

**Physics****Worksheet 5 : 11/08/2020****Class - IX****CHAPTER 5 : STATE OF MATTER AND PRESSURE****Instructions:**

- ✓ Read the chapter in your book - quickly and thoroughly, preferably more than once.
- ✓ Watch the uploaded video classes of this chapter from school's website/You Tube channel. For becoming more clear about the basics, watch more than once, if needed.
- ✓ Contact me in case of any difficulty in understanding.

(Questions given in this worksheet are important questions for all exams)

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**Cognitive Questions (Mark - 1)****1. What is called stress?**

Ans.: The force per unit area that develops within a substance due to deformation is called stress.

**2. Write down Hooke's law.**

Ans.: " Within elastic limit stress is directly proportional to strain."

**3. What is strain?**

Ans.: The relative change in length or shape which is made by applying a force from outside is called strain.

### Analytical Questions (Marks - 2)

**1. What is the reason of variation of the pressure at a point in specific liquid at a fixed depth?**

Ans.: We know, pressure,  $P = h\rho g$ . Here,  $h$  = depth of liquid,  $\rho$  = density of liquid and  $g$  = gravitational acceleration. Density of a certain liquid is fixed, fixed depth is fixed. But gravitational acceleration ( $g$ ) is different in different places of earth. So, we can say that, the reason of pressure variation at a point in a specific liquid at a fixed depth is because of the value of different gravitational acceleration in different places.

**2. Why do we feel that an object lost its weight when it is drowned in liquid?**

Ans.: If an object is drowned in liquid an upward force or buoyancy acts on it. So it seems like that the object lost some of its weight. The upward force or buoyancy acting on the object is equal to the amount of liquid that the object removes. If this buoyancy is subtracted from object's weight, we get object's net force which is less than object's weight. That is why we feel that the object lost some of its weight.

**3. Why an embankment dam's lower part is kept wider than the upper part?**

Ans.: While making any dam, a slope needs to be created. If not, the dam may break-down because of its own weight.

Therefore, the lower part is usually wider than the upper part. Also, embankment dams are normally made to stop water flow. The pressure applied by water increases as the height increases. So lower part of dam must tolerate more pressure. To control this pressure, lower part of dam is made wide so that the pressure due to water height decreases.

**4. Why ice is floating in water? Explain**

Ans.: If the density of a body is less than water, it will float on water otherwise it will sink. Ice is a state of water. When water transforms into ice, its volume increases but mass remains same. As a result, density decreases. Hence ice floats on water.

**5. Why does rotten egg floats on water? Explain.**

Ans.: Rotten egg floats on water because its density is less than water. Pure egg immerses in water because its density is more than that of water. When egg becomes rotten, gas comes out through porous shell of egg and for this reason in a same volume, the density of egg becomes less and it floats on water.

**6. The density of matter depends on the temperature - explain.**

Ans.: When heat is applied on a body, its atoms move away from each other. So its volume increases. Mass will be same and density is the ratio of mass and volume. So with increase of temperature, the density increases. But exception can be found in some cases (such as water).

**7. Why it is easier to swim in the sea than in the river?**

Ans.: The density of sea water is more than that of river water. As a result, buoyancy of sea water is more than river water. It is easier to swim in the sea than in the river because of this buoyancy.

**8. Why is it easier to penetrate paper by a sharp pin than by a dull one? Explain.**

Ans.: If the area of the force applied is less, then the pressure increases. The area of sharp edge of a pin is small compared to that of a dull one. So, when it is placed on a paper it penetrate the paper more easily than pin with dull edge.

We know,  $P = F/A$

When 'A' decreases, 'P' increases.

As a result, a sharp pin can penetrate more easily.

**9 . A needle gets sunk in water but a ship made of iron floats in water - Explain.**

Ans.: A needle has a very little volume. The weight of displaced water by the needle is less than its weight. So a needle gets sunk in water. On the other hand, a ship has a very large volume. The weight of displaced water by the ship is more than the ships weight. So a ship made of iron floats in water.

**10. Why does the iron sink in water but float on mercury? - Explain.**

Ans.: The density of iron is more than water but less than mercury. That is why the weight of iron is more than water of same volume but less than weight of mercury of same volume. So, when the iron piece is immersed in water, its resultant force is downward, so it sinks. When the iron is immersed in mercury the resultant force is upward, so floats being partially immersed.

**11. Why are elasticity of all matters not same?**

Ans.: Elasticity evolves due to the force of attraction and repulsion between the internal molecules of a body. This force depends on the average distance between the molecules. In liquids, they are comparatively distant from one another, but the force of attraction prevails between them. The distance between the molecules in gas are the most. For this reason, solids are the most elastic, liquids are less elastic than solids and gases almost have no elasticity.

**12. Steel is more elastic than rubber - Explain.**

Ans.: Elasticity is defined as the attributed property by which a body is able to resist deformation and recovers its original shape and size when the deforming force is removed. Elasticity is measured by the value of modulus of elasticity and is the ratio of stress and strain. In a steel object, the stress developed for a very small strain under an external force is greater than rubber. Because the intermolecular forces in steel is very strong, its modulus of elasticity is greater than that of rubber. So steel is more elastic than rubber.

**13. The unit and dimension of elastic constant and stress is same - explain.**

Ans.:

$$\begin{aligned} \text{Elastic Constant} &= \frac{\text{Stress}}{\text{Strain}} \\ &= \frac{\frac{\text{Force}}{\text{Area}}}{\frac{\text{Change of length}}{\text{Length}}} \\ \text{The unit of elastic constant} &= \frac{\frac{\text{N}}{\text{m}^2}}{\frac{\text{m}}{\text{m}}} = \text{Nm}^{-2} \end{aligned}$$

$$\begin{aligned}\text{The dimension of elastic constant} &= [\text{MLT}^{-2} \times \text{L}^{-2}] \\ &= [\text{ML}^{-1}\text{T}^{-2}]\end{aligned}$$

Again, stress is defined as the amount of force per unit area.

$$\text{Stress} = \frac{\text{Force}}{\text{Area}}$$

$$\text{The unit of stress} = \frac{\text{N}}{\text{m}^2} = \text{Nm}^{-2}$$

$$\begin{aligned}\text{Dimension of stress} &= [\text{MLT}^{-2} \times \text{L}^{-2}] \\ &= [\text{ML}^{-1}\text{T}^{-2}]\end{aligned}$$

So the unit and dimension of elastic constant and stress is same.