

1. (a) $D_1 = 0.32\text{mm}$ $\sqrt{1/2}$ mark $D_2 = 0.32\text{mm}$ $\sqrt{1/2}$ mark

(b) $D = \frac{0.32 + 0.32}{2}$ $\sqrt{1/2}$ mark

$0.32 \times 10^{-3} \text{ m}$ $\sqrt{1/2}$ mark

(c) $X = 40\text{cm}$ $\sqrt{1/2}$ mark

$y = 60\text{cm}$ $\sqrt{1/2}$ mark

(d)

L(cm)	45	40	35	30	25	20
X (cm)	43.2	49	51.2	55	58.7	63.7
Y (cm)	56.8	51	48.8	45	41.3	36.3
Y	1.31	1.04	0.95	0.82	0.70	0.57
$\frac{y}{x}$ 2dp.						

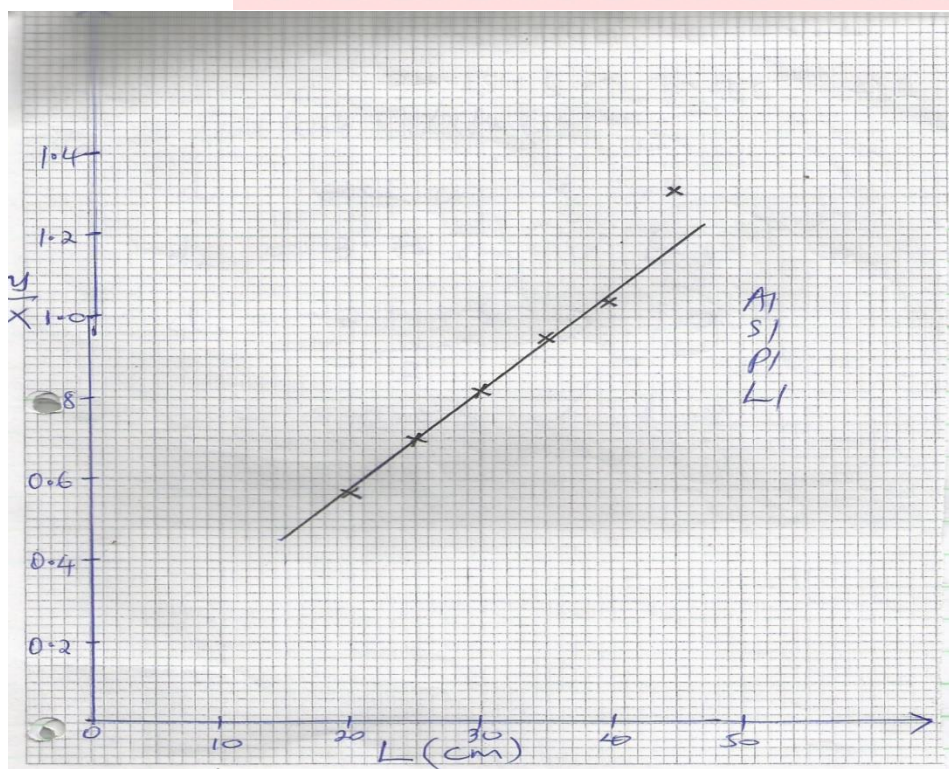
(3mks)

