

PHYSICS 232/3
MARKING SCHEME

Question 1

PART A

- (b) $X_1 = 2.5 \pm 0.1$ cm (1mrk)
 (c) $X_2 = 3.9 \pm 0.1$ cm (1mrk)

(e)

Distance of marble in air, X_1 (cm)	15	17	19	21	23	24.5	
Distance of 20g metal mass, X_1 (cm)	2.5	2.8	3.2	3.4	3.8	4.0	± 0.1 1d.p
Distance of 20g metal mass, X_2 (cm) when marble is in water.	3.9	4.6	5.0	5.5	6.1	6.4	± 0.1 1d.p
$X_1 - X_2$ (cm)	1.4	1.8	1.8	2.1	2.3	2.4	1 d.p

NB: $-x_1$: each value $\sqrt{1/2}$ for maximum 4 values
 $-x_2$: “ “ “ $\sqrt{1/2}$ ” “ “ “ “ (5mrks)
 - ($x_1 - x_2$): award 1mrk for all values correct.

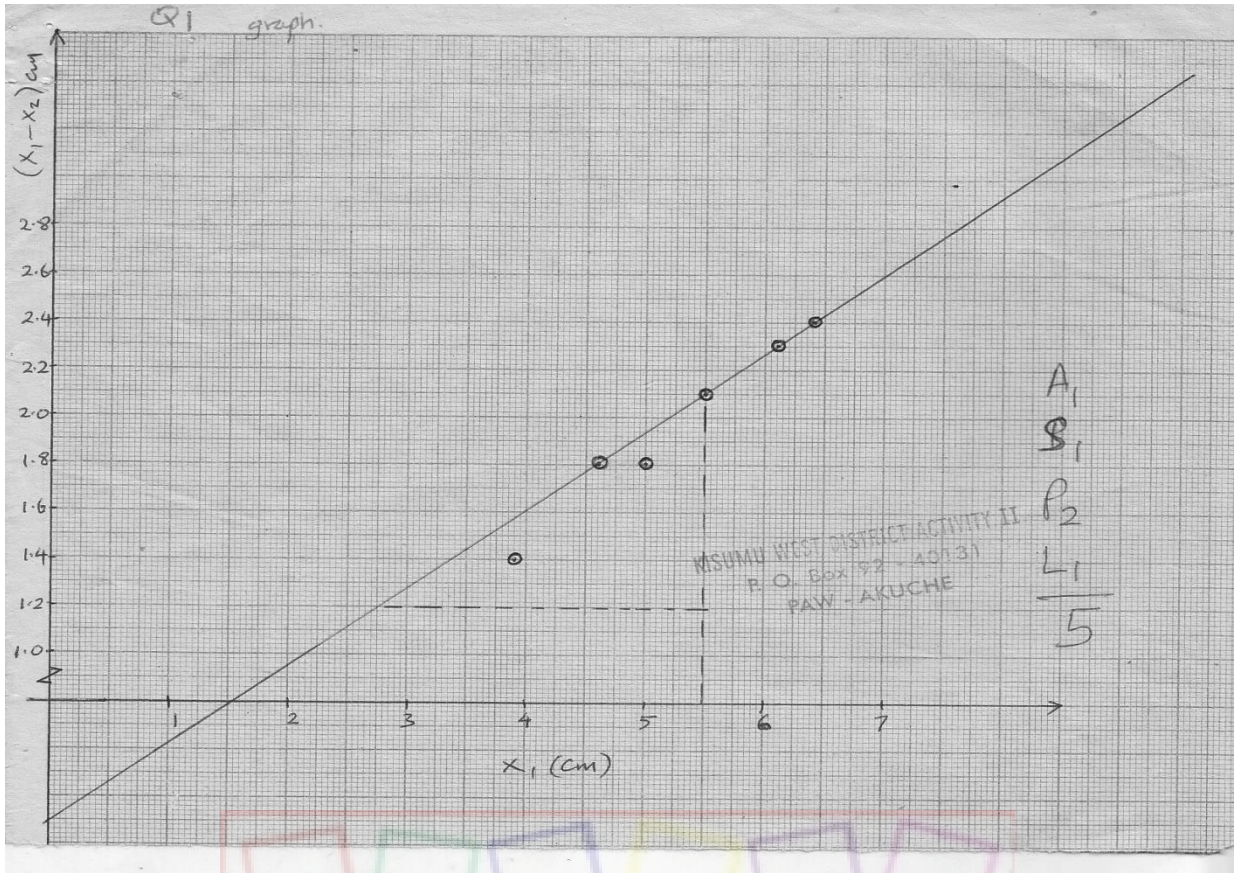
(f) graph attached overleaf.

(g) slope $S = \frac{2.1 - 0.48}{5.5 - 0}$ correct interval $\sqrt{1}$
 $= \frac{1.62}{5.5}$ correct evaluation $\sqrt{1}$
 $= 0.2945$ Accuracy $\sqrt{1}$ (3mrks)

PART B

- (h) $D_1 = 1.56$ cm $\sqrt{1/2}$
 $D_2 = 1.56$ cm $\sqrt{1/2}$
 $D = \frac{1.56 + 1.56}{2}$
 $= 1.56$ cm $\sqrt{1}$ (2mks)

Graph 1



(i)

$$\begin{aligned} \text{Volume} &= \frac{4}{3} \pi \left(\frac{D}{2}\right)^3 && \text{correct formula } \sqrt{1} \\ &= \frac{4}{3} \times \frac{22}{7} \times \left(\frac{1.56}{200}\right)^3 && \text{correct substitution } \sqrt{1} \\ &= 1.9886 \times 10^{-6} \text{ m}^3 && \text{correct evaluation } \sqrt{1} \end{aligned}$$

Question 2

Part 2

- (a) correct lines MN, M'N' and OT on the plain paper $\sqrt{1}$
- (b) correct positions of P₃, P₄ and line OP₃ P₄ $\sqrt{1}$
- (c) correct angle $\alpha = 2 \times 25 = 50 \pm 2$ $\sqrt{1}$

PART B

- (d) Angle $\theta_2 = 10 \pm 1$ $\sqrt{1}$

(e) (i)

θ_1^0	10	20	30	40	45	55	
θ_2^0	10	20	30	40	45	55	± 1
$\cos \theta_1$	0.985	0.940	0.866	0.766	0.707	0.574	3d.p
$\cos \theta_2$							3d.p

NB: - θ_2 : each value $\sqrt{1/2}$ for six values
 - $\cos \theta_1$: award 1 mark for all values correct
 - $\cos \theta_2$ " " " " " "

(ii) graph attached overleaf

(iii) slope, $S = \frac{\Delta \cos \theta_2}{\Delta \cos \theta_1} = \frac{(11 - 6) \times 10^{-1}}{(11 - 6) \times 10^{-1}} = \frac{5}{5} = 1$

(iv) $27 = \frac{\theta}{s}$, $27(s) = \theta$, $\theta = 27 \times 1 = 27 \pm 1$

(f) Law of reflection of light ; The angle of incidence equals
The angle of reflection

Graph 2

