

Chapter: 3

Q.1 Fill in the blank and rewrite the completed statements

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- 1 The air pressure on our body is equal to pressure.
a. Atmospheric b. Sea bottom c. Space

Ans The air pressure on our body is equal to **Atmospheric** pressure.

- 2 For a given object, the buoyant force in liquids of different is different.
a. the same b. density c. different d. area

Ans For a given object, the buoyant force in liquids of different **density** is different.

- 3 The SI unit of pressure is
a. N/m^3 b. N/m^2 c. Kg/m^2 d. Pa/m^2

Ans The SI unit of pressure is **N/m^2** .

Q.2 Match the pair

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1	Column - A	Column - B
	i. Sharp needle	a. Specific gravity
	ii. Relative density	b. Lower pressure
		c. Higher pressure

Ans	i. Sharp needle	Higher pressure
	ii. Relative density	Specific gravity

2	Column - A	Column - B
	i. Fluid	a. Lower pressure
	ii. Blunt knife	b. Higher pressure
		c. Same pressure in all directions

Ans	i. Fluid	Same pressure in all directions
	ii. Blunt knife	Lower pressure

3	Column - A	Column - B
	i. Relative density	a. Atmospheric pressure
	ii. Hecto Pascal	b. Lower pressure
		c. Specific gravity

Ans	i. Relative density	Specific gravity
	ii. Hecto Pascal	Atmospheric pressure

Q.3 Solve Numerical problems:

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1 The density of a metal is $10.8 \times 10^3 \text{ kg/m}^3$. Find the relative density of the metal.

Ans Given: Density of water = 10^3 kg/m^3 , density of a metal
= $10.8 \times 10^3 \text{ kg/m}^3$

To find: Relative density of metal = ?

Formula: Relative density of metal = Density of metal / Density of water

Solution: Relative density of iron = Density of metal / Density of water
= $10.8 \times 10^3 / 10^3$
= 10.8

Ans: The relative density of metal is 10.8

2 Volume of an object is 20 cm^3 and the mass is 50g. Density of water is 1 gcm^{-3} . Will the object float or sink in water?

Ans Given: Volume of an object = 20 cm^3 , mass of an object
= 50g, density of water
= 1 gcm^{-3}

To find: If the object will float or sink?

Formula : Density = Mass / Volume

Solution : Density = Mass / Volume

$$= 50/20$$

$$= 5/2$$

$$= 2.5 \text{ g/cm}^3$$

Relative density = Density of object / Density of water

$$= 2.5/1$$

$$= 2.5$$

Ans: As the density of the object is more than the density of water, the object will sink in water.

Q.4 Complete the given flow chart / table / diagram

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Weight or Force (N)	Area (m^2)	Pressure (N/m^2)
.....	0.04	20,000
1500	500

Weight or Force (N)	Area (m^2)	Pressure (N/m^2)
Weight = Pressure x Area = $20000 \times 0.04 = 800 \text{ N}$	0.04	20,000
1500	500	Pressure = $\frac{\text{Force}}{\text{Area}} = \frac{1500}{500} = 3 \text{ N/m}^2$

Density of metal (kg/m^3)	Density of water (kg/m^3)	Relative Density
.....	10^3	5
8.5×10^3	10^3	-

Density of metal (kg/m^3)	Density of water (kg/m^3)	Relative Density
Density of metal = Relative density x Density of water 5×10^3	10^3	5
8.5×10^3	10^3	8.5

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

Mass (Kg)	Volume (m^3)	Density (Kg/m^3)
350	175	$350/175 = 2$
Mass =	190	4
Density \times Volume		

190×4		
$= 760\text{kg}$		

Q.5 Give scientific reasons

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

- Ans**
- According to the law of inertia of rest, an object in the state of rest cannot change its state of rest due to its inherent property.
 - If a stationary bus suddenly speeds up, passengers are thrown in the backward direction due to the inertia of rest.
 - This is because the passengers sitting in the stationary bus are in the state of rest.
 - When the bus starts suddenly, the lower part of the body starts moving with the bus but the upper part of the body is still in the state of rest due to inertia.
 - And hence the passengers are thrown in the backward direction.