e) (ii) $= \frac{0.95 - 0.57}{35 - 20}$ $\sqrt{1}$ mark
0.02533

(iii) $K = \frac{100 \times 0.32 \times 10^{-3}}{0.02533}$ $\sqrt{1}$ mark

$= 1.263$

$\sqrt{1}$ mark



(f) outline $\sqrt{1}$ mark

$$d_1 = 2.1\text{cm} \quad \sqrt{1} \text{ mark}$$

$$d_2 = 3.6\text{cm} \quad \sqrt{1} \text{ mark}$$

$$d = \frac{2.1+3.6}{2} \quad \sqrt{1} \text{ mark}$$

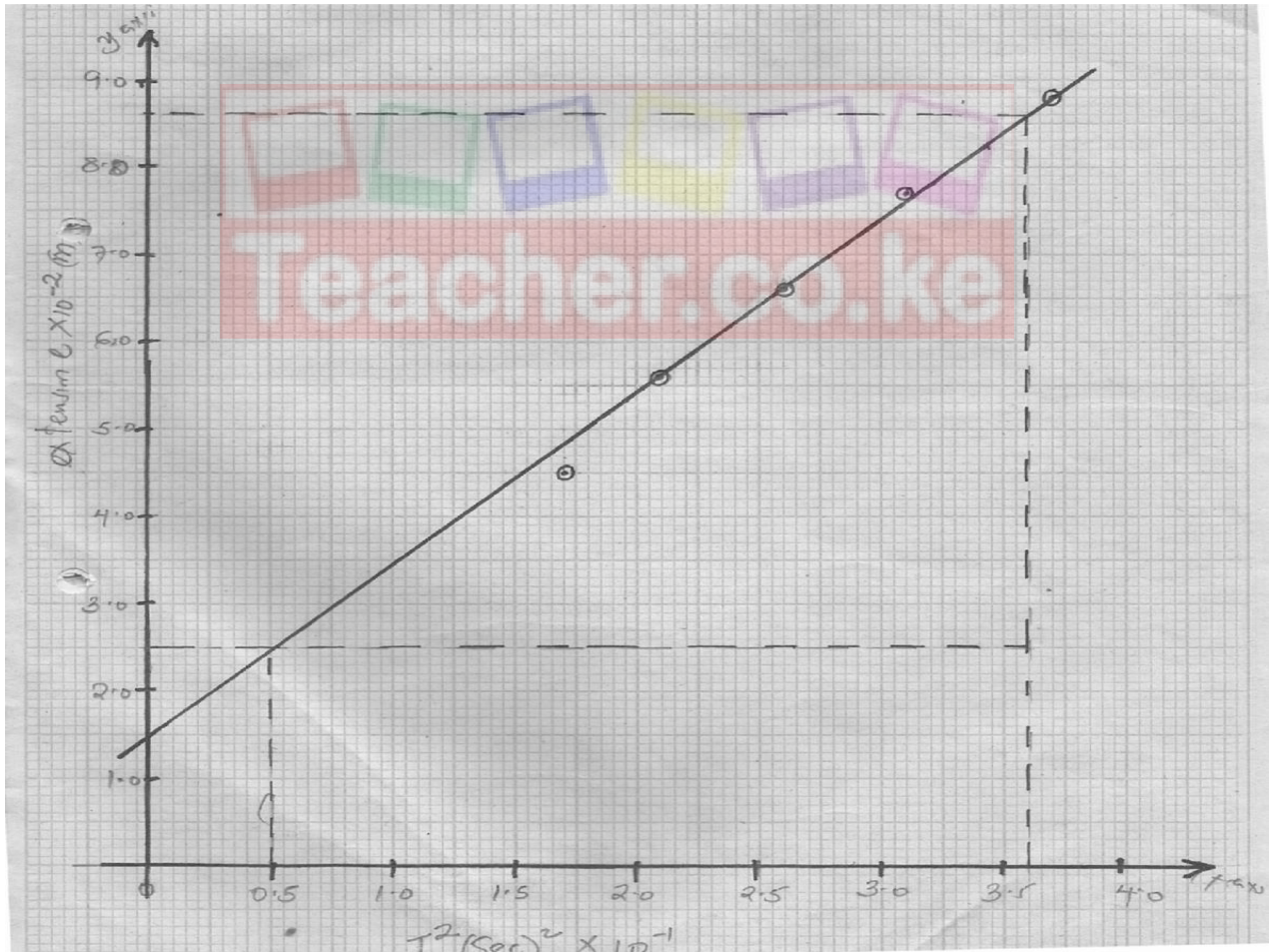
$$= 2.85\text{cm} \quad \sqrt{1} \text{ mark}$$

2. (a) (V) $L_0 = 56\text{cm}$ (or any other value) $\sqrt{1} \text{ mark}$

(V) (b)

Length (L(cm))		10	20	30	40	50	± 0.2
Extension e	Cm	8.8	7.7	6.6	5.6	4.5	$\sqrt{1/2} \text{ mark}$
	M	0.088	0.077	0.066	0.056	0.045	
Time for 20 oscillations period time T(sec) $T^2(\text{Sec})^2$		12.22	11.21	10.12	9.15	8.20	$\pm 0.5 \text{ sec}$
		0.611	0.561	0.506	0.458	0.410	$\sqrt{2} \text{ marks}$
		0.37	0.31	0.26	0.21	0.17	$\sqrt{1} \text{ mark}$

(VI) Graph



Labeled axes and unit $\sqrt{1} \text{ mark}$

Appropriate scale $\sqrt{1} \text{ mark}$

Plotting 4 or 5 correct by transferred $\sqrt{2}$ marks

3 correctly transferred $\sqrt{1}$ mark

Best line $\sqrt{1}$ mark

(vii) Gradient $\frac{\Delta e}{\Delta T^2}$ $\sqrt{1}$ mark

$$\begin{aligned} \text{slope} &= \frac{(86 - 2.5) \times 10^{-2}}{(3.6 - 0.5) \times 10^{-1}} \\ &= \frac{6.1 \times 10^{-2}}{3.1 \times 10^{-1}} \quad \sqrt{2} \text{ marks} \end{aligned}$$

$$= 0.1968 \text{ m/s}^2$$

(viii) Gradient = $R/4\pi^2$

$$R = \text{gradient} \times 4\pi^2$$

$$= 0.1968 \times 4 \times 3.142 \times 3.142 \quad \sqrt{1} \text{ mark}$$

$$= 7.771$$

(b) (ii) table

Object	distance	X(cm)
1	10.1	$\sqrt{1}$ mark
2	9.9	$\sqrt{1}$ mark

(iii) Average value of X

$$= \frac{10.1 + 9.9}{2} = 10.0 \text{ cm} \pm 0.1 \text{ cm} \quad \sqrt{1} \text{ mark}$$

(iv) Physical significance of X=10.0cm is the focal length of the lens used $\sqrt{1}$ mark