September 15 Pp 1

1a. vectors give both size + direction
scalars give only size.

b. Vectors: velocity, K.E. Weight, displacement, momentum.

Scalars: distance, speed

ci. $\rho = 2560\ kg/m^3$
$h = 2.72\ m$.
Rad. $= 45cm = 0.45\ m$,

$V = \pi R^2 h = \pi \times 0.45^2 \times 2.72$
$V = 1.73\ m^3$

$\rho = m/V$.

$2560 = m/1.73$

$m = 2560 \times 1.73$
$m = 4429.8\ kg$

ii. $P = F/A = \frac{(4429.8 \times 10)}{(\pi \times 0.45^2)} = \frac{44298}{0.636} = 69632\ Pa$

iii. they can make the base of the column with a greater area since $P \propto \frac{1}{A}$, $\therefore \uparrow$ area, $\downarrow$ pressure!

2ai. Orbit: the path which the planet takes to move around the sun; it remains the same for the same planet and is elliptical in shape.

aii. Pluto is further away and smaller in Mass. compared to Earth
$\therefore$ force of Pluto is less than that of Earth.

b. dwarf, it has not cleared all its neighbourhood ??

c. A star gives it an light since it is burning.
Pluto is not a star, but a piece of rock/gas which reflects light from the Sun.

d. ↓ gravity, ↓ weight since $W = mg$ and $W \propto g$.
∴ on Mars.

3a. Radiation.

b. dark such as black since dark surfaces are the best absorbers of heat

c. the air inside is given more K.E. ∴ it heats up., temp. ↑ resulting in more collisions due to greater speed.
∴ pressure increases.

d. Solid: particles are very closely packed together, ∴ having no space to move in, ∴ they vibrate back & fro in the same position.

~~Liquid~~ Gases: particles have ample space to move, ∴ they move around haphazardly with a fast speed.

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i. AB and, CD & EF

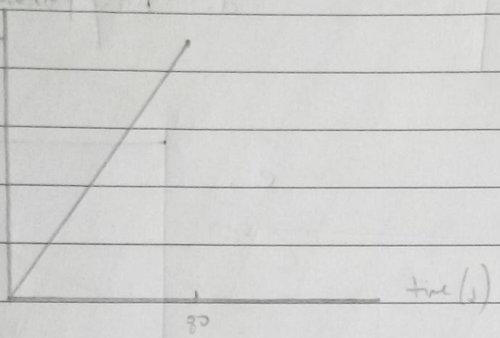
ii. BC and DE.

b. average speed = $\frac{\text{total dist}}{\text{total time}} = \frac{1200\text{ m}}{160\text{ s}} = 7.5\text{ m/s}$.

c. $15 = \frac{s}{t} = \frac{1200}{t}$

$t = \frac{1200}{15} = 80\text{ s}$.

d.



e. dec = acc. $\therefore a = \frac{v-u}{t} = \frac{0-15}{37.5} = -0.4\text{ m/s}^2$

$\therefore$ dec. $= 0.4\text{ m/s}^2$.

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5. i.

ii. b. Since tungsten is a metal, $\therefore$ a conductor which heats up.
$\therefore$ resistance is not fixed/constant
$\therefore$ V is not directly $\propto$ to I.

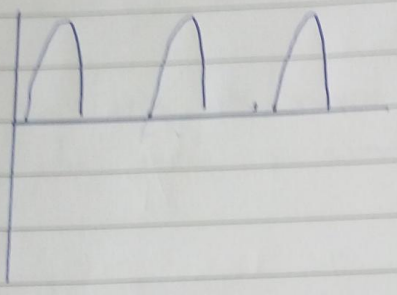
6a. alternating current: the voltage is increasing to a max value in one direction & going back to 0, to increase to a max again but in opposite direction.

b. $f = \frac{1}{T} = \frac{1}{0.02} = 50\,Hz$

t for 2½ waves = 0.05 sec.

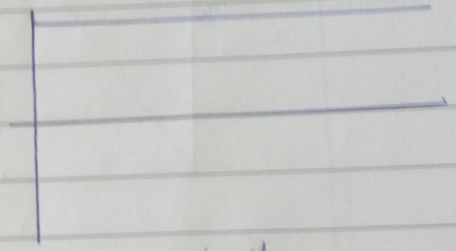
$\therefore T = 0.05 \div 2\frac{1}{2} = 0.02s$

c.



d. half-wave rectification.

e.

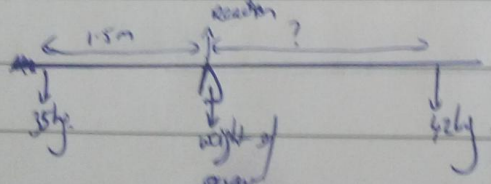


f. ??

because in a battery, current is direct, it has a max value & flows in one direction only.