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

- Ans**
- Buoyant force depends on two factors: Volume of the object and the Density of the liquid.
 - The density of marine water is higher than density of fresh water due to the salts dissolved in it.
 - More is the density of the liquid, more is the buoyant force. Hence in marine water, the buoyant force exceeds the gravitational force.
 - So, a ship dips to a larger depth in fresh water as compared to marine water as the buoyant force is more.

3 Fruits can easily be cut with a sharp knife.

- Ans**
- The force exerted perpendicularly on a unit area is called pressure ($P = F/A$).
 - Pressure is inversely proportional to the area. So lesser is the area more is the pressure.
 - Sharp knife has a very thin blade.
 - Hence the force required to cut the fruits is less as there is more pressure and the fruits can be cut easily.

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

- Ans**
- The force exerted perpendicularly on a unit area is called pressure ($P = F/A$).
 - Pressure increases as the depth of the liquid increases and at any point at a particular depth, liquid pressure is same in all directions.
 - Dams have broad walls at the base compared to top to withstand the high pressure exerted by huge amount of water at the base.
 - Therefore, the wall of a dam is broad at its base to provide strength and safety to the dam.

Q.6 Solve Numerical problems

3

1 The volume of a plastic covered sealed box is 350 cm^3 and the box has a mass 500g. 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 box	= 350 cm^3
Mass of the box	= 500g
density of water	= 1 g cm^{-3}

To find: If the object will float or sink = ?

Mass of water displaced by the box = ?

Formula : Density = Mass/ Volume

Solution : Density = Mass/ Volume

$$= 500/350$$

$$= 50/35$$

$$= 1.43 \text{ g/cm}^3$$

Relative density = Density of box/ Density of water

$$= 1.43 / 1$$

$$= 1.43$$

Ans: 1. As the density of the box is more than the density of water, the box will sink in water.

2. According to Archimedes principle, when an object is immersed in water, it displaces volume of water equal to volume of the box.

Therefore, Volume of water displaced = 350 cm^3

Mass of water displaced by the box :

$$\begin{aligned}\text{Mass of water displaced} &= \text{Volume of displaced water} \times \text{density of water} \\ &= 350 \times 1 \\ &= 350 \text{ g}\end{aligned}$$

Thus, the mass of water displaced is 350 g

Q.7 Answer the following

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

- Ans**
- The force exerted perpendicularly on a unit area is called pressure.
 - Pressure = Force / Area
 - Pressure is inversely proportional to Area. Greater is the area, lesser is the pressure.
 - Large number of wheels effectively distributes the load as the surface area increases thereby decreasing the pressure on the wheels.
 - Hence, the load carrying heavy vehicles have large number of wheels to distribute the pressure evenly.

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

- Ans**
- Whether a plastic cube released in water will sink or float to the surface of water depends on the buoyant force.
 - The plastic cube will float if the buoyant force is larger than its weight.
 - The plastic cube will sink if the buoyant force is smaller than its weight.
 - The plastic cube will float inside the water if the buoyant force is equal to its weight.

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

- Ans**
- The pressure created due to air is called the atmospheric pressure.
 - Air pressure at sea level is called 1 Atmospheric pressure. Air pressure decreases as one goes up in height from the sea level.
 - 1 Atmospheric pressure = $101 \times 10^3 \text{ Pa} = 1 \text{ bar}$
 - We constantly bear the atmospheric pressure on our heads.
 - But we don't get crushed due to atmospheric pressure, because the pressure inside our body exerted by the ears, lungs and stomach is balanced by the outside atmospheric pressure.
 - Also, the cavities in our body are also filled with air and arteries and veins are filled with blood. Therefore we don't get crushed.

Colours of your Dreams