

232/3
PHYSICS
PAPER 3
MARKING SCHEME

- a) $v=45.0\text{cm}^3$ ✓
 b) $I=\frac{10^6 \times 0.30}{45 \times 10^{-6}}$ ✓ = $0.006667 \times 10^{12} = 6.667 \times 10^9 \text{kg/m}^3$
 d)

Length L(cm)	70	60	50	40	30	20
Length L(m)	0.70	0.60	0.50	0.40	0.30	0.20
Time for 20 oscillation $\pm 2s$	61.01	56.08	51.36	46.06	39.81	32.80
Period T (s)	3.051	2.804	2.568	2.303	1.991	1.640
$T^2(\text{s}^2)$	9.309	7.862	6.595	5.304	3.960	2.690

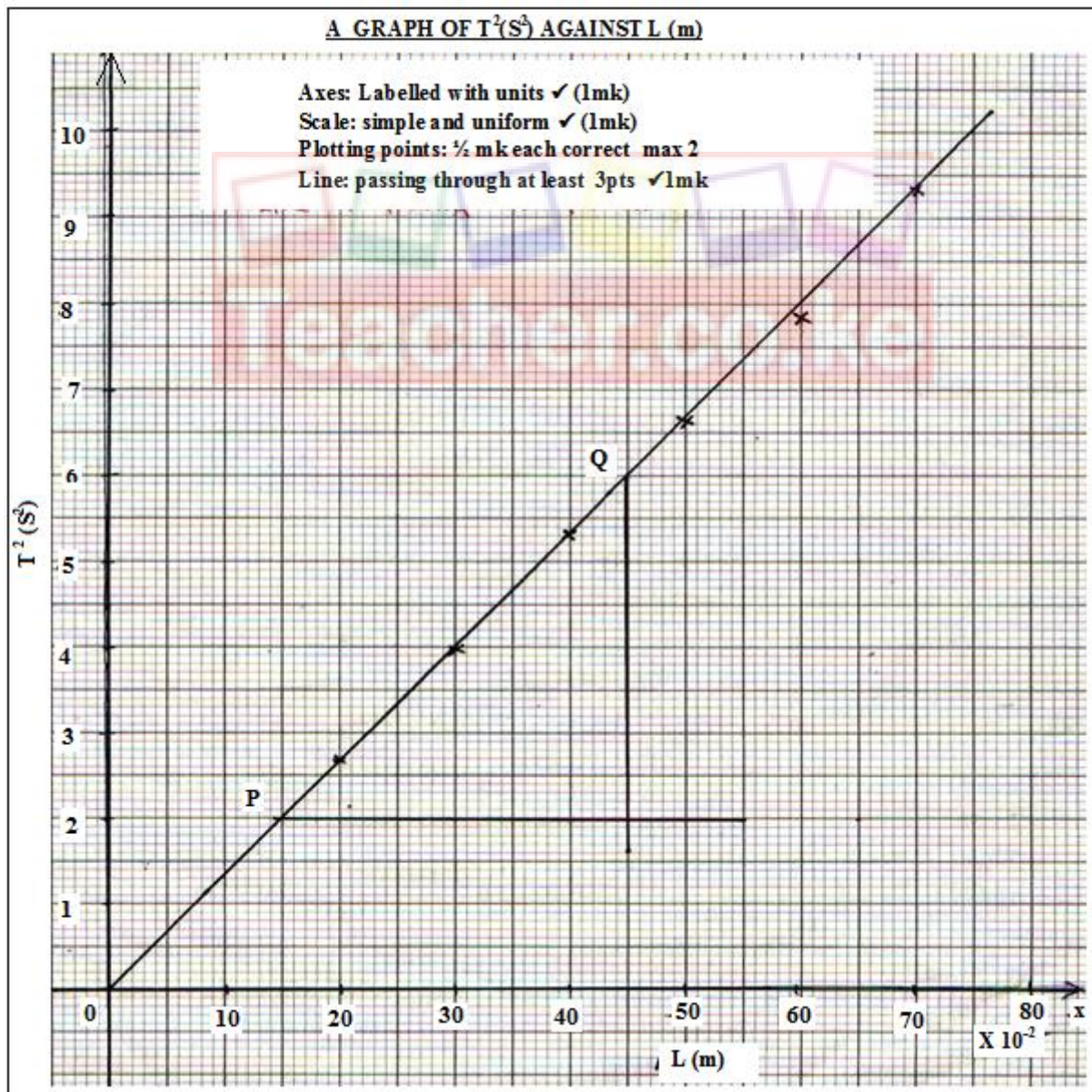
Correct conversion or length L in m ✓(1mk)

