LAINAKU 1 PHYSICS P1

232/1 MARKING SCHEME

SECTION A

1. Mass of the liquid = 12 – 6 = 6g;
   Volume of the liquid = 9cm^3;
   Density = $\frac{mass}{volume}$ = 6/9 =0.6667g/cm^3;
2. Its density will decrease;
3. The glass will first expand leading to the drop; later mercury expands causing the rise;
4. Thermometer in B recorded a higher temperature; Dull/black surfaces are better emitters of radiant heat; Water in A cooled faster.
5. Cohesive forces are forces of attraction between molecules of the same kind; while adhesive forces are forces of attraction between molecules of different kind;
6. Clockwise moments = anticlockwise moments
   (1.20 x 40) = (50 x F);
   48 = 50F
   F= 0.96N
   Upthrust force = þvg = weight in air – weight in liquid
   = 1.2 – 0.96 = 0.24N;

   0.24 = þ x 13.5 x 10^{-6}x 10
   Density, þ = 1777.8 kgm^{-3};
7. Pressure of a fixed mass of a gas is directly proportional to its absolute temperature provided the volume is kept constant;
8. The molecules of air above the vehicle moves at a higher velocity; therefore lowering the pressure above; the vehicle.
9. $A_1V_1 = A_2V_2$;
   ∏ X 0.4 X 0.4 X V_1 = ∏X 0.6 X 0.6 X 5

   $V_1 = \frac{0.36\ X\ 5}{0.16}$;
   = 11.25m/s

10. Work done = Average force x distance(extension);

    $= {}^1/_2 Fe$

    But F = Ke Therefore Work done = $^1/_2 k.e.e$ = ½ ke^2;

11. Oscillatory motion;

12. Gas pressure = atmospheric pressure + water pressure
    Water pressure = glycerine pressure;

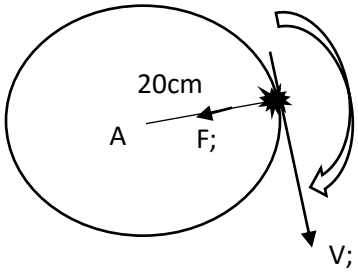
    H x 1260 x 10 = 0.2 x 1000 x 10;

    H = 2000/12600
      = 0.1587m;
13. Matter is made up of very many tiny particles. Small particles of salt fit in between molecules of water when dissolving;

SECTION B

14. a. i) let the height from the ground be s
    $S = ut + ½ gt^2$
    For the stone moving upward
    $S = 20t – 5t^2$; ……..(1)
    For the falling stone
    $60 – S = 0 + 5t^2$; ……..(2)
    Substituting equation 2 in 1
    S = 20t – (60 – S)
    S = 20t – 60 + s
    20t =60 t = 3s;

    ii) $S = ut – ½ gt^2$
    =20(3) – ½ x 10 x 9;
    =60 – 45 = 15m;
    b)i) This is the rate of change of angular velocity with time;
    ii) I.



    II . v = 2∏rf;
    = 2 x22/7 x 0.2 x 2
    = 2.514m/s;

    iii) $F = \frac{mv^2}{r} + mg$;

    $= \frac{0.02 \times 16 \times 16}{0.5} + (0.02 \times 10)$;

    = 10.24 + 0.2 = 10.44N

15. a) A floating body displaces its own weight of the fluid it floats on;
    b) To displace large volume; of water, hence enabling it to float;
    c) volume of water displaced = 300/750
    $= 0.4m^3$;
    Up thrust = weight of fluid displaced
    (400x) + 3000 = 0.4 x 1000 x 10;
    400x = 1000
    X = 2.5, 2 pupils;
    d) volume of water displaced = 300/600 = $0.5m^3$;

    T + weight = upthrust;
    T = (0.5 x 1000 x 10) – 3.75
    = 4996.25;

16. a)For a system of colliding bodies, the total linear momentum before collision is equal to the total momentum after collision;
    b) i)K.E = ½ $m_1u_1^2$ + ½ $m_2u_2^2$;
    =1/2 (1000 x 30^2) + 0
    = 450,000J;
    ii) $m_1u_1 + m_2u_2 = (m_1+m_2)v$;
    (1000 x 30) + 0 = (2500)V
    V = 12m/s;

    K.E. = ½ x 2500 x 12 x 12

    = 180,000J;

    iii) kinetic energy before collision is higher, some of the energy was converted to either heat, sound or light.

c) i.

