

9th Science Lesson 3 Questions in English

3] Fluids

1. A small iron nail sinks in water, whereas a huge ship of heavy mass floats on sea water. Astronauts have to wear a special suit while traveling in space. All these have a common reason called _____

- a) Density
- b) Pressure**
- c) Friction
- d) Heat

Explanation

A small iron nail sinks in water, whereas a huge ship of heavy mass floats on sea water. Astronauts have to wear a special suit while traveling in space. All these have a common reason called 'pressure'.

2. Which among the following statement is correct

- 1) If the pressure increases in a liquid, based on its inherent properties, it experiences tension and ultimately deforms or breaks. In the case of gases, it causes them to flow rather than to deform.
 - 2) Although liquids and gases share some common characteristics, they have many distinctive characteristics on their own. It is easy to compress a gas whereas liquids are incompressible. Learning of all these facts helps us to understand pressure better.
- a) Only 1
 - b) Only 2**
 - c) Both 1 and 2
 - d) None

Explanation

If the pressure increases in a solid, based on its inherent properties, it experiences tension and ultimately deforms or breaks. In the case of fluids, it causes them to flow rather than to deform.

3. Which among the following statement is correct

- 1) When you stand on loose sand, the force is acting on an area equal to the area of your feet. When you lie down, the same force acts on an area of your whole body, which is larger than the area of your feet. Thus, the force acting parallel to the surface is called thrust.
 - 2) Therefore, the effect of thrust, depends on the area on which it acts. The effect of thrust on sand is larger while standing than while lying.
- a) Only 1

- b) Only 2
- c) Both 1 and 2
- d) None

Explanation

When you stand on loose sand, the force is acting on an area equal to the area of your feet. When you lie down, the same force acts on an area of your whole body, which is larger than the area of your feet. Thus, the force acting perpendicular to the surface is called thrust.

4. Which among the following equation defines pressure

- a) Areas of contact / Thrust
- b) Area of contact / Weight of Particle
- c) **Thrust / Area of contact**
- d) Friction / Area of contact

Explanation

The force per unit area acting on an object concerned is called pressure. Thus, we can say thrust on a unit area is pressure. $\text{Pressure} = \text{Thrust} / \text{Area of contact}$.

5. In SI units, the unit of thrust is ____

- a) **Newton**
- b) Pascal
- c) Watt
- d) Joule

Explanation

In SI units, the unit of thrust is newton (denoted as N).

6. Which among the following is the unit of Pressure?

- a) $\text{N}^{-2}\text{m}^{-1}$
- b) Nm^{-1}
- c) N^{-2}m
- d) **Nm^{-2}**

Explanation

The unit of pressure is newton per square metre or newton metre⁻² (denoted as Nm^{-2}).

7. In the honour of the great French scientist, $1 \text{ Nm}^{-2} =$ what?

- a) $1 \text{ Nm}^{-2} = 1 \text{ W}$
- b) **$1 \text{ Nm}^{-2} = 1 \text{ pa}$**

- c) $1 \text{ Nm}^{-2} = 1 \text{ Joule}$
- d) $1 \text{ Nm}^{-2} = 1 \text{ Farad}$

Explanation

In the honour of the great French scientist, Blaise Pascal, 1 newton per square metre is called as 1 pascal denoted as Pa. $1 \text{ Pa} = 1 \text{ N m}^{-2}$.

8. Which among the following is called as fluids?

- a) Solid
- b) Liquid
- c) Gases
- d) **Both liquid and gases**

Explanation

All the flowing substances, both liquids and gases are called fluids. Like solids, fluids also have weight and therefore exert pressure. When filled in a container, the pressure of the fluid is exerted in all directions and at all points of the fluid. Since the molecules of a fluid are in constant, rapid motion, particles are likely to move equally in any direction.

9. Which among the following equation calculate pressure in fluid?

- a) **F/A**
- b) Pa/A
- c) N/A
- d) A/Pa

Explanation

Pressure in fluids is calculated as shown below. Fluid Pressure = Total force exerted by the fluid / Area over which the force is exerted = F / A .

10. The force exerted due to the pressure of a liquid on a body submerged in it and on the walls of the container is always what to the surface?

- a) Parallel
- b) Semi parallel
- c) **Perpendicular**
- d) Both parallel and perpendicular

Explanation

The force exerted due to the pressure of a liquid on a body submerged in it and on the walls of the container is always perpendicular to the surface.

