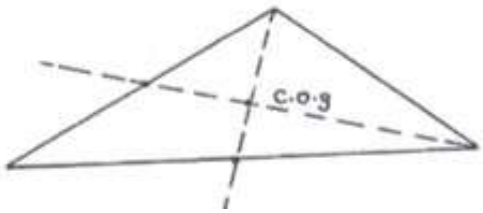
FORM FOUR CLUSTER KCSE MODEL5

PHYSICS PAPER 1 ANSWERS

SECTION A (25 Marks)

Answer all questions

1.



2. In the wider container the rate of evaporation is higher than the narrow one

3. Hydraulic brakes are more efficient hence requires less effort than mechanical ones and pressure is equally transmitted in all tyres simultaneously.

4. Although the body moves at constant speed, its velocity keeps on changing since it is at tangent to the circular path at any point.

5.

$$\text{Relative density} = \frac{Mass\ \ of\ liquid}{Mass\ of\ equal\ volume\ of\ water}\ \surd$$

$$\frac{695-20}{70-20}$$

$$\frac{675}{50}\ \surd$$

$$R.d = \frac{\rho_L}{\rho_w} \Rightarrow 13.5 = \frac{\rho}{1}$$

$$\rho_L = 13.5 gcm^{-3}$$

6.

$M = \rho v$

Mass of water $= 50g\ \surd$

$$\text{Volume} = \frac{m}{\rho} = \frac{50}{1} = 50cm^3\ \surd$$

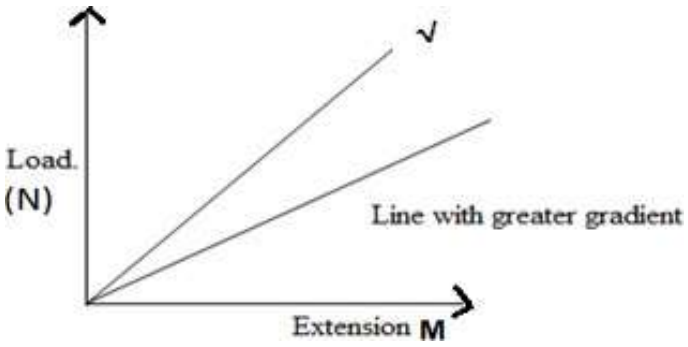
7. Cool or √ lower the temperature at the joint, since copper will contract more than iron, the joint will loosen. √

8. -It spreads to form a circular patch.

   -Oil spreads out to form oil film which is one molecule thick.

   -The oil drop is spherical.

9.



10. Fluid is incompressible.√

    - Non corrosive. .

    - Low melting point and high boiling point.

11. Force applied on master piston by the foot pedal exerts pressure on the fluid. √The pressure is transmitted equally throughout the fluid and produces a large force on the slave piston for braking the wheel. √

12.

V.R=4

$$Efficiency = \frac{M.A}{V.R} \times 100\% \sqrt{1}$$

$$M.A = \frac{L}{E}$$

$$= \frac{100}{28} = 3.5714$$

$$= Efficiency = \frac{3.5714}{4} \times 100\% \sqrt{1}$$

$$= 89.285\%$$

$$= 89.3\%$$

13. V2 is less than V1.√

14. Air molecules which are in constant random motion √ bombard the smoke particles randomly√

SECTION B (55 Marks)

Answer all questions

15. (a) Acceleration directed towards the centre of the circle in a circular path.

    (b)

    (i) Increasing distance from centre of rotation.√

    (ii) -Increases angular velocity.√

    -Reducing the friction by oiling or smoothening.√

    (ii) X√ since radius is smallest, angular velocity must be greatest to maintain the centripetal force.

