Force and Pressure

EXERCISE [PAGE 22]

Exercise | Q 1.1 | Page 22

Write the word in the blank space.

The SI unit of force is_____.

1. Dyne
2. **Newton**
3. Joule

Solution: The SI unit of force is **Newton**.

Exercise | Q 1.2 | Page 22

Write the word in the blank space.

The air pressure on our body is equal to _____ pressure.

1. **Atmospheric**
2. sea bottom
3. space

Solution: The air pressure on our body is equal to **atmospheric** pressure.

Exercise | Q 1.3 | Page 22

Write the word in the blank space.

For a given object, the buoyant force in liquids of different _____ is_____. (the same , density , different , area)

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

Exercise | Q 1.4 | Page 22

Write the word in the blank space.

The SI unit of pressure is_____.

1. N/m^3
2. **N/m^2**
3. kg/m^2

4. pa/m^2

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

Exercise | Q 2 | Page 22

Make a match

A group	B group
1. Fluid	a. Higher pressure
2. Blunt knife	b. Atmospheric pressure
3. sharp needle	c. Specific gravity
4. Relative density	d. Lower pressure
5. Hecto pascal	e. Same pressure in all directions

Solution:

A group	Answers
1. Fluid	e. Same pressure in all directions
2. Blunt knife	d. Lower pressure
3. sharp needle	a. Higher pressure
4. Relative density	c. Specific gravity
5. Hecto pascal	b. Atmospheric pressure

Exercise | Q 3.1 | Page 22

Answer the following question in brief.

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

Solution: The plastic cube is going to float on the surface of water as its density is less than that of water.

Exercise | Q 3.2 | Page 22

Answer the following question in brief.

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

Solution: We know, Pressure = Force / Area

So, greater the area of contact between two surfaces, lesser will be the pressure.
So, the load carrying heavy vehicles have large number of wheels so that the pressure on the road is reduced due to larger contact area. Also, using large number of wheels

ensures that the force due to the load is shared among the tyres and no single tyre is under stress.

Exercise | Q 3.3 | Page 22

Answer the following question in brief.

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

Solution: We carry atmospheric pressure of about 10^5 Pa on our heads. We don't feel it because this atmospheric pressure is balanced by the pressure created by the air and blood inside our body.

Exercise | Q 4.1 | Page 22

Why does it happen?

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

Solution: The density of marine water is more than the fresh water due to which the buoyant force on the ship in marine water is more than the fresh water. Hence, the ship dips to a larger depth in fresh water as compared to marine water.

Exercise | Q 4.2 | Page 22

Why does it happen?

Fruits can easily be cut with a sharp knife.

Solution: Since the sharp edged knife makes lesser contact with the fruits to be cut, thus the pressure exerted by it on the fruit is very large. Because of this large pressure, fruits are easily cut with a sharp knife.

Exercise | Q 4.3 | Page 22

Why does it happen?

The wall of a dam is broad at its base.

Solution: We know pressure of liquid increases with depth. So, the wall of a dam is made broader at its base so that it is able to withstand the heavy pressure exerted by the river water.

Exercise | Q 4.4 | Page 22

Why does it happen?

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

Solution: If a stationary bus suddenly speeds up, passengers are thrown in the backward direction. This is because initially the whole body of a passenger inside the bus was in the state of rest. But, when the bus suddenly starts or speeds up, the lower half of the passenger's body comes in motion in the forward direction but the upper half still remains at rest due to inertia of rest. Hence, the passengers are thrown backward when a stationary bus suddenly speeds up.

Exercise | Q 5 | Page 22

Complete the following tables.

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

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

weight(N)	Area (m^2)	Pressure(Nm^{-2})
-	0.04	20,000
1500	500	-

Solution: We know, Density = Mass / Volume

So, using above formula, we can find one quantity if other two quantities are given.

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

We know, Relative density of substances $= \frac{\text{Density of substances}}{\text{Density of Water}}$

So, using above formula, we can find one quantity if other two quantities are given.

Density of Metal (kg/m^3)	Density of water (kg/m^3)	Relative Density
5×10^3	10^3	5
8.5×10^3	10^3	8.5

We know, Pressure = Force / Area

So, using above formula, we can find one quantity if other two quantities are given.

Weight (N)	Area (m^2)	Pressure ($N\ m^{-2}$)
800	0.04	20,000
1500	500	3

Exercise | Q 6 | Page 22

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

Solution: Given:

Density of metal $= 10.8 \times 10^3\ kg/m^3$

We know, density of water = $1000\ kg/m^3$

$$\text{Relative density of substance} = \frac{\text{Density of substance}}{\text{Density of water}}$$

$$\text{Relative density of substance} = \frac{10.8 \times 10^3}{1000} = 10.8$$

Exercise | Q 7 | Page 22

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

Solution: Given:

Volume of object = $20\ cm^3$

Mass of object = 50 g

$$\text{Density of object} = \frac{\text{Mass of object}}{\text{Volume of object}} = \frac{50}{20} = 2.5\ g/cm^3$$

Now, we know density of water = $1 g/cm^3$

Since, density of object > density of water, therefore the object is going to sink in water.

Exercise | Q 8 | Page 22

The volume of a plastic covered sealed box is 350 cm^3 and the box has a mass 500 g. Will the box float on water or sink in water? what will be the mass of water displaced by the box?

Solution: Given:

Volume of box = 350 cm^3

Mass of box = 500 g

$$\text{Density of object} = \frac{\text{Mass of Object}}{\text{Volume of Object}} = \frac{500}{350} = 1.43 \text{ g/ cm}^3$$

Now, we know density of water = 1 g/cm^3

Since, density of box > density of water, therefore the object is going to sink in water.

Now, volume of liquid displaced = Volume of the object = 350 cm^3

$$\Rightarrow \frac{\text{Mass of liquid displaced}}{\text{Density of liquid displaced}} = 350 \text{ cm}^3$$

$\Rightarrow$ Mass of liquid = 350 × 1 = 350 g