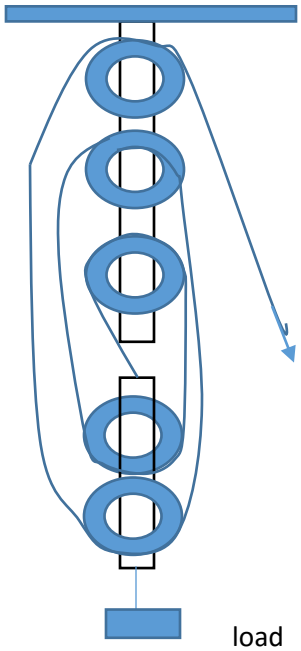


diagram 1mk

effort and load 1mk

ii) Efficiency = $\frac{M.A}{V.R}$ X 100;

80 = $\frac{M.A}{5}$ X 100, M.A. = 4;

M.A. = L/E

E = 1200/4 = 300N;

d) V.R. = $\frac{circumference}{pitch}$;

= $\frac{22/7 \times 2 \times 17.5}{25}$; = 4.4;

17. a) The quantity of heat required to raise the temperature of a unit mass of a substance by one degree or one kelvin;

b) i. Q = mlv;

= 0.1 x 2,260,000;

= 226,000J;

ii) Q = mlv + mcΔϴ;

= 226,000 + (0.1 x 4200 x 50);

= 247,000J;

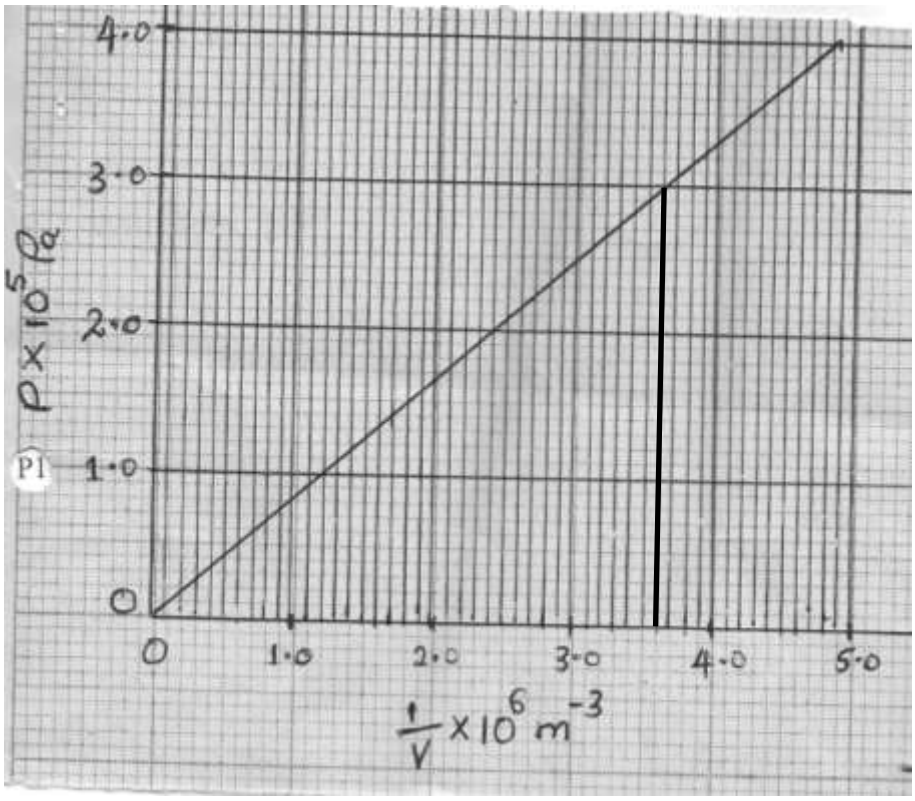
iii) Q = mcΔϴ;

247,000 = m x 4200 x 23;

M = 2.557kg;

18. a) A gas which obeys all the gas laws;

b)



i)by increasing the pressure slowly;

ii) k = slope;

$= \frac{(3.0 - 0) \times 10^5}{(3.6 - 0) \times 10^6}$;

= 0.08333NM;

iii) work done;

c) $\frac{V1}{T1} = \frac{V2}{T2}$;

$\frac{4000}{310} = \frac{V1}{340}$; V2 = 4387.09 L