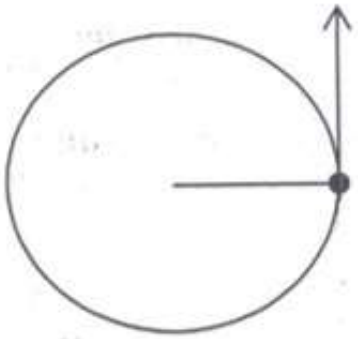
(c) (i) $F = m r \omega^2$ √

$2 = 0.1 \times 0.03\ W^2$

$$= \frac{2}{0.1 \times 0.03}$$ √

$\omega = 81.65 rads^{-1}$

(ii)



✓ Tangent at Z.

√ Tangent at z

16.

(i) Work done= mgh √

30 x10 x10 √

17.

(a) A body is partially or wholly submerged experiences an upthrust force equal to the weight of liquid displaced. √

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

$$mass\ of\ y = \frac{40}{10} kg$$ √

$$\ell = \frac{m}{v} = \frac{40}{10^{-3m^3}} = 4000 kg/m^3$$ √

(ii) $Upthrust\ in\ x$

$40 - 35 = 5N$

$$Mass\ of\ x\ displaced = \frac{5}{10} = 0.5kg$$ √

$But\ v = 10^{-3} m^3$ √

$$\ell_x = \frac{0.5kg}{10^{-3} m^3}$$ √

$= 500 kg/m^3$

(c) (i) $Volume\ of\ water\ displaced = 2.0 \times 10 = 20cm^3$ √

$Mass\ of\ water\ dispalced = 20 \times 1g/cm^3 = 20g$

$Mass\ of\ test\ tube + contents = 20g$ √

$mass\ of\ lead\ shots = 20 - 10 = 10g$ √

(ii) $Mass\ of\ test\ tube + contents = 20cm^3 \times 1.25g/cm^3 = 25g$ √

$Mass\ of\ lead\ shots\ to\ be\ added = 25 - 20 = 5g$ √

$$or\quad M.A = \frac{L}{E} = \frac{300}{100} = 3$$ √

18.

(a) (i) Acceleration is there when there is increase in velocity from h to v.(definition 1mk)

$$a = \frac{v-u}{t} \surd$$

$$at = v-u \surd$$

$$v = u + at$$ making v subject 1 mk

(ii) Displacement =average velocity x time

$$s = \left(\frac{u+v}{2}\right)t \surd$$

$But\ v = u + at$

$$\therefore s = \left(\frac{u+u+at}{2}\right) \times t$$

$$= \left(\frac{2u+at}{2}\right)t$$

$$s = ut + \tfrac{1}{2}at^2 \surd$$

(iii) $s = 20m \quad u = 25m/s \quad v = 0m/s \quad m = 1200g$

$$v^2 = u^2 + 2as$$

$$0^2 = 25^2 + 2 \times 20 \times a$$

$$a = 15.625m/s^2$$

$$F = ma$$

$$= 1200 \times 15.625 \surd$$

$$= 18750N \surd$$

(b) (i) $u = 200m/s \ \ a = -g = -10m/s^2 \ \ t = 5$ seconds

$$v = u - gt$$

$$= 200 - 10 \times 5 \surd$$

$$= 150m/s$$

(ii) $s = ut - \tfrac{1}{2}gt^2$

$200 \times g - \tfrac{1}{2} \times 10 \times 8^2 \surd = 1280m \surd$

19.

(a) Specific latent heat of vaporization is the heat energy required to change 1 kg mass of liquid to vapour without temperature change. √

(b) (i) Mass of condensed steam =133 –(55+75)
=3g√

(ii) $Q = MC\theta\,(\text{Calorimeter}) + MC\theta\,(\text{water})$
$= 0.055\times 390\times(30-20) + 0.075\times 4200\times(30-20)\,\surd$
$= 214.5 + 3150$
$= 3364.5J$

(iii) (I) $Q = 0.003L + 0.003\times 4200\times 70\,\surd$
$= 882 + 0.003L\,\surd$

(II) $882 + 0.003L = 3364.5\,\surd$
$L = 827{,}500JKg^{-1}\,\surd$

(c) (i) The mass of the gas must be fixed.(constant) √