

FORM FOUR CLUSTER KCSE MODEL9

PHYSICS PAPER 1 ANSWERS

SECTION A (25 Marks)

Answer ALL questions

1.

i. $\frac{1\text{cm}}{10} = 0.1\text{cm};$

ii. $100 - 96.4 = 3.6\text{cm};$ **OR**
 $0.1 \times 36 = 3.6\text{cm}$

2. Weight of movable parts;

3. Moves on a straight line with uniform velocity;

4. a) Volume – decreases;

b) Density – increases;

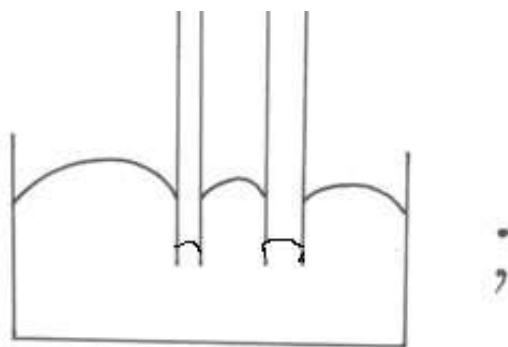
c) Mass – no change/constant;

5. $F_1 \times d_1 = F_2 d_2;$

$F_1 \times 1 = 8 \times 5;$

$F_1 = 40\text{N};$

6.



7. $\theta = MC\Delta T$

$M /_P C_P = M /_W C_W \Delta T_W$

$C_P \Delta T_P = C_W \Delta T_W;$

if $C_W > C_P$ then

$\Delta T_P > \Delta T_W;$

8.

$$V_1 A_1 = V_2 A_2 ;$$

$$\cancel{A} \times \left(\frac{9}{1000} \right)^2 \times 3 = \cancel{A} \left(\frac{5}{1000} \right)^2 \times V^2 ;$$

$$81 \times 3 = 25 V^2$$

$$V^2 = \frac{243}{25}$$

$$= 9.72 \text{ m/s} ;$$

9. Increases area of contact;

Hence increasing pressure; acting on ice hence lowering melting point of ice.

10. *93cm corresponds to 100° C*

? cm corresponds to 18° C

$$\frac{93 \times 18}{100} ;$$

$$= 16.74^\circ \text{C}$$

Thermometer reads 16.74 + 2;

$$= 18.74^\circ \text{C} ;$$

11. Increase in pressure;

Presence of impurities;

12. Double walled encloses a vacuum and the cork are poor conductors of heat hence minimizes heat gain by conduction;

Silvery walls are poor absorbers of heat hence minimizes heat gain through radiation;

13. Weight equal to the upthrust;

SECTION B (55 Marks)

Answer ALL the questions

14. (a) Velocity is displacement per unit time while speed is distance per unit time;

$$(b) \text{ i) } a = \text{slope} ;$$

$$= \frac{40 - 0}{0 - 5} ;$$

$$= -8 \text{ m/s}^2$$

$$\text{ii) } W = Mg$$

$$40 = M \times 10 ; \text{sub}$$

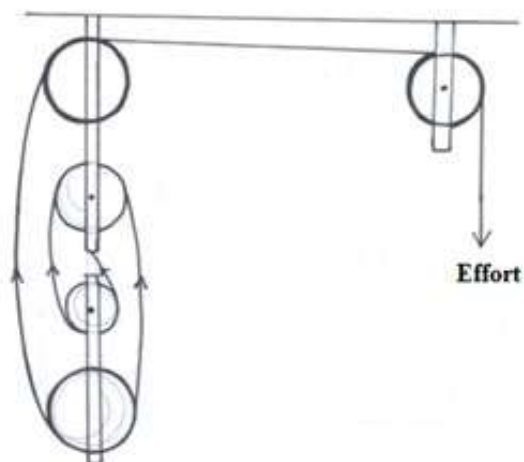
$$M = 8 \text{ kg} ;$$

$$40 = M \times 8$$

$$M = 5 \text{ kg}$$

mass on earth 5 kg

(c) i)



