ASUMBI GIRLS HIGH SCHOOL

POST -MOCK 1

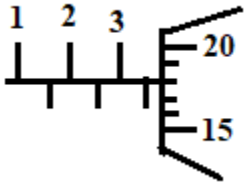
AUGUST/SEPTEMBER

2022

PHYSICS PAPER 1 MS

SECTION A (25 MARKS)

1. (a)



(b)

3.68 – 0.03

=3.65mm

2. Marble rolls down because brass contracts more than iron.
3. Gases are compressible
4. Adhesive forces between water molecules and glass beaker are stronger than cohesive forces between water molecules hence resultant force makes water to form a concave meniscus. Cohesive forces between mercury molecules are greater than adhesive forces between mercury molecules and glass beaker hence resultant force makes mercury form a convex meniscus.

5. 0.7 x 13600 x 10 = h x 1000 x 10

   h= 9.52m

6. Volume flux = AV

   Volume = $3.142 \times 10^{2} \times 5 \times 10^{-6}$

   Volume flux = $3.142 \times 3.142 \times 10^{-4} \times 5$ = $4.936 \times 10^{-3}\ m^3/s$

7. For a system in equilibrium; Moment = Fd

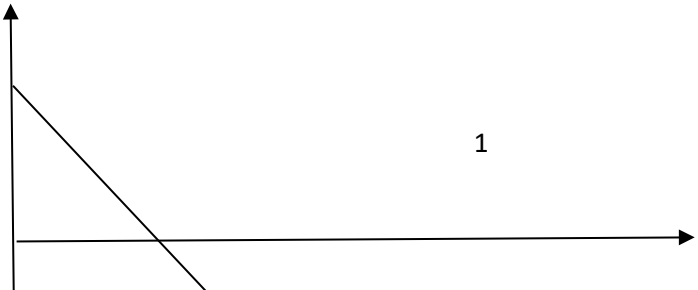
   Sum of clockwise moments = sum of anticlockwise moments

   (30 x 0.1) + (2 x 0.1) = (20 x 0.1) + (x x 0.3)

   6.2 – 2 = 0.3x

   x = 14N

8. V (m/s)



t (s)

9. The papers bulge outwards away from each other. This is due to the pressure outside reducing below atmospheric pressure hence resultant outward force.

10. Weight of water displaced (upthrust)

$U = W_A - W_W$
$= 2.5 - 2.0$
$= 0.5\ N$
$W = \rho vg$
$V = \frac{W}{\rho g}$

$V = \frac{0.5}{1000 \times 10}$
$V = 5 \times 10^{-5}\ m^3$
Volume of water displaced = Volume of stopper

$W = \rho vg$
$\rho = \frac{W}{vg}$
$\rho = \frac{2.5}{5 \times 10^{-5} \times 10}$
$\rho = 5000 kg/m^3$

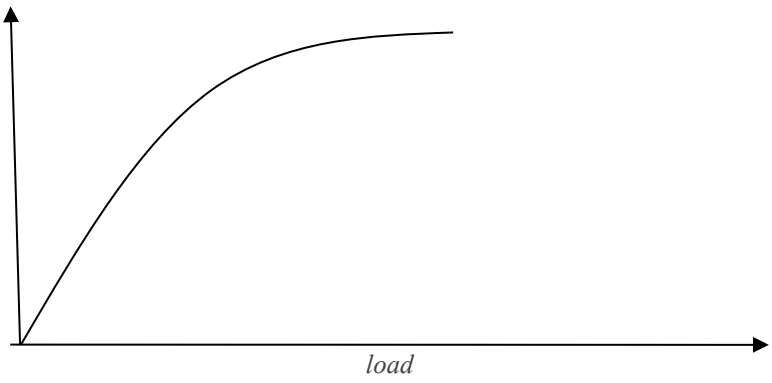
11. -Temperature
-Mass

12. Increase in cross-section area increases the number of free electrons per unit length which are responsible for thermal conductivity.

13. The size of the molecules is negligible.

Intermolecular forces are negligible.

14.



15. (a) The number of collisions per unit time will increase due to an increase in molecules of the gas per unit volume. Hence, the rate of change of momentum increases with the increase in number of collisions per unit time increase pressure.

(b) The volume of a fixed mass of a gas is directly proportional to its absolute temperature if the pressure is kept constant

