

1. (i)  $d=0.00035M$  (5 d.p)  $\frac{1}{2}$  mk

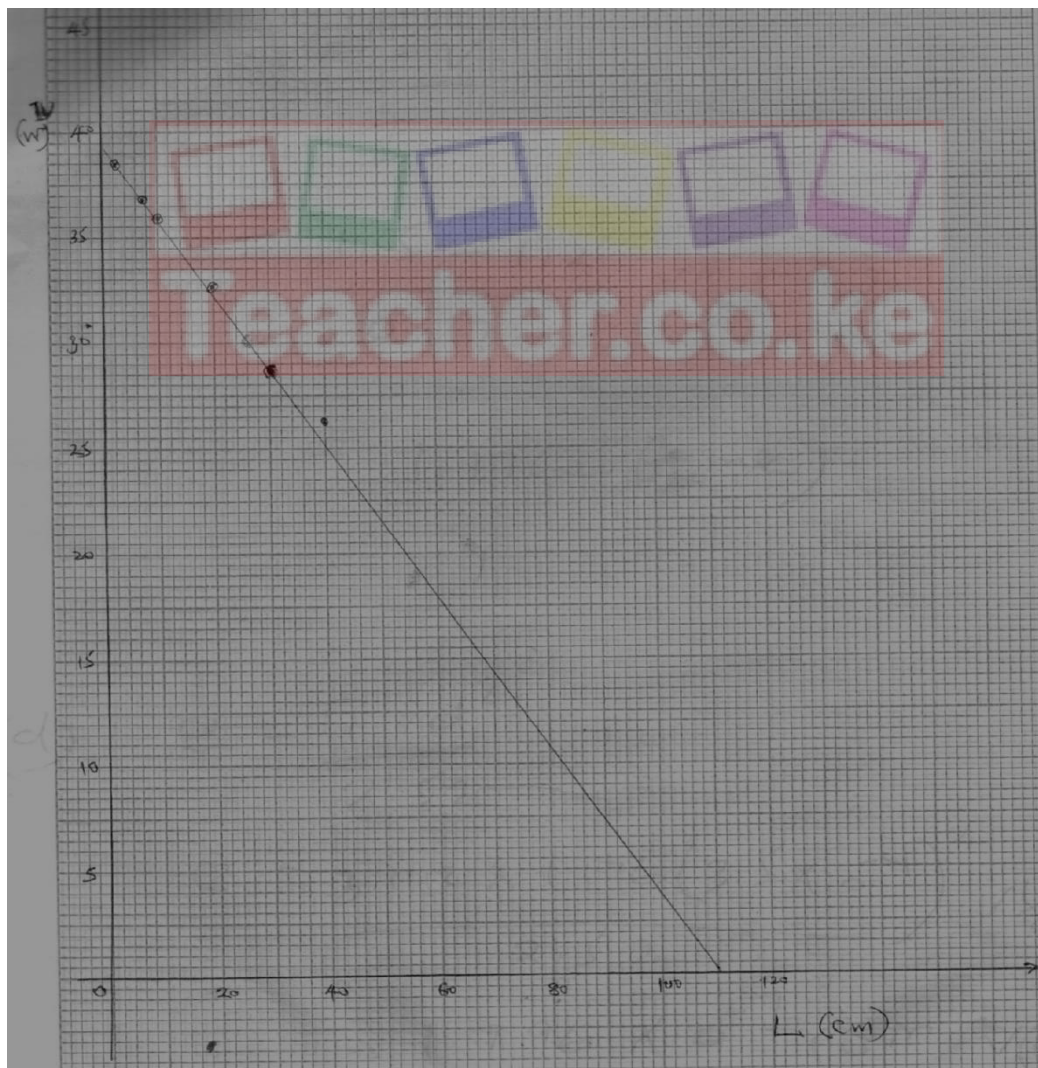
(ii)  $E=1.5 \pm 0.1$  V (1 dp) ( $\frac{1}{2}$  mk)

Tables 1-5mks

L(cm)	2.5	7.5	10.0	20.	30.	40.0
Pd(V)	0.70	0.80	0.90	1.05	1.15	1.20
I(A)	0.55	0.46	0.40	0.31	0.25	0.22
IV (watts)	0.3850	0.3680	0.3600	0.3255	0.2875	0.264
$X10^{-2}$	38.50	36.80	36.00	32.55	28.75	26.40

(a)(iii)  $L_0=110$ cm (students horizontal axis intercept correctly read) 1mk

(b)(ii)



©(i)  $V=1.30V \sqrt{(\frac{1}{2} \text{ mk})}$   
 $I=0.17A \sqrt{(\frac{1}{2} \text{ mk})}$   
 $r = \frac{E-V}{I}$   
 $= \frac{1.5-1.3}{0.17} \sqrt{(\frac{1}{2} \text{ mk})}$   
 $=1.17\Omega \sqrt{(\frac{1}{2} \text{ mk})}$

(d)  $e= \frac{\pi r d^2}{2.52}$

$E= \frac{3.142 \times 1.176 (3.5 \times 10^{-4})^2}{2.52} \sqrt{(\frac{1}{2} \text{ mk})}$

$=1.796 \times 10^{-7} \Omega \text{m} \sqrt{(1 \text{mk})}$

(f)  $b= (6.00 \text{cm})$  or candidates value

Table 2

$l^\circ$	10	20	30	40
Y(cm)	4.3	4.2	4.0	3.9

(g) (i)  $Y \text{ average} = \frac{4.3 + 4.2 + 4.0 + 3.9}{4}$

$=4.1 \text{cm} \sqrt{(\frac{1}{2} \text{ mk})}$

(ii)  $K = \frac{b}{y} = \frac{6.00}{4.1} = 1.463$

2. Part A

(a)  $t=7.60 \text{cm} \sqrt{\frac{1}{2} \text{ mk}}$   
 $W=2.43 \text{cm} \sqrt{\frac{1}{2} \text{ mk}}$

