FORM FOUR CLUSTER KCSE MODEL 3

PHYSICS PAPER 1 ANSWERS

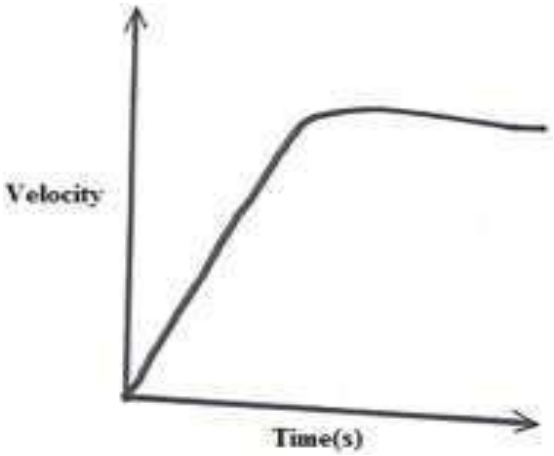
SECTION A (25 Marks)

Answer ALL question

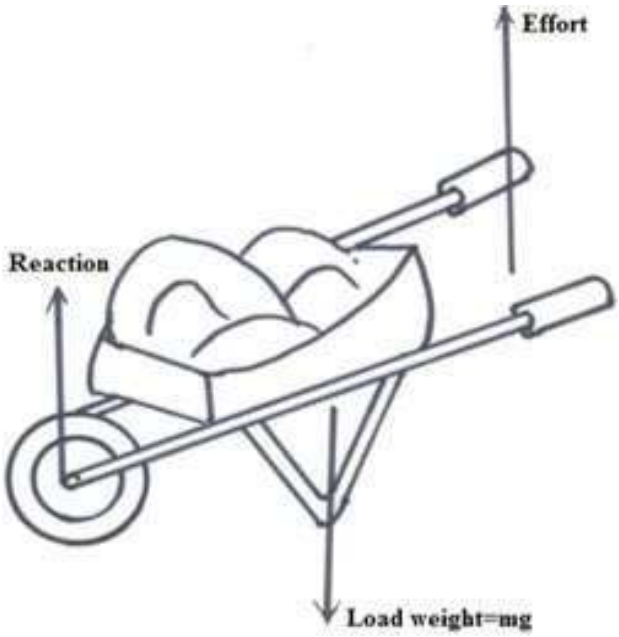
1

$$\text{Vernier reading} = 3.5 + 0.15 = 3.65mm\surd$$
$$\text{Diameter} = 3.65 - 0.09$$
$$= 3.56mm\surd$$

2



3.



4.

$$h_1 p_1 g = h_m p_m g \surd$$

$$h_1 = \frac{1.36\times10^3 \times 64}{8\times10^2} \surd$$

$$= 1088cm = or 10.88m \surd$$

5. It has a large surface area exposed for liquid to escape/evaporate escaping with latent heat from the liquid

6. Sum of clockwise movement= Sum of anticlockwise movement or

$$f_1 d_1 = f_2 d_2 \,/\, f_1 d_1 + f_2 d_2 = f_3 d_3 + f_4 d_4 \surd$$

$$(4-3-6) = 3.6-2)\times 40 \surd$$

$$= 160N \surd$$

7.

$$F_r = 0.3\times10N = 3N \surd$$

$$\text{Resultant force} = 10N - 3N = 7N$$

$$F = ma \surd$$

$7N = 5 \times a$

$a = 1.4 m/s^2 \surd$

8. When the tap is opened gas leaves through the nozzle at a higher velocity lowering pressure just above the nozzle.

Atmosphere pressure pushes air into the low pressure region.

9. Spring 1 extend by 4 mm Spring 2 extend by 4 mm. Total extension = 8 mm

10. The one left with gaps.√ The gaps allows for expansion and contraction during extreme weather conditions while the continuous one may bulge.

11. As the vehicle brakes it stretches increasing time for impact hence reducing the impulse.√

12. Gases have larger intermolecular distances than liquids.√

13. It becomes less stable√/stability decreases.

SECTION B (55 Marks)

14. Answer all questions in this section

a) (i) $273 + 80 = 353K \surd$ - working must be shown.

(ii) Room temperature√

(iii) Q=Pt√

$= 1 \times 1000W \times 5 \times 60 \quad Or$

$= 300000J \surd$

(iv) $MC\Delta\theta = Pt \surd$

$\frac{1200}{1000} kg \times C \times 70K = 300000J \surd$

$C = \frac{300000J}{84KgK}$

$= 3571.4 J/Kg/K \surd$

b) Ml=Pt√

$\frac{50kg}{1000} \times L_v = 1000 \times 3 \times 60J \surd$

$L_v = 3.6 \times 10^6 J/Kg \surd$

15.

