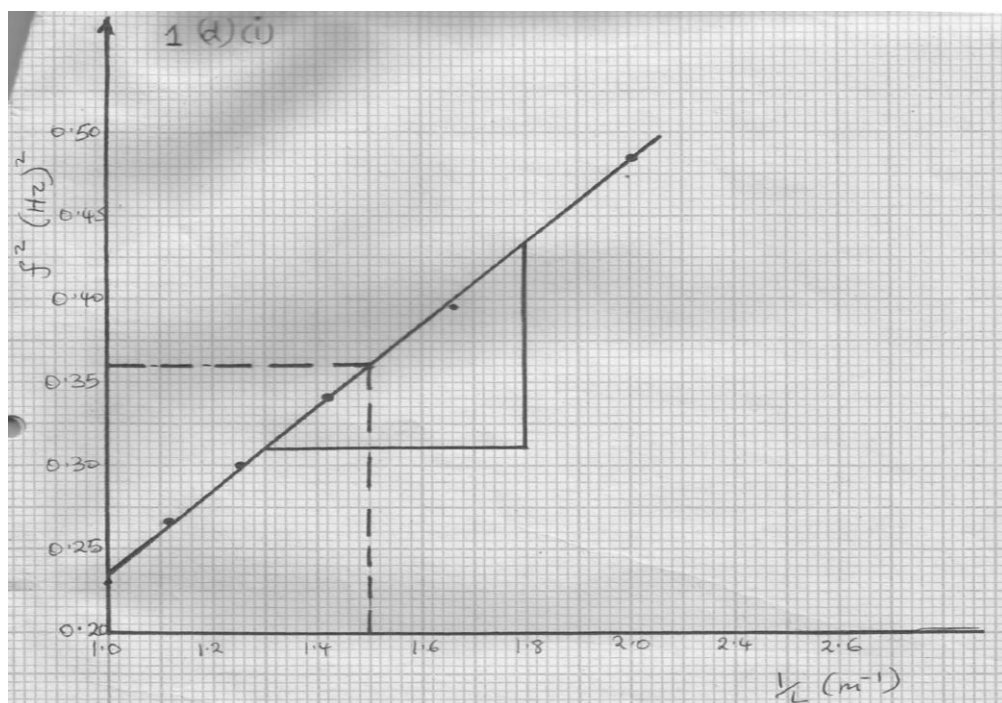
Length, L (m)	1.0	0.9	0.8	0.7	0.6	0.5	
Time t for 10 oscillations (s)	20.82	19.40	18.30	17.11	15.90	14.35	✓✓✓ 3mks
Period, $T = \frac{t}{10}$ (s)	2.082	1.94	1.83	1.711	1.59	1.435	✓1mk
Frequency, f (Hz)	0.480	0.515	0.546	0.584	0.629	0.697	✓1mk
$f^2(\text{Hz})^2$	.0230	0.265	0.298	0.341	0.396	0.486	✓1mk
$\frac{1}{L}(\text{m}^{-1})$	1.00	1.111	1.250	1.428	1.667	2.00	✓1mk

(d) (i) Axes labeled with units ✓1mk

Correct scale ✓1mk

Plotting ✓1mk

Line of fit ✓1mk (should pass through at least three correctly plotted points).



(ii) Slope = $\frac{0.435 - 0.31}{1.8 - 1.3}$ ✓1mk

= $\frac{0.125}{0.5}$

= 0.25 ✓1mk

$$\begin{aligned} \text{(iii)} \quad \frac{g}{4\pi^2} &= \text{slope} \sqrt{1mk} \\ g &= \text{slope} \times 4\pi^2 \\ &= 0.25 \times 4 \times 3.142^2 \\ &= 9.87 \text{ m/s}^2 \end{aligned}$$

$$\text{(iv) when } \frac{L}{f^2} = 1.5 \text{ m-1}, \quad f^2 = 0.36 \text{ (Hz)}^2$$

$$\begin{aligned} f &= \sqrt{0.36} = 0.6 \text{ Hz} \\ T &= \frac{1}{f} = \frac{1}{0.6} \end{aligned}$$

