

FORM FOUR CLUSTER KCSE MODEL 2

PHYSICS PAPER 1 ANSWER

SECTION A (25 Marks)

1. Upthrust force in Glycerine is higher than upthrust force in water. (1mk)
2. The metal A has higher expansivity than metal B. On increase in temperature the strip curves more hence pointer deflection. (2mks)
3. - Reducing the base area. -Increasing the weight of solids. (2mks)
4.
 - (a)
$$E = Ke^2$$
$$= 8 \times 0.25 \times 0.25$$
$$= 0.5 J$$
 - (b)
$$E = \frac{1}{2} MV^2$$
$$0.5 = \frac{1}{2} \times 0.05 \times V^2$$
$$20 = V^2$$
5. This increase the base area of the person to retain c.o.g within area in case of sliding. (2mks)
6.
 - Upthrust.
 - Density of air.
 - Size of objects.
7. (a) - It solidifies before attaining zero kelvin.
 - Its volume is by molecules and intermolecular distance.
- (b)
$$P_1 V_1 = P_2 V_2$$
$$750 \times 240 = 510 \times V^2$$
$$V^2 = 259.94 \text{ mm}$$
8. For a system in equilibrium sum of clockwise moment at a point is equal to sum of anticlockwise about the same point.
9. Shiny surface is poor emitter of heat hence more heat is retained in the kettle.
10. Volume of water removed= $50 \times 0.04 = 2.0 \text{ cm}^3$ New reading = $(25 + 2) = 27 \text{ cm}^3$
11.
$$h_w p_w g = h_o p_o g$$
$$10 \times 1 = h_o \times 0.6$$
$$h_o = \frac{10}{0.6} = 16.667 \text{ cm}$$
12. Blowing wind increases the difference in velocity of air above and below. This causes greater difference in pressure hence higher upthrust force.
13. - Reducing the speed of rotation of the mass in m.
 - Increasing the radius of the circular path.

SECTION B (55 Marks)

14. (a) It is the product of force and the distance moved in the direction of that force.

$$(i) \quad V.R = \frac{1}{\sin \theta} \quad (2\text{mks})$$

$$\frac{1}{\sin 30} = 2$$

$$(ii) \quad \eta = \frac{M.A}{V.R} \quad (2\text{mks})$$

$$\frac{75}{100} \times 2 = M.A$$

$$= 1.5$$

$$(iii) \quad M.A = \frac{L}{E} \quad (2\text{mks})$$

$$1.5 = \frac{100}{E} \quad E = 666.67 \text{ N}$$

$$(iv) \quad \frac{w_0}{w_I} = 0.75 \quad (3\text{mks})$$

$$\frac{2 \times 1000}{0.75} = W.I$$

$$= W.I = 2666.67 \text{ J}$$

15. (a) In solids the molecules vibrate in their fixed position while in liquids the molecules are able to move about.

$$(i) \quad \text{Determine vol of drop.}$$

$$1 \text{ drop} = \frac{0.1}{150} = 2.0 \times 10^{-3}$$

$$(ii) \quad \text{Volume of drop} = \text{vol of patch}$$

$$2.0 \times 10^{-3} = 154 \times t$$

$$t = 1.2987 \times 10^{-5} \text{ cm}$$

(iii) The patch is assumed to be Mondeyer.

(iv) The patch formed will be larger. The k.e of oil molecules has increased hence larger intermolecular space.

(v) Determining the extend of oil spillage in an ocean.

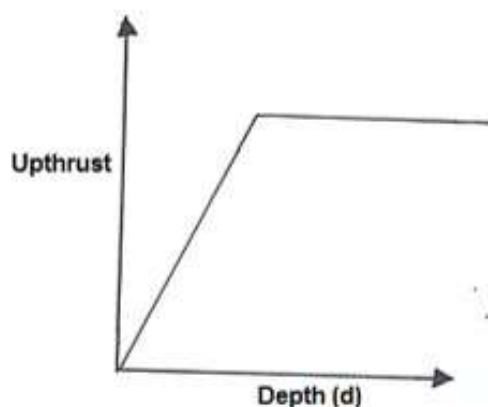
16. (a) -A floating body displaces its own weight of the fluid in which it floats.

(b) (i) To enable the hydrometers float upright.

(ii) To make the hydrometer sensitive/increase the accuracy.

(iii) Increases in temperature leads to decreases in density hence the hydrometer sinks deeper.