Time for 20 oscillation ($1/2$ mark for each value with range maximum 3mks)

Correct evaluation for period ✓(1mk)

Correct evaluation T^2 ✓(1mk)

- e) Graph



- g) i) $d = 0.32 \times 10^{-3} = 3.2 \times 10^{-4}$ ✓

ii) Slope = $\frac{6-2}{(45-15)10^{-2}} \checkmark = \frac{4}{3} \times 10^2 = 133s^2/m \checkmark$

iii) $T^2 = \frac{32\pi^2 l}{Gd} = y = mx + c$

Slope = $\frac{32\pi^2}{Gd} \checkmark = G = \frac{32\pi^2}{Slope \times d} \checkmark = \frac{32 \times (3.142)^2}{133 \times 3.2 \times 10^{-4}} = \frac{315.909}{0.04256} = 7,424.577s^2$

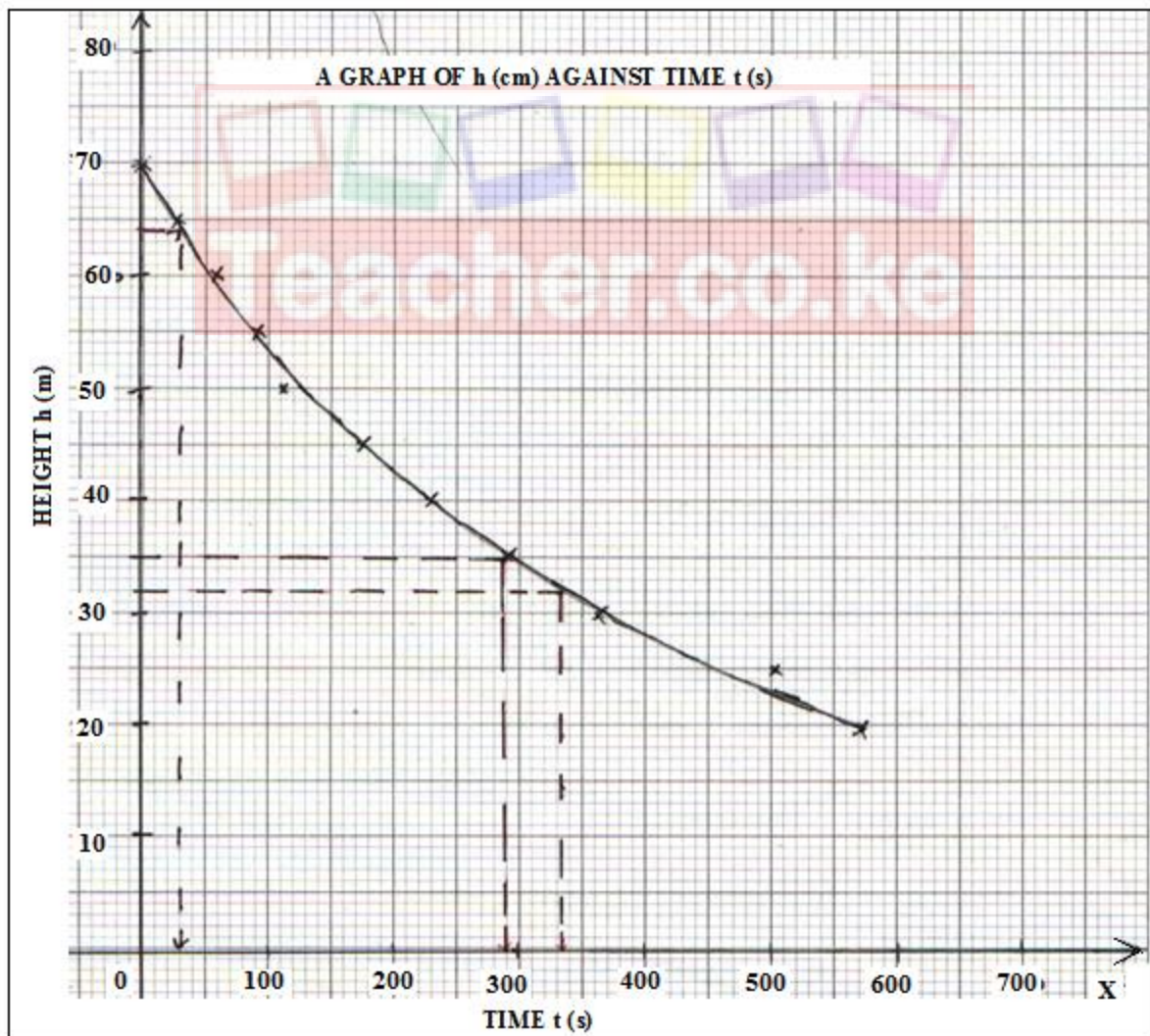
b)

