QB365 Question Bank Software Study Materials

Fluids Important 3 & 5 Marks Questions With Answers (Book Back and Creative)

9th Standard

Science

Total Marks : 78

3 Marks

11 x 3 = 33

1) On what factors the pressure exerted by the liquid depends on?

Answer : Pressure exerted by a liquid at a point is determined by

i) depth (h)

ii) density of the liquid (p)

iii) acceleration due to gravity (g)

2) Why does a helium balloon float in air?

Answer : Helium in the balloon is lighter than the air around it, it receives an upward thrust known as buoyancy. Because helium weighs less than the amount of air it has displaced. So it floats.

3) Why it is easy to swim in river water than in sea water?

Answer : It is easier to swim in the sea water as compared to river water, Because sea water has dissolved salts in it, which increases the density of water and also increases its upthrust, so the body sink less and we can easily swim in it as compared to the river water, because river water is less dense than sea water.

4) What is meant by atmospheric pressure?

Answer : The layer of the air around the earth upto certain height of about 300 km, is called as the atmosphere of the earth. Since air occupies space and has weight, it also exerts pressure. This pressure is called atmospheric pressure.

5) State Pascal's law.

Answer : Pascal's Law states that the external pressure applied on an incompressible liquid is transmitted uniformly throughout the liquid.

6) State Archimedes principle.

Answer : Archimedes principle states that a body immersed in a fluid experiences a vertical upward buoyant force equal to the weight of the fluid it displaces.

7) A silver cylindrical rod has a length of 0.5m and radius of 0.5m. Find the density of the rod if its mass is 3000 kg.

Answer : Mass of the cylinder = 3000kg

Volume of the cylinder = $\pi r^2 h$

= 3.14 x $(0.5)^2$x 0.5

= 0.3925m^3

Density = $\frac{mass}{volume}$

= $\frac{3000kg}{0.3925m^3}$

Density of the rod = 7643kg/m^3.

8) A rectangular wooden block of mass 4kg. Its length, breadth and height is 50cm, 30cm and 10 cm. Find the pressure on it with its sides measuring 50 x 30 is facing up and when its sides measuring 30 x 10 facing up.

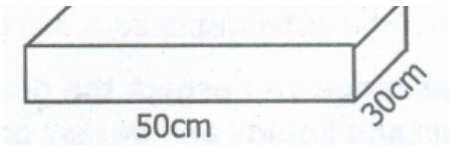
Answer : Case 1:

Force (F) = mass x 9

= 4 x 9.8

= 39.2 N

Pressure = $\frac{F}{A}$



A = 50 x 30 = 1500 cm^2

= $\frac{1500}{10000}$ = 0.15 m^2

= $\frac{39.2}{0.15}$

= 261.3 N/m^2 or 261.3 Pascal.

Pressure in case 1 = 261.3 Pascal

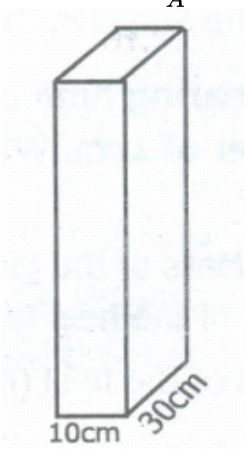
Case 2:

Force (F) = m x 9

= 4 x 9.8

= 39.2 N

Pressure = $\frac{F}{A}$



A = 30 x 10 = 300 cm^2

= $\frac{300}{10000}$ = 0.03 m^2

= $\frac{39.2}{0.03}$

= 1306 N/m^2 or 1306 Pascal.

Pressure = 1306 Pascal

Conclusion:

∴ As the area increases pressure decreases.

9) Why are cutting edges of knife sharpened?

Answer : Cutting edges of knife are sharpened because as the area decreases the pressure increases. Hence small force is enough to cut an object.

10) What is relative density?

Answer : The ratio of density of the substance to density of water at 4°C is called the relative density.

$$\text{Relative Density} = \frac{\text{Density of the substance}}{\text{Density of water at } 4^\circ C}$$

11) Give the types of hydrometer and its uses.

Answer : (i) Lactometer is used to check purity of milk.

(ii) Saccharometer is used to measure density of sugar in a liquid.

(iii) Alcoholometer is used to measure higher level of alcohol in spirits.

5 Marks 9 x 5 = 45

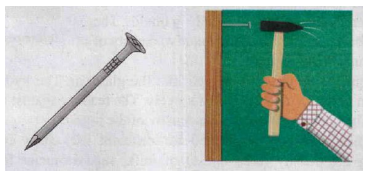
12) With an appropriate illustration prove that the force acting on a smaller area exerts a greater pressure.