(c) $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

$V_2 = \frac{200 \times 353}{293}$

$V_2 = V_1 T_2$ $V_2 = 240.96cm^3$

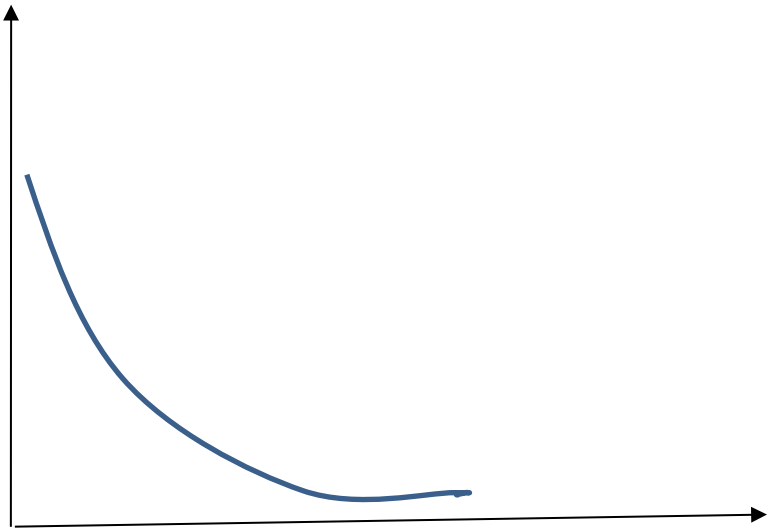
T_1

(d) (i) The volume of air at closed end decreases since more mercury exerts greater pressure resulting into reduction in volume

(ii) Adding the mercury slowly / in little amounts to let the pressure change be slow

(e) (i) Methane will liquify before zero volume is reached / methane is a real gas. Boyle`s law applies for an ideal gas

(ii)



16. (a)

(i) Periodic time = $\frac{1}{f}$ = $\frac{1}{5}$ = 0.2 s

(ii) w = 25c+
= 2 x 3.142 x 5
= 31.42 $rads^{-1}$

(iii) Linear velocity = $\frac{\text{distance}}{\text{time}}$ $C = 2\pi r$ $V = \frac{2 \times 3.142 \times 0.7 \times 5}{15}$ = 21.99ms^{-1}

(iv) $T = mg + \frac{mv^2}{r}$

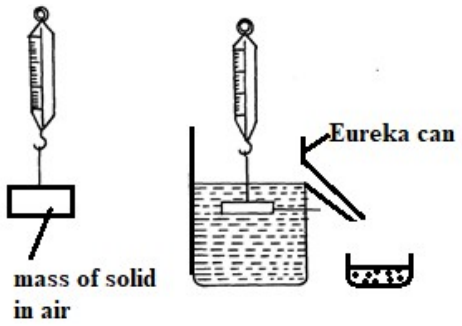
$$= \frac{(0.04 \times 10) + 0.04 \times (21.99)^2}{0.7} = 28.03N$$

(b)

(i)	time = 1 second; gradient = $\frac{(45 - 5)m}{(2 - 0)s}$ $= \frac{(40)}{2} ms^{-1}$ $= 20ms^{-1}$	t = 4 seconds $\frac{(60 - 50)m}{(4.25 - 2)s}$ $= 4.444m/s$
(ii)	$a = \frac{v - u}{t}$ $= \frac{(4.444 - 20)ms^{-1}}{(4 - 1)s}$	$a = -5.185ms^{-2}$

17. (a) When a body is partially or totally immersed in a fluid, it experiences an upthrust equal to the weight of the fluid displaced.

(b)



-Tie the piece of metal with the spring and suspend it in air.

- Record its weight W_1.
- Fill Eureka can with water until it flows out freely through the spout.
- Weigh an empty beaker. Put the beaker under the spout and immerse the metal partially in water.
- Wait until dripping stops and weigh the beaker with its contents.
- Record the weight of partially immersed piece of metal W_2.
- Remove the object (metal) from water and repeat the experiment with a re-filled Eureka can and empty beaker (now piece of metal partially immersed.) Record weight W_3.

(c) Weight of hydrometer = weight of water displaced

$W = mg$ $W = \rho vg$ $V = Ah$

(0.015×10) $= 1000 \times 2 \times 10^{-4} \times h \times 10$

$1000 \times 20 \times 10^{-4}$ $1000 \times 20 \times 10^{-4}$

$h = 0.075m$

(d)

(i) Upthrust = weight of air displaced

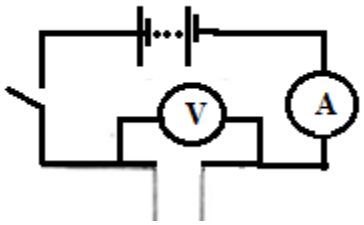
$W = v\rho g$

$= 200 \times 1.2 \times 10$

= 2400N

18. (a) Adding impurities
Application of pressure

(b) (i)



(ii)

- Arrange the apparatus as shown in the set up
- Switch on the immersion heater and start your stop watch. Note reading of ammeter and the corresponding voltmeter reading.
- After a reasonable amount of water has been collected, stop the stopwatch and note the time taken to heat the ice
- determine the mass of water collected.
- Use the equation $VIt = mL_f$ to determine L_f

c) (i) $H = C\theta$

$= 40\ JK^{-1} \times (34 - 25)\ K$

$= 360\ J$

(ii) $H = mc\theta$

$= 0.1 \times 4200 \times 9$

$= 3780\ J$

(iii) $360 + 3780 = 4140\ J$

(iv) $c = \frac{Q}{m\theta}$

$$c = \frac{4140}{0.15\,x\,(100-34)}$$

$$c = 418.18\,J/kgK$$