- (i) $u = vpg$
 $0.5 = v \times 800 \times 10$
 $v = 6.25 \times 10^{-5} m$
- (ii) Upthrust = weight of liquid disp.
 Weight = mg
 $m = \frac{0.5}{10} = 0.05 kg$
- (iii)



17. (a) The quantity of heat required to raise the temperature of a given mass of substances by $10\text{ }^{\circ}\text{C}$.

- (b) (i) $H = ML f$
 $= 0.03 \times 33400$
 $= 1002 J$
- (ii) $M_i L_f + M_i C_w(T - O) = 0.4 \times 4200 \times (18 - T)$

$$1002 + 0.03 \times 4200(T - O) = 30240 - 1680T$$

$$1002 + 126T = 30240 - 1680T$$

$$1806T = 29238.$$

$$T = 16.189^{\circ}\text{C}$$

(iii) No heat absorbed by the apparatus.

(c) (i) The fixed temperature at which heat absorbed is used to convert a liquid into a gas.

(ii) -Lowering the pressure.

-Removing impurities.

18. (a) For a helical spring or any other elastic material the extension is directly proportional to stretching force provided the elastic limit is not exceeded.

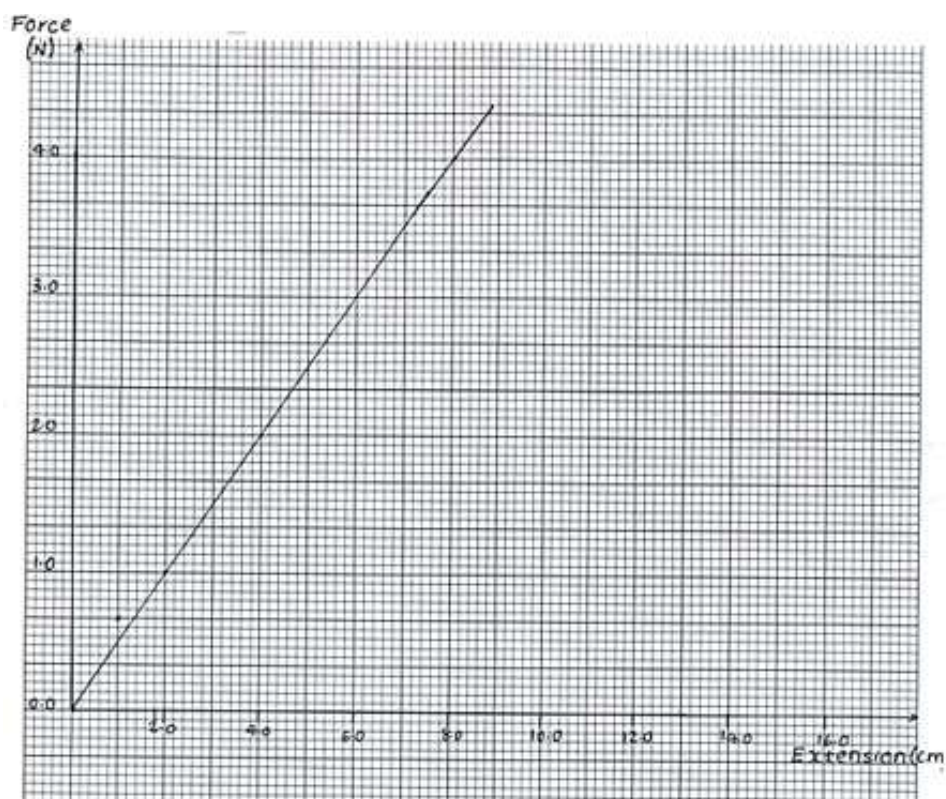
c) Figure shows the motion of a train over a section of track which includes a sharp bend.