(b) (i)  $T=1.31 \text{cm} \sqrt{1 \text{mk}}$   
(ii)  $IWT=7.60 \times 2.43 \times 1.31$   
 $=24.19 \text{cm}^3 \sqrt{1 \text{mk}}$

©(i)  $X = 43.0 \text{cm} \sqrt{\frac{1}{2} \text{ mk}}$   $y=35.0 \text{cm} \sqrt{\frac{1}{2} \text{ mk}}$

(ii)  $m = 50x/y$   
 $= \frac{50 \times 43}{35} = 61.43 \text{g} \sqrt{1 \text{mk}}$

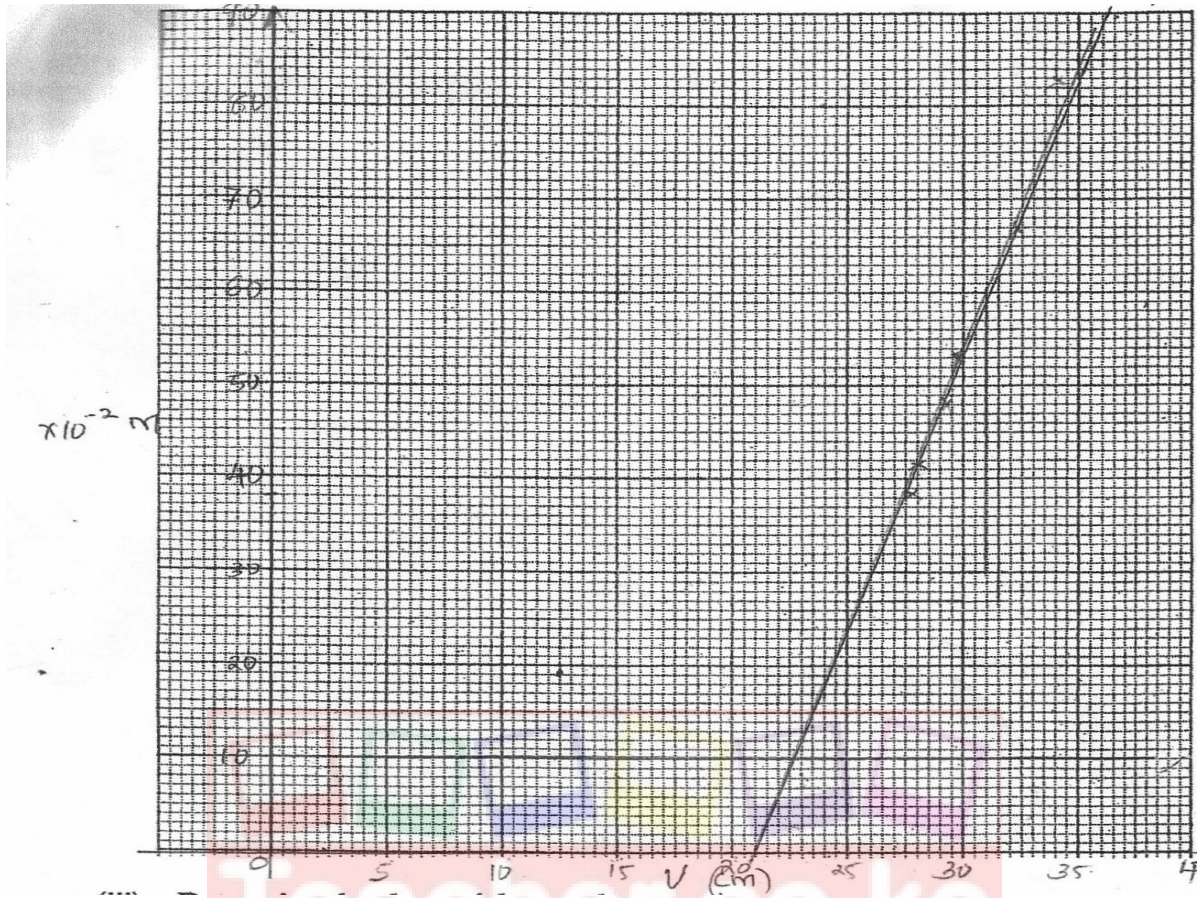
(iii)  $\text{density} = \frac{61.43}{24.19}$

$=2.54 \text{g/cm}^3 \sqrt{1 \text{mk}}$

(b)

L(cm)	100	95	90	85	80	75
U(cm)	72.3	67.0	60.8	55.4	47.7	41.0
V(cm)	27.7	28.0	29.2	29.6	32.3	34.0
$m = \frac{v}{u}$	0.3831	0.4179	0.4802	0.5343	0.6771	0.8293
$X10^{-2}$	38.31	41.79	48.02	53.43	67.71	82.93

(ii) Plot the graph of  $m$  against  $v$



(iii) Determine the slope of the graph (3mks)

$$\text{slope} = \frac{\Delta M}{\Delta V(\text{cm})}$$

$$\frac{30 \times 10^{-2}}{5}$$

0.06/cm√ (with units)

Accuracy = 0.05-0.06

(iv) Given that  $\frac{v}{f} - 1$

$$m = \frac{v}{f} - 1$$

$$\frac{I}{f} = \text{slope} \sqrt{1}$$

$$f = \frac{1}{\text{slope}}$$

$$f = \frac{1}{0.06}$$

$$= 16.67 \text{ cm} \sqrt{}$$