SAMIA SUB- COUNTY FORM FOUR JOINT EXAMINATION - 2021
PHYSICS PAPER 1
MARKING SCHEME

1. a) -0.02cm ✓1

   b) 2.13 + 0.02 = 2.15 ✓1

2. mass displaced = (20 x 0.6)

   = 12g ✓1

   Density = $\frac{mass}{volume}$

   = $\frac{12}{60}$ ✓1

   = 0.2g/cm^3 ✓1

3. – Surface tension ✓1

   - Weight of the drop ✓1

4. Clockwise moments = anti-clockwise moment ✓1

   W x 1.6 = T x 0.4

   40 x 1.6 = 0.4T ✓1

   T = $\frac{40 \times 1.6}{0.4}$

   = 160N ✓1

5. A loses heat through evaporation because of the large surface area. B because dull surface is a good emitter of heat. (2 marks)

6. 1 rev = $2\pi^0$

   43 rev = 43 x $2\pi^0$

   = 86 π^0

   ώ = 270.212 c/s ✓1

   V = rw ✓1

   = $\frac{10}{100}$ x 270.212 m/s = 27.0212 m/s ✓1

7. a) A collision in which objects combine / fuse, losing kinetic energy in the process ✓1

   b) Final momentum = initial momentum

   (0.5 + 1.5)V = (0.5 x 1.2) + (1.5 x 0.2) ✓1

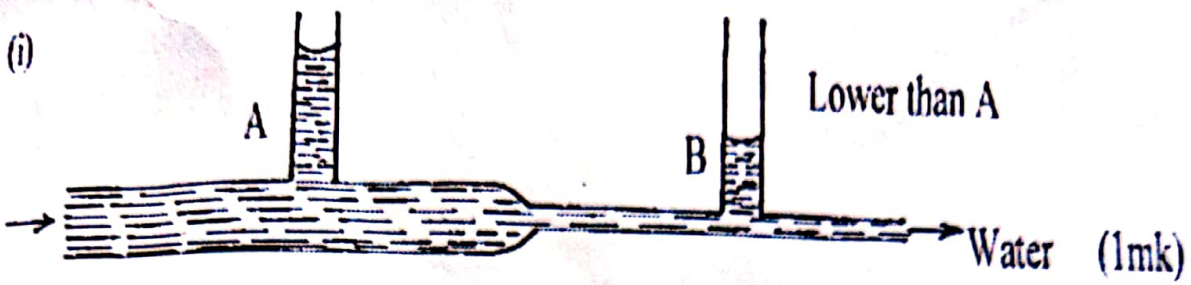
   2.0V = 0.6 + 0.3

   2.0V = 0.9

   V = 0.45m/s ✓1

8.

(i)



(1mk)

ii) $V_B A_B = V_A A_A$

$V_B \times 2 \times 10^{-4} = 0.6 \times 8 \times 10^{-4}$

$$V_B = \frac{0.6 \times 8 \times 10^{-4}}{2 \times 10^{-4}}$$

$= 2.4 ms^{-1}$

9. $$\text{Power} = \frac{work\ done}{time\ taken}$$

$$= \frac{force \times distance\ moved}{Time\ taken} \checkmark^1$$

$$= \frac{mg \times d}{t}$$

$$= \frac{(60 \times 10 \times 25)W}{30} \checkmark^1$$

$= 500W \checkmark^1$

SECTION B

10 (i) Effort distance = V.R × Ld.
= 6 × 1.5 ✓
= 9m ✓

(ii) Workdone by effort = Effort × Effort distance
= 500N × 9m ✓
= 4500J ✓

(iii) useful workdone = Load × load distance
= 2800 × 1.5 ✓
= 4200J ✓

(iv) M.A = $\frac{L}{E} = \frac{2800}{500}$ ✓ = 5.6 ✓

(v) Eff = $\frac{M.A}{V.R} \times 100$ ✓
= $\frac{5.6}{6} \times 100$ ✓
= 93.33% ✓

(vi) Friction between the moving parts of the machine.

11 (i) $H = \frac{1}{2} g t^2$ ✓

$20 = \frac{1}{2} \times 10 \times t^2$ ✓

t = 2.0 sec. ✓

(ii) $R = ut$
$= 20 \times 2$ ✓
$= 40m$ ✓

(iii) $V = u + at$ ✓
$= 0 + 10(2)$
$= 20 m/s$ ✓

(iv) $\frac{F_1}{A_1} = \frac{F_2}{A_2}$ ✓
$F_1 = \frac{25000 \times 50}{2500}$ ✓
$= 500N$ ✓

(v) Pressure due to water $= hpg$
$= h \times 1000 \times 10$
Pressure exerted $= \frac{F}{A} = \frac{25000}{0.25} = 100,000 N/m^2$ ✓

$hpg = 100000$
$10000h = 100000$
$h = 10m$ ✓

12(a) Quantity of heat required to change a mass of a substance from solid state to liquid state without change in temperature.

