FORM FOUR CLUSTER KCSE MODEL 6

PHYSICS PAPER 1 ANSWERS

SECTION A (25 Marks)

Answer all questions

1. Water level drops in tube Y and rises in tube X.√

Black surface is better absorber of heat than shiny surface. √

Gas in B expands more than gas in A. √

2.

$A_1V_1 = A_2V_2$ √
$d_1^2V_1 = d_2^2V_2$
$(4.2)^2 \times 48 = (d_2)^2 \times 32$ √
$d_2 = 5.144\,cm$ *Ans*

3. Random motion of particle of matter. √

4.

$p = h\rho g$
$h \times 1.25 = \left(\frac{76-71}{100}\right) \times 13600$ √.
$h = 544m$ √

5. In liquid state, particles are further apart than in solid state.(w.t.e) √

In liquid state forces of attraction between particles are weaker than in solid state. (w.t.e) √

6.

$125 - 50 = 75g$
$110 - 50 = 60g$
$density\ of\ liquid\ L = \frac{60}{75} \times 1 = .8gcm^{-3}$
$Volume\ of\ vessel = 75cm^3$
$Mass\ of\ liquid\ L = \frac{75}{2} \times 0.8 = 30g$ √
$Mass\ of\ water = \frac{75}{2} \times 1 = 37.5g$
$Total\ mass = 50 + 30 + 37.5 = 117.5g$ √

7. Prevents back –flow of mercury (w.t.e) √

8.

$\frac{5}{3} \times 24 = 40N\sqrt{}$ **NB working must be shown.**

9.

$11.0 + 0.38 = 11.38mm$ **NB working must be shown.**

10.

$50 \times 20 = 10cm^3\sqrt{} \qquad 35.5 + 10 = 45.5cm^3\sqrt{}$ (45.5ml)

11. Temperature. √

12. The glass first contracts and the level rises. √The liquid also gets cooled and contracts faster than the glass thus the level falls. √

13. . The balls move towards each other. √Pressure between the balls is reduced and higher pressure the opposite sides pushes them towards each other. √

SECTION B (55 Marks)

Answer all questions

14. . (a) Rate of change of displacement with time. √

(b) (i) $AB: accel. = \frac{30}{20 \times 60} = 0.025ms^{-2}\sqrt{}$

$CD: accel = \frac{-30}{10 \times 60} = -0.05ms^{-2}\sqrt{}$

(ii) Distance $= \frac{1}{2}(100 + 70) \times 60 \times 30 = 153{,}000m\sqrt{}$

(iii) Average velocity $= \frac{153{,}000}{100 \times 60}\sqrt{} = 25.5ms^{-1}\sqrt{}$

(c) $h = \frac{1}{2}gt^2 \quad 1.8 = \frac{1}{2} \times 10^2 \quad t = 0.6s\sqrt{} \quad$ distance $= 15 \times 0.6\sqrt{}$

$= 9m\sqrt{}$

15. . (a)Increases in temperature leads to increases in kinetic energy/movement of particles. √

The particles hit the walls of the container at a faster rate. √

Pressure is caused by particles hitting the walls of the container. √

(b) (i) -Length of air column from the scale. √

-Temperature from the thermometer. √

(ii) -Take several readings of length/volume of air column and temperature. √

-Tabulate the readings. √

-Plot a graph of length/volume against temperature. √

-The graph is a straight line verifying Charles's law. √

(iii) To uniformly heat the dry air. √

(c) $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ √ $\frac{1.5\times10^5\times1.6}{285} = \frac{1.0\times10^5\times V_2}{273}$ √ $V_2 = 2.299m^3$ √

16. . (a) When a body is wholly or partially immersed in a fluid, it experiences an up thrust equal to the weight of the fluid displaced. √

(b) (i) Volume of water displaced $= 30.4\times5 = 152cm^3$ √

Weight of water displaced $= = V\rho g = mg = 0.0152\times10$ √$=1.52$N √

Up thrust $=1.52$ N √

(ii) Weight of cylinder $= 0.342\times10 = 3.42N$ √

Reading on spring balance $= 3.42 - 1.52$ √

$= 1.9N$

(c) (i) anticlockwise moments =clockwise moments at equilibrium√

$F \times 0.4 = 0.2\times0.3$ √

$F = 0.15N$

Up thrust =0.25-015=0.10N√ (allow 0.1 N)

(ii) Volume of liquid displaced =152.5 cm^3

Density of liquid $= 10 \div 12.5$ √$=0.8gcm^{-3}$√ ($800kgm^{-3}$)

17. (a) Keeps changing direction/velocity changing. √

(b) (i) $T = \frac{MV^2}{r} - mg / Mr\omega^2 / Mr(2\pi f)^2$ √

$T = 2.5 \times 2(2 \times 3.142 \times 3)^2 - 25$ √

$= 1752N$ √

(ii) $T = \frac{MV^2}{r} + Mg / Mr\omega^2 / Mr(2\pi f)^2$

$T = 2.5 \times 2(2 \times 3.142 \times 3)^2 + 25$ √

$= 1802N$ √

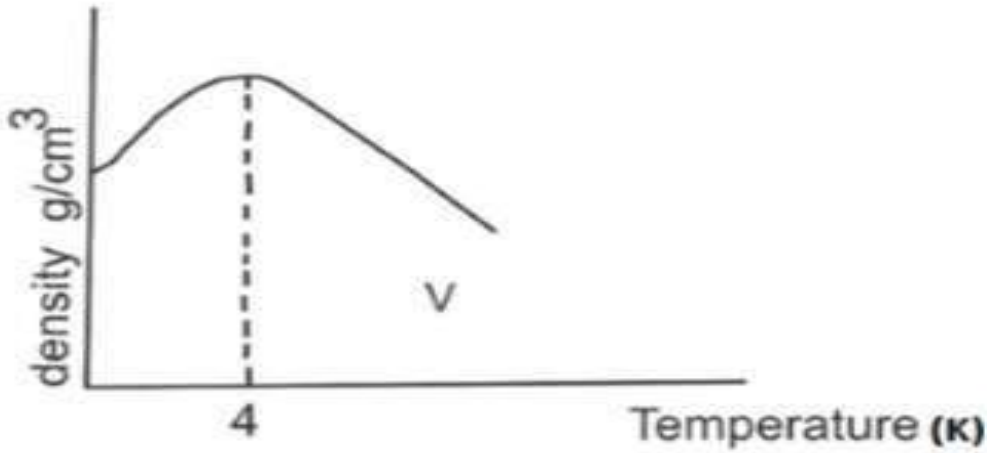
(c) $F_c = \frac{MV^2}{r}$ √

$800 = \frac{4V^2}{4.5}$ √ $\quad V = 30ms^{-1}$ √

18.

. (a) (i) 4+273=277 k √

(ii)



(b) (i) $Q = Pt$

$= 300 \times 5 \times 60$ √

$= 90{,}000J$ √

(ii) $Q = mc\Delta\theta$ √

$90{,}000 = m \times 4{,}200 \times 40$ √

$= m = 0.5357kg$ √