7a. The principle of moments states that the total C moments about a fixed point is equal to the total G moments about the same point.

b.



Since balanced

C mom = G mom

$420 \times d = 350 \times 1.5$

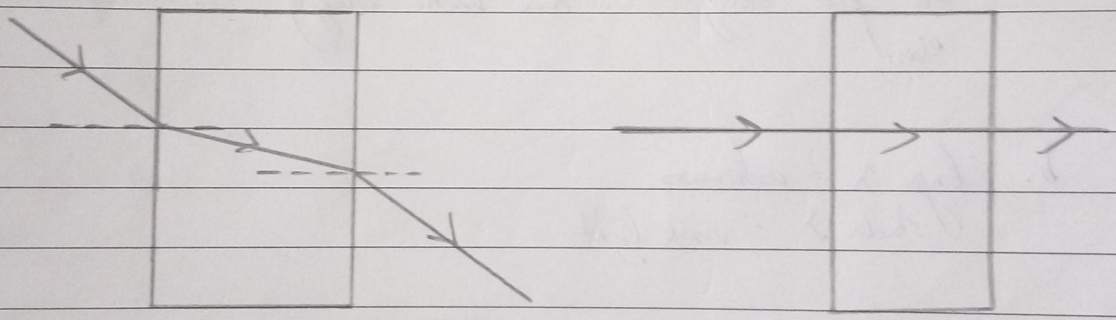
$d = \frac{525}{420} = 1.25\,m.$

c. Since mass on Andrei's side increased but distance remained the same, ∴ moment increased, ∴ moment should also ↑.
∴ Daniela needs to move further away from pivot to balance the see-saw again.

d i. the see-saw moves up since the force acting on it is removed so it goes back to its original length, higher than 40cm above ground.

ii. No, since the mass on the see-saw is smaller than the force applied is also smaller ∴ a smaller compression results.

8a



b. speed of light decreases in denser medium.
light ray is bent.

c. a. depth = 175 cm = 1.75 m
η = 1.33
R. depth = ?

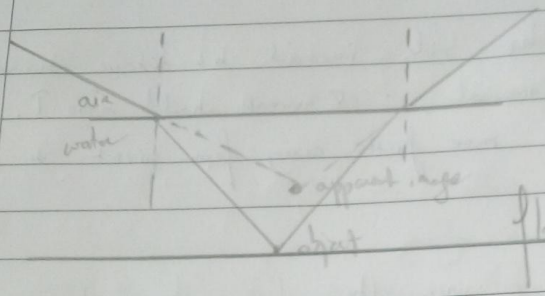
η = real depth / app. depth

$\eta = 1.33 = \frac{R.d.}{1.75}$

$R.d = 1.33 \times 1.75$

$= 2.33 m.$

d.



the refraction at the water-air boundary deviates the rays further away from each other, hence when these rays are extended to meet, they always meet above the real depth.

9.a. transverse waves from the microwaves travel to the food, giving the food energy, ∴ more kinetic energy, ∴ temperature of food rises.

b. - long λ = radiowaves.
- shorter λ = visible light

G x U V I M R

c. $f = 4000\ MHz = 4000000\ Hz$
$v = 3 \times 10^8\ m/s$.
$\lambda = ?$

$v = f\lambda$
$3 \times 10^8 = 4000000\lambda$
$\frac{3 \times 10^8}{4000000} = \lambda$
$\lambda = 75\ m$.

d. - they are all transverse waves (or any other property of electromagnetic spectrum)
- γ + x rays have very high frequencies when compared to microwaves.

e. 180 °C in 6 mins = 6 x 60 = 360 s.
? in 1 sec

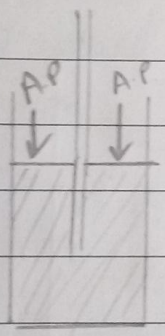
$\frac{1 \times 180}{360} = 0.5\ °C/s$

10 a. Atmospheric pressure is the pressure caused by the air particles; the weight of the air particles exert a force, hence a pressure.

b. the air from beneath the rubber suction cup is eliminated or reduced
∴ atmospheric pressure pushing on the outside of the cup is greater than the atmospheric pressure on the inside of the cup. ∴ it remains attached to the glass.

c. The person needs to first suck out all the air from the straw.
In this way, the atmospheric pressure by the air ΔP the liquid would be greater than that inside the straw, hence the liquid moves up the straw

?



d When Atm. P ↑, h ↕

e. As we move to outer space, atm. pressure always decrease until it becomes 0. Hence, the column h always decreases, until eventually, in outer space it becomes 0.