11. Pressure exerted by a liquid at a point is determined by what?

- a) Depth
- b) Density of the liquid
- c) Acceleration due to gravity
- d) **All the above**

Explanation

Pressure exerted by a liquid at a point is determined by, (i) depth (h) (ii) density of the liquid (ρ) (iii) acceleration due to gravity (g).

12. A man whose mass is 90 kg stands on his feet on a floor. The total area of contact of his two feet with the floor is 0.036 m² (Take, $g = 10 \text{ ms}^{-2}$). How much is the pressure exerted by him on the floor?

- a) 15000 N
- b) 15000 Pa
- c) 25000 N
- d) **25000 Pa**

Explanation

The weight of the man (thrust),

$$F = mg = 90\text{Kg} \times 10\text{ms}^{-2} = 900 \text{ N}$$

$$\text{Pressure, } p = F/A = 900\text{N} / 0.036 \text{ m}^2 = 25000 \text{ Pa}$$

13. A tall beaker is filled with liquid so that it forms a liquid column. The area of cross section at the bottom is A. The density of the liquid is ρ . The height of the liquid column is h. In other words, the depth of the water from the top-level surface is 'h'. what is pressure due to liquid column?

- a) $P = h\rho Ag$
- b) **$P = h\rho g$**
- c) $P = hA / \rho g$
- d) $P = 1 / h\rho g$

Explanation

We know that, thrust at the bottom of the column (F) = weight of the liquid.

$$\text{Therefore, } F = mg \text{ (1)}$$

We can get the mass of the liquid by multiplying the volume of the liquid and its density. Mass, $m = \rho V$ (2)

$$\text{Volume of the liquid column, } V = \text{Area of cross section (A)} \times \text{Height (h)} = Ah \text{ (3)}$$

Substituting (3) in (2)

Mass, $m = \rho Ah$ (4)

Substituting (4) in (1)

Force = $mg = \rho Ahg$

Pressure, $P = \text{Thrust (F)} / \text{Area (A)} = mg / A = \rho(Ah)g / A = \rho hg$

$\therefore$ Pressure due to a liquid column, $P = h\rho g$.

14. Earth is surrounded by a layer of air up to certain height (nearly 300 km) and this layer of air around the earth is called ____

- a) Crust
- b) Galaxy
- c) **Atmosphere**
- d) Debris

Explanation

Earth is surrounded by a layer of air up to certain height (nearly 300 km) and this layer of air around the earth is called atmosphere of the earth. Since air occupies space and has weight, it also exerts pressure. This pressure is called atmospheric pressure.

15. Which among the following statement is true

- a) Air gets thinner with decrease in altitude
- b) Air gets heavier as we go above the sea level
- c) **Air gets thinner with increase in altitude**
- d) All the above

Explanation

The air gets 'thinner' with increasing altitude. Hence, the atmospheric pressure decreases as we go up in mountains. On the other hand, air gets heavier as we go down below sea level like mines.

16. The atmospheric pressure we normally refer is _____

- a) The air pressure at stratospheric level
- b) The air pressure at ground level
- c) **The air pressure at sea level**
- d) The air pressure at mountain level

Explanation

The atmospheric pressure we normally refer is the air pressure at sea level.

17. What is the pressure of sea level at which human lung is adapted to breath?

- a) 93.7 K Pa
- b) 101.3 K Pa**
- c) 104.8K Pa
- d) 98.2K Pa

Explanation

Human lung is well adapted to breathe at a pressure of sea level (101.3 k Pa). As the pressure falls at greater altitudes, mountain climbers need special breathing equipments with oxygen cylinders. Similar special equipment's are used by people who work in mines where the pressure is greater than that of sea level.

18. The instrument used to measure atmospheric pressure is called ____

- a) Anemometer
- b) Tachometer
- c) Galvanometer
- d) Barometer**

Explanation

The instrument used to measure atmospheric pressure is called barometer.

19. A mercury barometer, first designed by which Italian physicist?

- a) Pascal
- b) Galileo
- c) Enrico Fermi
- d) Torricelli**

Explanation

A mercury barometer, first designed by an Italian Physicist Torricelli, consists of a long glass tube (closed at one end, open at the other) filled with mercury and turned upside down into a container of mercury. 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.

