

Floatation: Class-9 important solved Questions from previous year CBSE Board Paper -2

Question: 1. If a body floats on the surface of a liquid, then how much is the weight of the liquid displaced as compared to weight of body.

Answer: Ans: The weight of the liquid displaced is equal as compared to weight of body.

Question: 2. . What does Archimedes' Principle state?

Answer : The Principle states that: *"A body immersed in a liquid loses weight by an amount equal to the weight of the liquid displaced."*

Archimedes principle also states that: *"When a body is immersed in a liquid, an upward thrust, equal to the weight of the liquid displaced, acts on it."*

Thus, when a solid is fully immersed in a liquid, it loses weight which is equal to the weight of the liquid it displaces.

Loss in weight of solid = W in air – w in liquid

Loss in weight of solid = *the weight of the liquid displaced*

The more the density of liquid in which the solid is immersed, the less is the weight of the liquid displaced on immersing the solid.

Question: 3. when we put a piece of iron on the surface of water it sinks immediately, but a ship made of iron and steel floats on water. Give reason in two points.

Answer: Buoyancy force acting on ship is more than the weight of ship so it floats. This is because water displaced by ship is more than that of a piece of iron

Question: 4. the mass of a solid iron cube of side 3 cm is to be determined by using a spring balance. If the density of iron is about 8.5 gCC^{-1} , What should be the least count of the best suited spring balance to determine the weight of solid ?

Answer: mass of cube = $d \times v = 3 \times 3 \times 3 \times 8.5 = 229.5 \text{ gwt}$

The least count of the best suited spring balance to determine the weight of solid = 0.5 gwt

Question: 5.. Mass of a cubical copper block of 2 cm side is 64 g. Calculate the density of copper.

Answer : the density of copper = $m/v = 64/8 = 8 \text{ g/cm}^3$

Question: 6. A force is applied on a metal block lying on floor in one direction. Still the block does not move.

Name the force which is balancing it.

Answer : Friction force

Question: 7. A ball filled with air has a volume of 500 cm³. Calculate the minimum force applied by a child to put it completely inside the water. (Take $g = 10 \text{ m/s}^2$)

Answer : the minimum force applied by a child to put it completely inside the water = $vdg = 500 \times 0.01 \times 1 = 5$ gwt

So the child needs to apply 5N force to put it completely inside water.

Question: 8. Why buoyant force acts in direction perpendicular to the earth surfaces.

Answer: Fluid pressure act normally on any area in whatever orientation the area may be held

Question: 9. Why does the diver wear metallic cover while going into the sea ?

Answer: Fluid pressure increases with depth. So withstand with high pressure at depth of sea the diver wear metallic cover while going into the sea.

Question: 10. Two objects A and B have densities 0.7 g/mL and 2.6 g/mL respectively. Both the objects are separately placed on the surface of a fluid of density 1.5 g/mL. What will be the direction of net force acting on the objects A and B and why?

Answer: Density of objects A is less than Density of water. So net force act in upward direction.

Density of objects B is more than Density of water. So net force act in downward direction.

Question: 11. Define thrust. Name the factors on which the pressure depends. What happens if a man standing on a sand surface lies down on the sand?

Answer: The perpendicular force acting on a surface is called thrust

Pressure depends on : (a) inversely proportional to area of contact. (b) directly proportional to force or thrust

When a man standing on sand surface lies down the area of contact increases hence the pressure exerted by him on the sand will decrease.

Question: 12. Name the instrument used to determine the density of liquid in which balance and graduated cylinder are not required. Why this instrument is made heavy near the bottom?

Answer: The instrument used to determine the density of liquids is hydrometer. It consists of a uniform test tube. The base of the tube is made heavier by taking few lead shots in it so that the tube remains vertical while floating in water or a given liquid.

Questions: 13. Loaded test-tube placed in pure milk sinks to a certain mark (M). Now some water is mixed with the milk. Will the test tube sink more or less? Explain. [2011 (T-II)]

Answer: As density of milk is greater than density of water, so when some water is mixed with milk, then amount of buoyant force is decreased at some extent. Consequently test tube will sink more.

Question: 14. If relative density of aluminium is 2.7 and density of water is 1000 kg/m^3 . What is the density of aluminium in SI unit?

Answer: Relative density of aluminium = Density of aluminium/Density of water

⇒ Density of aluminium = Relative density of aluminium × Density of water = $2.7 \times 1000 \text{ kg/m}^3 = 2700 \text{ kg/m}^3$

Question: 15. A sphere of mass 5 kg and volume $2.2 \times 10^{-4} \text{ m}^3$ is completely immersed in water. Find the buoyant force exerted by water on the sphere. Density of water = 1000 kgm^{-3} (Given : $g = 9.8 \text{ ms}^{-2}$).

Answer. Here, volume of sphere = Volume of water displaced = $2.2 \times 10^{-4} \text{ m}^3$

(∵ sphere is completely immersed in water)

Mass of the water displaced = Volume × Density = $2.2 \times 10^{-4} \text{ m}^3 \times 1000 \text{ kg m}^{-3} = 2.2 \times 10^{-1} \text{ kg}$

Thus, buoyant force exerted by water = weight of water displaced = mg

= $2.2 \times 10^{-1} \text{ kg} \times 9.8 \text{ m/s}^2 = 21.56 \times 10^{-1} \text{ N} = 2.156 \text{ N}$

16. In the experiment of “observing and comparing pressure exerted by iron cuboid on sand bed”, what is the conclusion drawn from the experiment? Does it match with the theoretical aspect ?

Solution:

Conclusions drawn from the experiment:

1. The pressure in sand is greater when the solid iron cuboid is placed on its least surface area.
2. The pressure exerted by the smallest surface area is greater than the other surfaces with larger areas.

Yes, it matches with theoretical aspect