Answer : 1. Take a nail. It has two ends. One end is sharp and other end is bulged head.

2. We usually keep the pointed end on the wall or wood and hammer on the bulged head

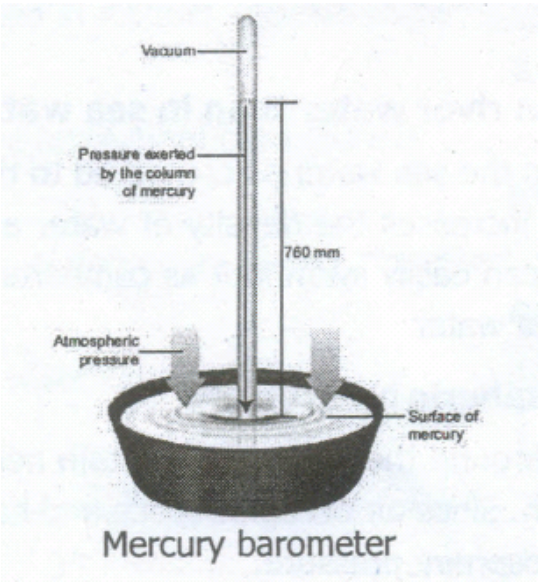
3. So very small area creates a large pressure.

4. Thus the nail penetrates into the wall or wood.



13) Describe the construction and working of mercury barometer.

Answer :



Mercury barometer

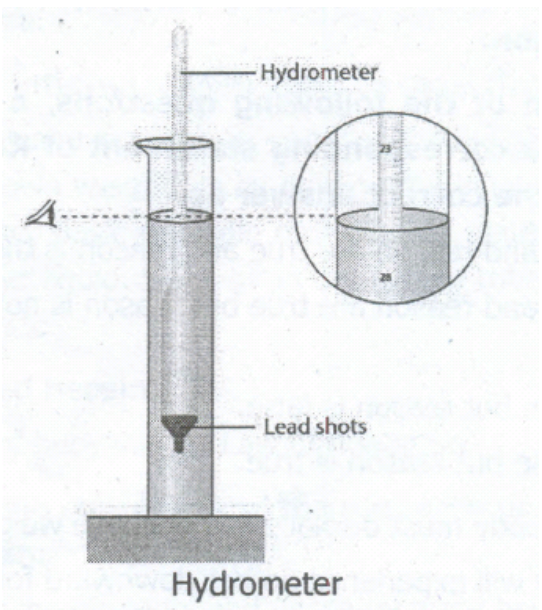
1. The instrument used to measure atmospheric pressure is called Barometer.
2. It consists of a long glass tube which is closed at one end, open at the other filled with mercury and turned upside down in a container of mercury.
3. This is done by closing the open end of the mercury filled tube with the thumb and then opening it after immersing it in to a trough of mercury.
4. The Barometer works by balancing the mercury in the glass tube against the outer air pressure.
5. If the air pressure increases, it pushes more of the mercury up into the tub and if the air pressure decreases, more of the mercury drains from the tube.
6. The space between mercury and closed end is vacuum, since vacuum cannot exert any pressure, the level of mercury in the tube provides a precise measure of air pressure, which is called atmospheric pressure.
7. This type of instrument can be used in a lab or weather station.

14) How does an object's density determine whether the object will sink or float in water?

Answer : 1. An object will sink or float in a liquid is determined by the density of the object compared to the density of the liquid .
2. If the density of a substance is less than the density of the liquid it will float. For example, a piece of wood which is less dense than water will float on it.
3. Any substance having more density than water for example a stone, will sink into water.

15) Explain the construction and working of a hydrometer with diagram.

Answer : Hydrometer is based on the principle of floatation. The weight of the liquid displaced by the immersed portion of the hydrometer is equal to the weight of the hydrometer



Hydrometer

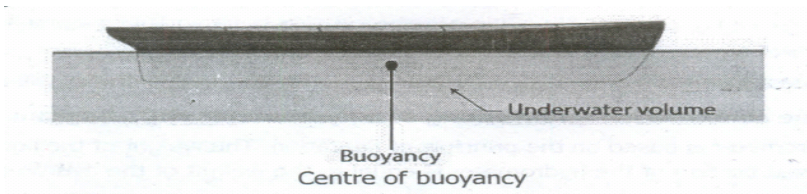
1. It is a direct reading instrument used for measuring the density or relative density of the liquid.
2. It consists of a cylindrical stem having a spherical bulb at its lower end, and a narrow tube at its upper end.
3. The lower spherical bulb is partially filled with leadshots or mercury. This helps hydrometer to float or stand vertically in liquids.
4. The narrow tube has marking so that relative density of a liquid can be read directly.
5. The liquid to be tested is poured into the glass jar. The hydrometer is gently lowered into the liquid until it floats freely.
6. The reading against the level of liquid touching the tube gives the relative density of the liquid.