20. Which among the following statement is correct

- 1) The barometer works by balancing the mercury in the glass tube against the outside air pressure. 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.
- 2) As there is no air trapped in the space between mercury and the closed end, there is vacuum in that space. Vacuum cannot exert any pressure. So, the level of mercury in the tube

provides a precise measure of air pressure which is called atmospheric pressure. This type of instrument can be used in a lab or weather station.

- a) Only 1
- b) Only 2
- c) **Both 1 and 2**
- d) None

21. On a typical day at sea level, the height of the mercury column is ____

- a) 720 mm
- b) **760 mm**
- c) 780 mm
- d) 820 mm

Explanation

On a typical day at sea level, the height of the mercury column is 760 mm.

22. Let us calculate the pressure due to the mercury column of 760 mm which is equal to the atmospheric pressure. The density of mercury is 13600 kg m^{-3} ?

- a) $P = 2.134 \times 10^5 \text{ Pa}$
- b) **$P = 1.013 \times 10^5 \text{ Pa}$**
- c) $P = 0.714 \times 10^5 \text{ Pa}$
- d) $P = 3.182 \times 10^5 \text{ Pa}$

Explanation

Pressure, $P = h\rho g$

$$= (760 \times 10^{-3} \text{ m}) \times (13600 \text{ kg m}^{-3}) \times (9.8 \text{ ms}^{-2})$$

$$= 1.013 \times 10^5 \text{ Pa.}$$

23. What is the other unit of one atmospheric pressure?

- a) Joule
- b) Watt
- c) **Bar**
- d) Farad

Explanation

Pressure $P = 1.013 \times 10^5 \text{ Pa}$ is called one atmospheric pressure (atm). There is also another unit called (bar) that is also used to express such high values of pressure.

$$1 \text{ atm} = 1.013 \times 10^5 \text{ Pa.}$$

1 bar = 1×10^5 Pa.

Hence, 1 atm = 1.013 bar.

Expressing the value in kilopascal gives 101.3 k Pa. This means that, on each 1 m² of surface, the force acting is 1.013 k N.

24. Calculate the pressure exerted by a column of water of height 0.85 m (density of water, $\rho_w = 1000 \text{ kg m}^{-3}$) and kerosene of same height (density of kerosene, $\rho_k = 800 \text{ kg m}^{-3}$)

- a) **Pressure due to water = 8500 Pa and pressure due to kerosene = 6800 Pa**
- b) Pressure due to water = 7200 Pa and pressure due to kerosene = 6800 Pa
- c) Pressure due to water = 8500 Pa and pressure due to kerosene = 5600 Pa
- d) Pressure due to water = 7200 Pa and pressure due to kerosene = 5600 Pa

Explanation

Pressure due to water = $h\rho_w g$

$$= 0.85 \text{ m} \times 1000 \text{ kg m}^{-3} \times 10 \text{ m s}^{-2} = 8500 \text{ Pa.}$$

Pressure due to kerosene = $h\rho_k g$

$$= 0.85 \text{ m} \times 800 \text{ kg m}^{-3} \times 10 \text{ m s}^{-2} = 6800 \text{ Pa.}$$

25. For pressures higher than atmospheric pressure, absolute pressure = ?

- a) Atmospheric pressure – Gauge pressure
- b) Gauge pressure – Atmospheric pressure
- c) **Atmospheric Pressure + Gauge Pressure**
- d) Gauge pressure / Atmospheric pressure

Explanation

The absolute pressure is zero-referenced against a perfect vacuum and gauge pressure is zero referenced against atmospheric pressure.

For pressures higher than atmospheric pressure, absolute pressure = atmospheric pressure + gauge pressure

For pressures lower than atmospheric pressure, absolute pressure = atmospheric pressure – gauge pressure.

26. In petrol bunks, the tyre pressure of vehicles is measured in a unit called ____

- a) Pa
- b) **Psi**

- c) Pv
- d) Pnm

Explanation

In petrol bunks, the tyre pressure of vehicles is measured in a unit called psi. It stands for pascal per inch, an old system of unit for measuring pressure.

27. which among the following Law is the basis for the Hydraulic pressure?

- a) **Pascal's Law**
- b) Hooke's Law
- c) Graham's Law
- d) Kepler's Law

Explanation

Pascal's law became the basis for one of the important machines ever developed, the hydraulic press. It consists of two cylinders of different cross-sectional areas.