H cm	Trial 1	Trial 2	Trial 3	Mean time t(s)
70	0	0	0	0
65	30	27	28	28.33
60	61	56	57	58.00
55	105	87	86	92.67
50	151	122	124	112.33
45	207	163	168	179.33
40	274	206	212	230.67
35	344	256	272	290.67
30	434	327	338	366.33
25	452	406	413	453.67
20	592	506	527	575.67

Trial =1 mark each max 3

Mean time=1 mark for any current value max (3mks)

c)



d) $h=64\text{sec}; t=30.0\text{s}\sqrt{1/2}$

$$h=32; t=335.0\text{s}\sqrt{1/2}$$

$$\text{Time taken}=(335 - 30)\text{s} = 305\text{s}\checkmark$$

 e) From the graph when $h=35\text{cm}; t=290\text{s}$

f) $v = \pi r^2 h$

$$= 3.142 \times \left(\frac{3.18}{2}\right)^2 \times 3.22 \checkmark = 25.577\text{cm}^3 \checkmark$$

 g) i) $y=88\text{mm}$

$$\begin{aligned} \text{ii) } \frac{Y}{X} &= \frac{wx}{wy} = Wx = \frac{yx(wy)}{x} \\ &= \frac{88\text{mm} \times 2\text{N}}{100\text{mm}} \checkmark \\ &= 1.76\text{N} \checkmark \end{aligned}$$

up thrust = real weight-apparent weight

$$U = Wy - Wx$$

$$= 2.0 - 1.76$$

$$= 0.24\text{N} \checkmark$$

PART FOUR

a) $v=(3.0 \pm 0.2V = 0A)$

b)

Length cm	70	50	40	30	20	10
p.d v (v)	2.4	2.3	2.2	2.1	2.0	1.8
Current I	0.18	0.21	0.25	0.29	0.32	0.38

 @^{1/2}

c) graph

d) From the graph

i. e.m.f of one cell

 intercept=e.m.f of two cells in series \checkmark

$$= 2.96\text{V}$$

$$\text{e.m.f of one cell} = \frac{2.96}{2} = 1.48\text{V} \checkmark$$

ii. Internal resistance of one cell

$$E = V + Ir = V - rI + E = \text{gradient} = -r$$

$$\text{gradient} = \frac{\Delta V}{\Delta I} = \frac{2.5 - 0.8}{0.15 - 0.7} \checkmark$$

$$\text{i. } = \frac{1.7}{-0.55} = -3.09\Omega$$

$$\text{internal resistance of one cell } \frac{-3.09\Omega}{2} = -r \checkmark = r = 1.55\Omega \checkmark$$

 iii. When $I=0.5\text{A}$ from the graph p.d= $1.42\text{V} \checkmark$

 iv. When p.d= 1.0V from graph $I=0.62\text{A} \checkmark$

