3. FORCE AND PRESSURE

Q 1) Write proper word in the blank space.

a. The SI unit of force is the …… (Dyne, Newton, Joule)

Ans. Newton

b. The air pressure on your body is equal to the …….. pressure. (Atmospheric, Sea bottom, Space)

Ans. Atmospheric

c. For a given object, the buoyant force in liquids of different …….. is …….. (the same, density, different, area)

Ans. density is the same

d. The SI unit of pressure is ……

(N/m^3, N/m^2, kg/m^2,pa/m^2)

Ans. N/m^2

Q 2) Make a match

1. Fluid	Higher pressure
2. Blunt knife	Atmospheric pressure
3. Sharp needle	Specific gravity
4. Relative density	Lower pressure
5. Hecto Pascal	Same pressure in all directions

Ans

1. Fluid	Same pressure in all directions
2. Blunt knife	Lower pressure
3. Sharp needle	Higher pressure
4. Relative density	Specific gravity
5. Hecto Pascal	Atmospheric pressure

Q 3) Answer the following question is brief.

a. A plastic cube is released in water. Will it sink or come to the surface of water?

Ans. When a plastic cube is released in water. It will float on the surface of water, as density of plastic cube is less than the water. More buoyant force is exerted on the plastic cube which lifts the cube upwards and allows it to float on the surface.

b.Why do the load carrying heavy vehicles have large number of wheels?

Ans. The pressure produced by a force depends on the area of the surface which the force acts. If the surface area is greater, then less pressure is produced. Load carrying heavy vehicles have large number of wheels so that the load is distributed over large surface area of the wheels in contact with the road. Hence the pressure decreases and tyres do not burst.

c. How much pressure do we carry on our heads? Why don't we feel it?

Ans. Pressure exerted by atmosphere on our head is nearly 1000 kg or 1 tonne. The air pressure at the sea level is about 101 × 10^3Pa, it is never felt because air exerts pressure equally from all directions on our body. The cavities in our body are filled with air, and arteries and veins are filled with blood. We do not get crushed due to atmospheric pressure as our body pressure balances the atmospheric pressure.

Q 4) Why does it happen?

a. A ship dips to a larger depth in fresh water as compared to marine water.

Ans. The buoyant force acting on any object is proportional to the density of the fluid in which the object is immersed. As the density of fresh water is less than that of marine water, it exerts upward force because of high density. The buoyant force on a body in fresh water is less than in marine water. Therefore, a ship dips to a larger depth in fresh water as compared to marine water.

b. Fruits can easily be cut with a sharp knife.

Ans. The effect of a given force varies inversely as the area of the surface on which the force is applied. Effect of force increases when the area in small. The cutting edge of a sharp knife has less cross sectional area compared to that of a blunt knife. While

cutting fruits force applied on the handle is transformed to the edge. For a given force, pressure is inversely proportional to the area of the surface on which the force acts.

c. The wall of a dam is broad at its base.

Ans. The wall of a dam is broad at its base because the forces exerted are strongest close to the ground. Water pressure increases with the depth, the lower portion of the dam has greater water pressure exerted upon it. The increasing thickness of the lower portion of the dam also helps it to supports its own weight. To bear this high pressure, the wall of a dam is made stronger and broad at the base than at the top,

d. If a stationary bus suddenly speeds up, passengers are thrown in the backward direction.

Ans. The passengers in a stationary bus are in static position, as body is initially at rest. As the bus suddenly speeds up, the lower parts of their body in contact with the bus also tend to move. But upper parts of their body are still in the state of rest due to inertia. And as a result body falls back.

Q 5) Complete the following table.

Mass (kg)	Volume (m^3)	Density (kg/m^3)
350	175	.....
.....	190	4

Ans. Using the formula,

Density = mass / volume

Mass (kg)	Volume (m^3)	Density (kg/m^3)
350	175	2
760	190	4

Density of a metal (kg/m^3)	Density of water (kg/m^3)	Relative Density
.....	10^3	5
$8.5\ x\ 10^3$	10^3	.....

Ans. Using the formula, relative density

= Density of a metal / Density of water

Density of a metal (kg/m^3)	Density of water (kg/m^3)	Relative Density
5×10^3	10^3	5
$8.5\ x\ 10^3$	10^3	8.5

Weight (N)	Area(m^2)	Pressure ($N.m^{-2}$)
.....	0.04	20,000
1500	500	.....

Ans. Using the formula,

Pressure = weight / area

Weight (N)	Area (m^2)	Pressure ($N.m^{-2}$)
800	0.04	20000
1500	500	3

Q 6) The density of a metal is 10.8×10^3 kg/m^3, Find the relative density of the metal.

Given: Density of a metal = 10.8×10^3 kg / m^3,

To find: Relative density of the metal

Solution: Relative Density = $\frac{density\ of\ metal}{density\ of\ water}$

$\therefore \quad = \frac{10.8 \times 10^3}{10^3}$

$\therefore \quad = 10.8$

(Density of water is 10^3 kg/m^3)

∴ Relative Density of the metal is 10.8

Q 7) The volume of an object is 20 cm^3 and the mass is 50 g. The density of water is 1 gm^3. Will the object float on water or sink in water?

Given: Volume of an object = $20cm^3$

Mass = 50 gm

To find: Density

Solution: Density $= \frac{Mass}{Volume}$

$$= \frac{50}{20}$$

$$= 2.5\ gm/cm^3$$

As Density of an object is more than the density of water. So the object will sink in water

Q 8) The volume of a plastic covered sealed box 350 cm^3 and the box has a mass 500 gm. Will the box float on water or sink in water? What will be the mass of water displaced by the box?

Ans. Given Volume of the box =$350cm^3$

Mass of the box = 50 gm

To find: Density = ?

Solution: Density $= \frac{Mass}{Volume}$

$$= \frac{500}{350}$$

$$= 1.42\ g/cm^3$$

As Density of the box is more than that of water. So the box will sink in the water.

∴ Mass of water displayed by the box is equal to the volume of the box.

The mass of water displayed by the box is 350g.

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