(ii) $VR = 4$;

$$\frac{Ed}{Ld} = VR$$

$$\frac{0.4}{Ld} = 4$$

$$Ld = 0.1M$$

$$Wd = L \times Ld$$

$$= 1000 \times 0.1;$$

$$= 100J;$$

(iii) $\frac{MA}{VR} = 0.75$

$$MA = 0.75 \times 4$$

$$= 3;$$

$$\frac{L}{E} = 3$$

$$\frac{1000}{E} = 3$$

$$E = 333.33N;$$

15. (a) There is continuous change in direction hence velocity changes;

$$\begin{aligned}
 \text{(b) i) } \omega &= \frac{2\pi}{T} \text{ OR } v = \frac{2\pi r}{T} = \frac{2\pi \times 0.5}{1} \\
 &= \frac{2\pi}{1} = \pi \text{ m/s} & = \pi \text{ m/s} \\
 &= 2\pi \text{ rad/s;} \\
 F &= M\omega^2 r & F = \frac{mv^2}{r} \\
 &= 0.04 \times (2\pi)^2 \times 0.5; \\
 &= 0.78877 \text{ N} \\
 T_{\text{max}} &= F + mg \\
 &= 0.78877 + 0.4 \\
 &= 1.18877 \text{ N;}
 \end{aligned}$$

$$\begin{aligned}
 \text{ii) } a_{\text{hor}} &= 301429 \text{ m/s;} \\
 u &= 0 \\
 a &= 10 \\
 s &= 20 \\
 t &= ? \\
 20 &= \frac{1}{2} \times 10 \times t^2 \\
 t &= 2 \text{ s;} \\
 \text{Horizontal distance} &= 3.1429 \times 2 \\
 &= 6.28578 \text{ m}
 \end{aligned}$$

16. (a) Lower atmospheric pressure at higher altitudes; hence there is more fluid pressure in the pen hence pressure difference causes ink to ooze out;

$$\begin{aligned}
 \text{(b) (i) } P &= \frac{F}{A} \\
 &= \frac{120 \text{ N}}{0.006 \text{ m}^2}; \text{Sub} \\
 &= 20,000 \text{ N/m}^2;
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) } 20,000 &= 0.1 \times 1200 \times 10 + \frac{\text{load}}{0.5}; \\
 20,000 &= 1200 + \frac{\text{load}}{0.5} \\
 \text{Load} &= 9,400 \text{ N;}
 \end{aligned}$$

(iii)

-Non corrosive;

-High boiling point;

-Lower melting point;

(c) *Pressure*

$$\text{difference} = 1306 \times 1.25 \times 10$$

$$= 16,325 \text{ Pa};$$

$$0.74 \times 13600 \times 10 - P_{TOP} = 16,325$$

$$P_{TOP} = 84315;$$

$$= 61.996 \text{ cmHg};$$

17. (a) Amount of heat required to completely change the state of a unit mass of a substance from solid to a liquid without change in temperature;

(b) (i) $156 - 145 = 11^\circ\text{C};$

(ii) $\theta = MC\Delta\theta;$

$$0.06 \times 400 \times 28 + 0.085 \times 4200 \times 28;$$

$$= 672 + 9996$$

$$= 10668 \text{ J};$$

(iii) $\theta = ML_v;$

$$0.011 \times 4200 \times 62 + 0.011 L_v = 10,668;$$

$$0.011 L_v = 7,803.6$$

$$L_v = 709418.18 \text{ J / kgs};$$

(iv) Heat losses are neglected.

18. (a) -Pressure of a gas is directly proportional to absolute temperature;

- Mass and volume of the gas is fixed;

b (i) Concentrated sulphuric (iv) acid;

(ii) -Traps dry air

-Dry air

- Pointer for air level/volume

(iii) - Heat water bath and stir well enough. Read the level of dry gas using the acid pointer; Read the corresponding value of temperature in Kelvin; Record those values in a table.

- Repeat the experiment for different corresponding values of temperature (heating more) and height of dry air.

- Plot a graph of pressure against absolute temperature. This is a straight line graph through the origin;

19. (a) Floatation involves a state where up thrust/weight of displaced fluid is equal to the weight of object. For sinking, the weight of object is greater than the up thrust;

(b) (i) $V \text{ of water displaced} = 4 \times 6 = 24 \text{ cm}^3$;

$$\begin{aligned} \text{Mass of displaced water} &= 24 \times 1 \\ &= 24 \text{ g}; \end{aligned}$$

$$\begin{aligned} \text{Weight of object} &= \frac{24}{1000} \times 10 \\ &= 0.24 \text{ N}; \end{aligned}$$

(ii) $\ell = \frac{m}{v}$;

$$0.250 = \frac{24}{v}$$

$$v = 96 \text{ cm}^3$$

$$h = 24 \text{ cm};$$