$$\textcircled{i} \quad K = \frac{\Delta F}{\Delta e}$$

$$= \frac{4 - 0}{16 - 0} \quad K = 0.25 \text{ N/cm}$$

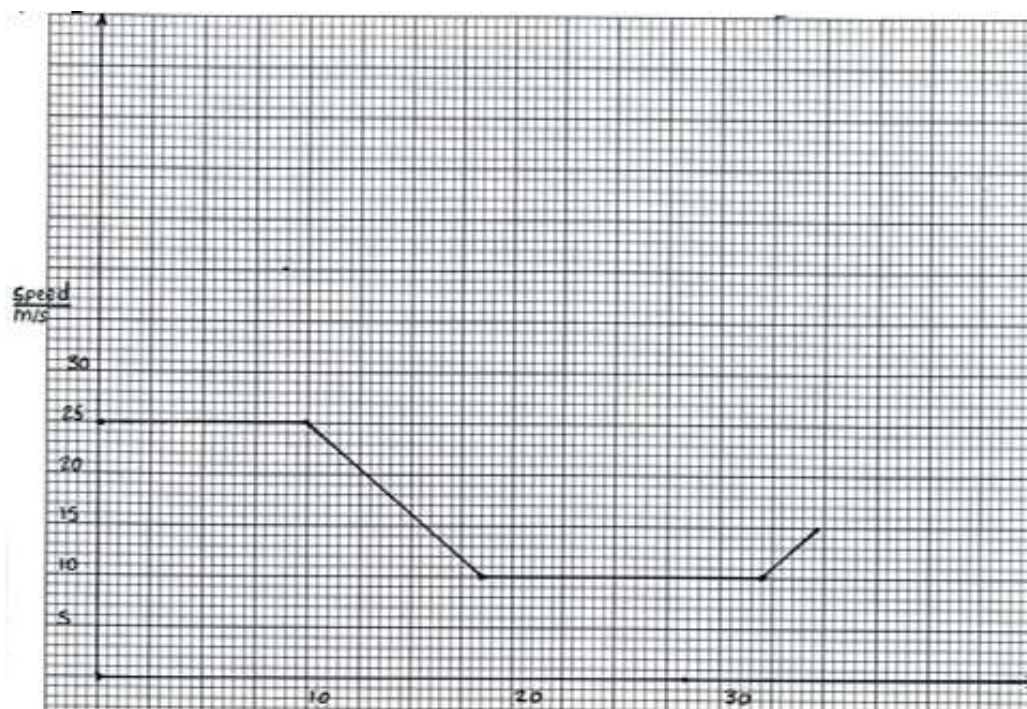
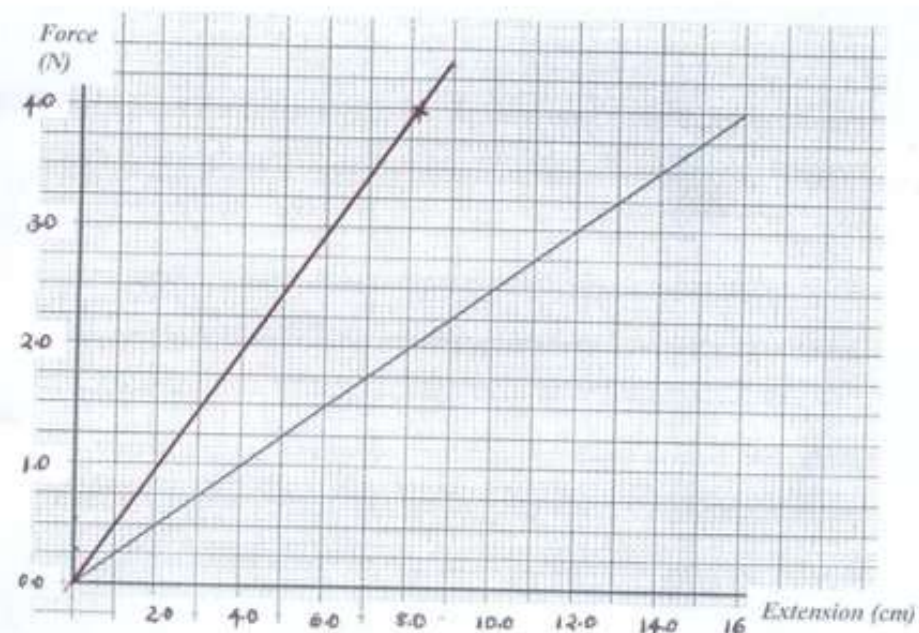
$$\textcircled{ii} \quad K_r = K_1 + K_2$$

$$= 0.25 + 0.25 = 0.5 \text{ N/cm}$$



c) Figure shows the motion of a train over a section of track which includes a sharp bend.

(iii)



a) The section of the track with the sharp bend has a maximum speed restriction. The train decelerates approaching the bend so that at the start of the bend it has just reached the maximum speed allowed. The train is driven around the bend at the maximum speed allowed and accelerates immediately on leaving the bend. Calculate the length of the bend.

Distance = Area under the curve

$$= 10 \times (32 - 18)$$

$$= 10 \times 14$$

$$= 140 \text{ m}$$

b) To slow down to go round the bend. Calculate the deceleration.

$$\begin{aligned} a &= \frac{v-u}{t} \\ &= \frac{10-15}{18-10} \\ &= -0.625 \text{ m / s } (0.625 \text{ m / s}) \end{aligned}$$