. a) Mass of water in the bottle =66.4-43.2√

=23.2g√

b) Volume of water that completely filled the bottle

=23.2g/1 gcm^3

=23.2cm^3√

(Allow T.E from a

(Must show working)

c) Volume of density bottle = 23.2cm√ (Allow TE from b)

d) Mass of sand = (67-5-43-2)-24.3g (working must be shown)

e) Mass of water that filled the space above sand =83.3-67.5=14.8g.√

f) Volume of sand =volume of bottle-volume of added water√

=23.2-14.8

8.4cm^3√

g) Density $= \frac{mass}{volume}$ $\ell = \frac{m}{v}$ √

$= \frac{24.3}{8.4}$

=2.893cm^3√

16.

a) The pressure of a fixed mass of an ideal gas is directly proportional to the absolute temperature provided the volume remains constant.√

b)i) $\frac{1}{v} = 55\sqrt{}$

$V = \frac{1}{55} = 0.01812cm^3$

ii) Slope of the graph

$\text{Slope} = \frac{(2.0-0)\times10^5 N/M^2}{(40-0)\times10^0/M^3}$ √√

$= 5x10^3 NM$

iii) $T = \frac{PV}{2R}$

$P = \frac{2RT}{V}$

$5\times10^3 = 2\times R\times 200\sqrt{}$

R=12.5J/K√

Graph P against $\frac{1}{v}$ ∴ *slope* = $2RT$ √

T=200K

Allow TE

c) Increase in temperature causes molecules to move faster (gain kinetic-energy √causing more number of collisions with the walls√ of cylinder at constant pressure volume increase as the molecules push √against the wall.

17.

i) VR = 4√

ii) M.A = V.R x efficiency√;

$= 4\times\frac{75}{100}$ or;

=3√

iii) $\text{M.A} = \frac{Load}{Effort}\sqrt{}$

$3 = \frac{2400N}{Effort}$

$\text{Effort} = \frac{2400}{3} = 800N\sqrt{}$

iv) $\text{Efficiency} = \frac{work\,out\,put}{work\,in\,put}$

$\text{Work input} = \frac{work\,out\,put}{Efficiency}$

$= \frac{1200 \times 2.5}{0.75}\sqrt{}$

$= 4000J\sqrt{}$

b) i) Whirl the body at a measured radius and time.√
Complete oscillations /revolutions

Work out periodic time√
Measure the mass of the body

$F = mw^2r\sqrt{}$

$\text{F=M}\left(\frac{2\pi}{T}\right)^2 r = \frac{\pi^2 mr}{T^2}$

(ii) $F = mw^2r + c$

$\text{F} = \frac{100w^2r}{1000} + c$

$0.1w^2 = slope\ of\ the\ graph\sqrt{}$

$= \frac{0.6 - 02}{0.5 - 0.16} = \frac{0.4}{0.34} = 1.1765\sqrt{}$

$w^2 = 11.765$

$w = 3.42997\,rads^{-1}\sqrt{}$

18.

3a)(i) Volume displaced $= 0.8 \times 0.5 \times 1.2$

$= 0.48 m^3$

Weight displaces $= 0.48 cm^3 \times 1000 \times 10 N / Kg$

$= 4800N$

(ii) Average density of water displaced remains constant

$\therefore 1000 = \frac{480kg + X}{0.8 \times 0.5 \times 2}$ √(where X is the extra mass of water displaced

$X = 800 - 450$ √

=320kg

Force required =Mg

$= 320kg \times 10N / kg$

=3200N

b) Apparent loss in weight = 3.0-0.22

=2.78N

Mass displaces = 0.278kg√

$\text{Volume displaced} = \frac{Mass\ displaced}{Density}$

$= \frac{0.278\,kg}{1000\,kg/m^3}$ √

$= 2.78 \times 10^{-4} m^3$

$\text{But density} = \frac{mass}{volume}$ √$= \frac{0.3kg}{2.78 \times 10^{-4}} = 1079.1kg/m^3$ √

c) UPthrust = weight of air displaced $= v \int g$

$= 2 \times 1.3 \times 10 = 26N$ √

Weight of balloon $= 0.1 \times 2 \times 10 + 10 = 12N$ √

Resultant force =26N-12N

=14N√