$$\text{f) } y = 17.3 \text{ cm} \pm 1.0 \text{ cm} \sqrt{1mk}$$

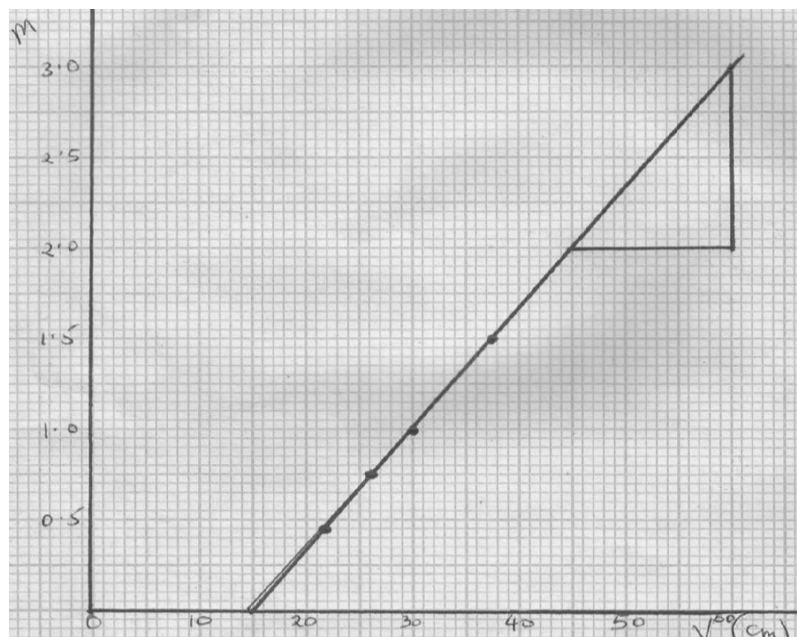
$$\begin{aligned} \text{g) } W_1 &= \frac{0.5 \times 17.3}{10} \\ &= 0.865 \text{ N} \sqrt{1mk} \end{aligned}$$

$$\begin{aligned} U_w &= 1.0 - 0.865 \\ &= 0.135 \text{ N} \sqrt{1mk} \end{aligned}$$

$$2 \text{ (b) } d = 15.0 \text{ cm} \pm 1.0 \sqrt{1mk}$$

U (cm)	20	25	30	35	40	50	
V (cm)	60.0	37.5	30.0	26.0	24.0	21.5	± 2.0
$M = \frac{v}{u}$	3.00	1.50	1.00	0.74	0.60	0.43	

f) Axes $\sqrt{1mk}$
scale $\sqrt{1mk}$
Plotting $\sqrt{1mk}$
Line $\sqrt{1mk}$



$$\text{g) Slope} = \frac{3.0 - 2.0}{60 - 45} \sqrt{1\text{mk}} \text{ (correct extraction)}$$

$$= \frac{1.0}{15}$$

$$= 0.0667 \sqrt{1\text{mk}}$$

$$\text{h) } \frac{I}{n} = \text{slope}$$

$$n = \frac{1}{\text{slope}} = \frac{1}{0.0667}$$

$$= 15.0 \text{ cm}$$

$$\text{(i) When } m = 0$$

$$V = 15.0 \text{ cm} \pm 1.0$$

$$O = \frac{15}{n} - 1 = \frac{n}{15} = 1 \quad n = 15.0 \text{ cm} \sqrt{1\text{mk}}$$

$$\text{(k) } E = 3.0 \text{ V} \pm 0.2 \sqrt{1\text{mk}}$$

$$\text{(l) } V = 2.30 \text{ V} \pm 0.2 \sqrt{1\text{mk}}$$

$$I = 0.26 \text{ V} \pm 0.2 \sqrt{1\text{mk}}$$

$$\text{(m) } \frac{3.0 - 0}{(3.0 - 2.3)} = \frac{m}{5} \times \frac{2.30}{0.26} \sqrt{1\text{mk}} \text{ Correct substitution}$$

$$m = 2.42 \sqrt{1\text{mk}}$$