(b)(i) Heat absorbed by ice $= ml_f$ ✓
$= 0.02 \times 334000$
$= 6685 J$ ✓

(ii) $Q = mc\theta$

$= 0.02 \times 4200 T$ ✓

$= 84T$ Joules ✓

(iii) Heat lost $= M_{ww} c\theta + m_{cc} c\theta$

$= 0.2 \times 4200 (60 - T) + 0.08 \times 900 (60 - T)$ ✓

$= 50400 - 840T + 4320 - 72T$

$= 54720 - 912T$ ✓

(iv) Heat lost = Heat gained. ✓

$54720 - 912T = 84T$ ✓

$996T = 54720$

$T = 54.94^{\circ}$

$\approx 55^{\circ}C$ ✓

13 (a)

Mass of block (g)	Normal Reaction, R	Spring balance reading
	1.569	
160	~~1.569~~	0.9
250	2.452	1.8
390	3.825	2.7
490	4.805	3.7
600	5.884	4.6
640	6.276	5.0

3 mks for all
2 mk for 4-5
1 mk for 3

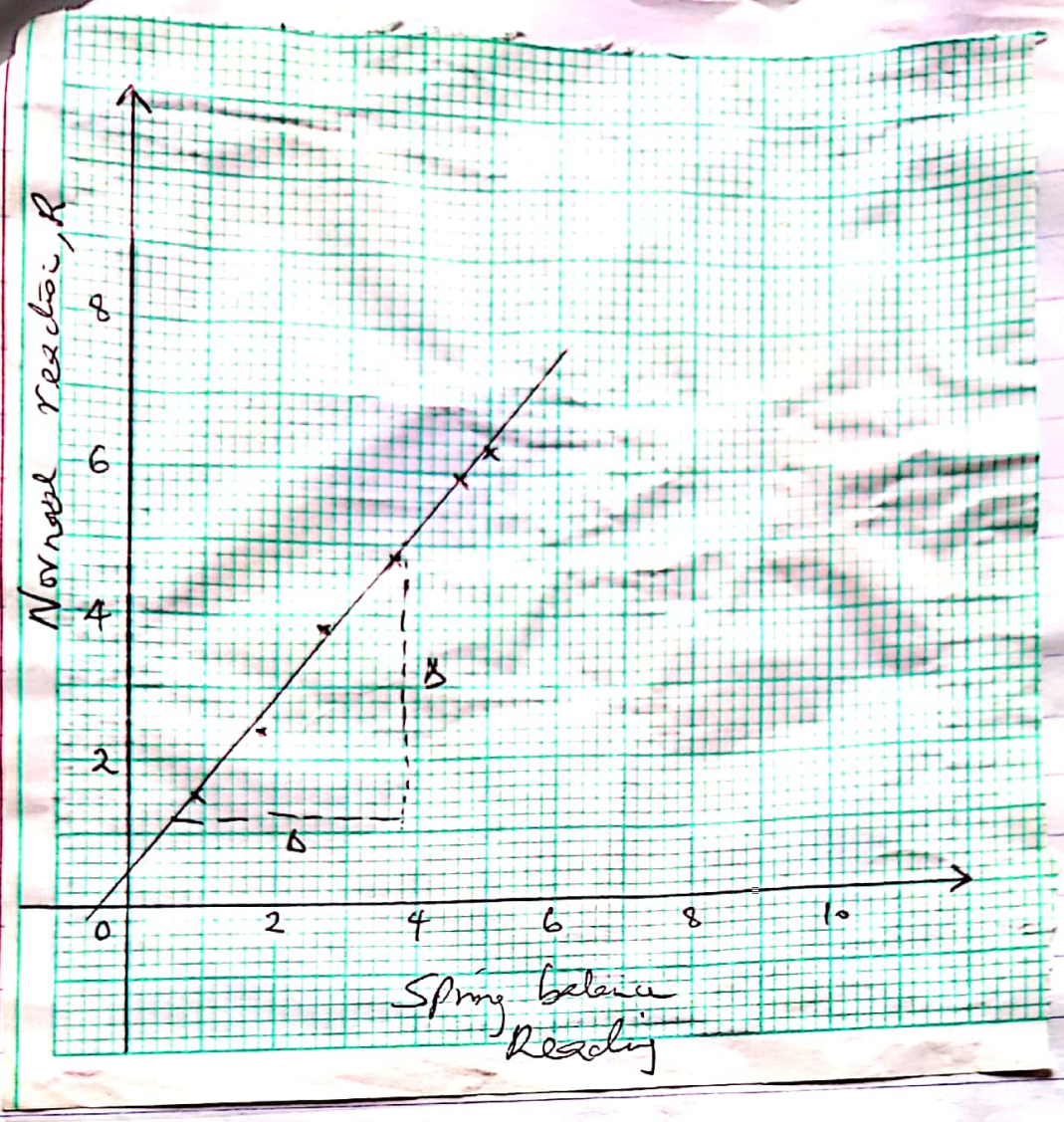
(b) Graph.

(c) Gradient $= \frac{\Delta R}{\Delta F} = \frac{5.2 - 1.8}{4.0 - 1.0}$

$= \frac{3.4}{3}$

$= 1.13$

(b)



(c) Gradient $= \frac{\Delta \text{Normal}}{\Delta \text{balance read.}} = \frac{5.0 - 1.2}{3.8 - 0.6}$

$= 1.188$

(d) Coefficient of friction

(e) Static friction

14(a) A floating body displaces its own weight of the fluid in which it floats.

(b) Upthrust in water $= 40 - 30 = 10N$

Upthrust in paraffin $= 40 - 35 = 5N$

$R.D = \frac{\text{Upthrust in liq x}}{\text{Upthrust in Water}} = \frac{5}{10} = 0.5$

(c)(i) Volume of water displaced $= 2.0 \times 10 = 20\,cm^3$ ✓
Mass of water displaced $= 20 \times 1\,g/cm^3 = 20g$ ✓
Mass of lead shots $= 20g - 10g = 10g$ ✓ or $0.01kg$

(ii) Mass of test tube and Content $= 20 \times 1.25 = 25g$ ✓
Mass to be added $= 25g - 20g = 5g$ ✓