16) State the laws of flotation.

Answer : Laws of flotation are:

1. The weight of a floating body in a fluid is equal to the weight of the fluid displaced by the body.
2. The centre of gravity of the floating body and the centre of buoyancy are in the same vertical line.

The point through which the force of buoyancy is supposed to act is known as centre of buoyancy.



17) Name the instrument used to check the purity of milk. What is its principle? How does it work? where it is used?

Answer : 1. The instrument used to measure the purity of milk is Lactometer .

2. Lactometer works on the principle of gravity of milk.

Working:

1. The lactometer consists of a long graduated test tube with a cylindrical bulb with the graduation ranging from 15 at the top to 45 at the bottom. The test tube is filled with air. This air chamber causes the instrument to float.
2. The spherical bulb is filled with mercury to cause the lactometer to sink up to the proper level and to float in an upright position in the milk.
3. Inside the lactometer there may be a thermometer extending from the bulb up into the upper part of the test tube where the scale is located.
4. The correct lactometer reading is obtained only at the temperature of 60^oC.
5. A lactometer measures the cream content of milk. More the cream, lower the lactometer floats in the milk. The average reading of normal milk is 32.
6. Lactometers are used highly at milk processing units and at the dairies.

18) a) When a golf ball is lowered into a measuring cylinder containing water, the water level rises by $40cm^3$, when the ball is completely submerged. If the mass of the ball in air is 44g. Calculate its density.

b) A 5kg sheet of tin sinks in water but if the same sheet is converted into a boat or a box, it floats. Give reason.

Answer : a) Mass of the ball m = 44g

Volume of water displaced = $40cm^3$

Density of the ball when it is completely submerged = $\frac{mass}{volume}$

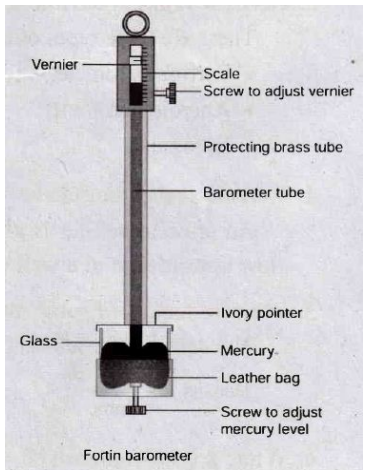
= $\frac{44}{40}$ = 1.1 g/cm^2

Density = 1.1 g/cm^3.

b) The density of tin is higher than that of water, so the sheet of tin sinks in water But when the same sheet of tin is converted into boat or box, a lot of air is trapped in the boat or box. Then the average density of boat or box, made of tin sheet, becomes lower than that of water, therefore it floats in water.

19) Draw and describe Fortin's barometer.

Answer : It is a mercury barometer in which the mercury bath along with mercury and barometer tube is covered with a flexible leather case so that spilling of mercury during transport is averted. The amount of movement of a screw at the bottom to maintain the mercury level same is a measure of the atmospheric pressure.



20) Describe the Lactometer working mechanism.

Answer : Lactometer:

(i) One form of hydrometer is a lactometer, an instrument used to check the purity of milk. The lactometer works on the principle of gravity of milk.

(ii) The lactometer consists of a long graduated test tube with a cylindrical bulb with the graduation ranging from 15 at the top to 45 at the bottom.

(iii) The test tube is filled with air. This air chamber causes the instrument to float. The spherical bulb is filled with mercury to cause the lactometer to sink up to the proper level and to float in an upright position in the milk.

(iv) Inside the lactometer there may be a thermometer extending from the bulb up into the upper part of the test tube where the scale is located. The correct lactometer reading is obtained only at the temperature of $60^{o}F$. A lactometer measures the cream content of milk. More the cream, lower the lactometer floats in the milk.

(v) The average reading of normal milk is 32. The lactometers are used highly at milk processing units and at dairies.