FORM FOUR CLUSTER KCSE MODEL8

PHYSICS PAPER 1 ANSWER

SECTION A (25 Marks)

1. Volume of wate 0.6 x 3 = 1.8cm^2

   Reading 7.6 x 1.8=5.8cm^3(2 marks)

2. Oil film forms between machine parts, so avoiding direct contact.√ (2marks)

3. $w = mg$

   $600N = 50 \times g$ √

   $g = {}^{600}/_{50} = 12N/kg$ √

4. Ammonia is less denser than chlorine and so diffuses faster than chlorine.(2mks)

5. Pour cold water in the top glass. It will contract to a level of easy separation.

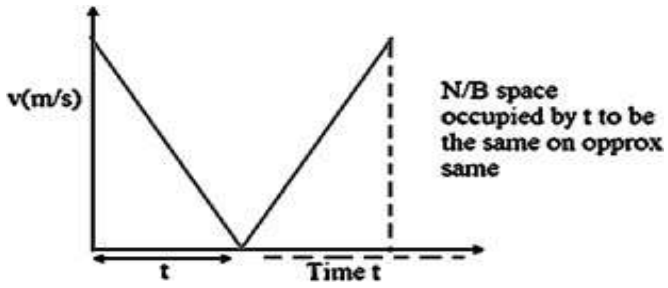
6. Oil film formed on water reduces surface tension and makes the mosquito larvae to sink, they die control mosquitoes breeding.

7. The balloon expands and hence up thrust due to displaced air increasing lifting the balloon.
8. Pressure of a fixed mass of gas is directly proportional to its absolute temperature provided the volume is kept contract.

9. Neutral equilibrium.

10. Elastic limit must is not exceeded.

11.



12. The lowest coin will fling away leaving the rest of the pile intact, due to the law of inertial that a body remains in its state of rest or uniform motion in a straight line unless acted upon by an external force.
13. T_1 will remain at one temp (room temp say) while T_2 will progressively increase the reading as the heating goes on.√ Water is a poor conductor of heat so T_1 does not get heated but T_2 reads increasing temperature because of convection currents.
14. Air molecules which are in constant random motion √ bombard the smoke particles randomly√(2mks)

SECTION B: (55 Marks)

Answer question in this section in the spaces provided.

15. (a) Acceleration directed towards the centre of the circle in a circular path.(1mks)
    (b) (i) Increasing distance from centre of rotation.√
    (b) (ii) -Increases angular velocity.√ (any 2)

-Reducing the friction by oiling or smoothening.√ (2mks)

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

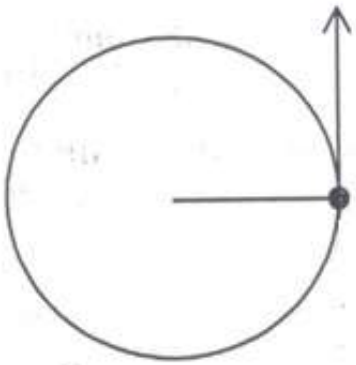
(c) (i) $F = m r \varpi^2 \surd$

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

$$= \frac{2}{0.1 \times 0.03} \surd$$

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

(ii)



✓Tangent at Z.

√ Tangent at z (2mks)

16.

(i) Work done = mgh √

30 x10 x10 √

=3000 J √

(ii) Work by force N=FS

$$100 \times \frac{10}{Sin\ 15^0} \surd$$

$$= 100 \times 38.6370$$

=3863.70J√ (2mks)

(iii) $$Efficiency = \frac{Work\ output}{Work\ input} \times 100\% \surd$$

$$= \frac{3000}{3863.7} \times 100\% \surd$$ (3mks)

$$= = 77.57\% \surd$$

(iv) Work done in overcoming friction =3863.7-3000

=863.7J√ (1mk)

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(v) $V.R = \frac{1}{Sin\ 15} = 3.864\ \surd$

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

$77.57 = \frac{M.A}{3.864} \times 100\ \surd$

$M.A = 9.997 \cong 3.0$

$or \quad M.A = \frac{L}{E} = \frac{300}{100} = 3\ \surd$ (3mks)

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

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

$mass\ of\ y = \frac{40}{10} kg \surd$

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

(ii) $Upthrust\ in\ x$

$40 - 35 = 5N$

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

$But\ \ v = 10^{-3} m^3 \surd$

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

$= 500kg/m^3$

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

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

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

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

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

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

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) $u = 200m/s \quad a = -g = -10m/s^2 \quad t = 5$ 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√

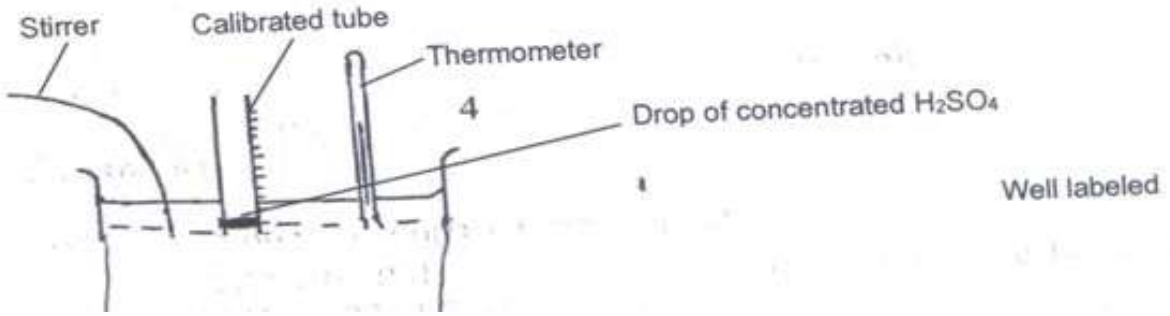
(b) (i) Mass of condensed steam $=133-(55+75)$
$=3g\surd$

(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) √



-The temperature of the gas is altered by heating the water bath.

-Temperature T in Kelvin of gas is measured by thermometer. √

-The volume, measured using the calibrated tube.

-Several values of V and corresponding value of T (in Kelvin) are recorded. √

-If the graph of V against T is a straight line through the origin, Charles' law is verified (alternatively if

$\frac{V}{T}$ = a constant, Charles law is verified