28. Pascal's law states that the external pressure applied on an incompressible liquid is transmitted how?

- a) Transmitted perpendicular to the liquid surface
- b) Transmitted parallel to the liquid surface
- c) Transmitted along the edges of liquid
- d) **Transmitted equally throughout the liquid**

Explanation

Pascal's principle is named after Blaise Pascal (1623-1662), a French mathematician and physicist. The law states that the external pressure applied on an incompressible liquid is transmitted uniformly throughout the liquid. Pascal's law can be demonstrated with the help of a glass vessel having holes all over its surface. Fill it with water. Push the piston. The water rushes out of the holes in the vessel with the same pressure.

29. In Hydraulic press, the force F_2 that acts on the larger piston is greater than the force F_1 acting on the smaller piston. Hydraulic systems working in this way are known as ____

- a) Flow force
- b) Force dynamic
- c) **Force multipliers**
- d) Force extensions

Explanation

The force F_2 that acts on the larger piston is greater than the force F_1 acting on the smaller piston. Hydraulic systems working in this way are known as force multipliers.

Pressure on piston of small area 'a' is given by, $P = F_1 / A_1$ (1)

Applying Pascal's law, the pressure on large piston of area A will be the same as that on small piston. Therefore, $P = F_2 / A_2$ (2)

Comparing equations (1) and (2), we get $F_1 / A_1 = F_2 / A_2$. or $F_2 = F_1 \times (A_2 / A_1)$.

Since, the ratio A_2 / A_1 is greater than 1, the force F_2 that acts on the larger piston is greater than the force F_1 .

30. A hydraulic system is used to lift a 2000 kg vehicle in an auto garage. If the vehicle sits on a piston of area 0.5 m^2 , and a force is applied to a piston of area 0.03 m^2 , what is the minimum force that must be applied to lift the vehicle?

- a) $F_2 = 1038 \text{ N}$
- b) $F_2 = 1176 \text{ N}$**
- c) $F_2 = 1236 \text{ N}$
- d) $F_2 = 1383 \text{ N}$

Explanation

Given: Area covered by the vehicle on the piston $A_1 = 0.5 \text{ m}^2$

Weight of the vehicle, $F_1 = 2000 \text{ kg} \times 9.8 \text{ m s}^{-2}$

Area on which force F_2 is applied, $A_2 = 0.03 \text{ m}^2$

Solution:

$$P_1 = P_2 ; F_1 / A_1 = F_2 / A_2 \text{ and } F_2 = (F_1 / A_1) \times A_2 ;$$

$$F_2 = (2000 \times 9.8) 0.03 0.5 = 1176 \text{ N}$$

31. Which among the following is the mass per unit volume of a given substance?

- a) The surface tension of a substance
- b) The force of a substance
- c) The Temperature of a substance
- d) The density of a substance**

Explanation

Let us assume that the mass of the flask be 80 g. So, the mass of the flask filled with water is 330 g and the mass of flask filled with kerosene is 280 g. Mass of water only is 250 g and kerosene only

is 200 g. Mass per unit volume of water is $250/250 \text{ cm}^3$. This is 1g/cm^3 . Mass per unit volume of kerosene is $200 \text{ g}/250 \text{ cm}^3$. This is 0.8 g/cm^3 . The result 1 g/cm^3 and 0.8 gcm^3 are the densities of water and kerosene respectively. Therefore, the density of a substance is the mass per unit volume of a given substance.

32. The SI unit of density is ____

- a) N / m^2
- b) Kgm^3
- c) **Kg / m^3**
- d) Nm^2

Explanation

The SI unit of density is kilogram per meter cubic (kg/m^3) also gram per centimetre cubic (g/cm^3).

33. The symbol for density is ____

- a) **ρ**
- b) J
- c) w
- d) c

Explanation

The symbol for density is rho (ρ).

34. At what temperature density of the water is 1g/cm^3 ?

- a) 2°C
- b) **4°C**
- c) 8°C
- d) 10°C

Explanation

We can compare the densities of two substances by finding their masses. But, generally density of a substance is compared with the density of water at 4°C because density of water at that temperature is 1g/cm^3 .

35. Density of any other substance with respect to the density of water at 4°C is called ____

- a) Absolute density
- b) Co-Operative density
- c) **Relative density**
- d) All the above

Explanation

Density of any other substance with respect to the density of water at 4 °C is called the relative density. Thus, relative density of a substance is defined as ratio of density of the substance to density of water at 4 °C.

Mathematically, relative density (R.D), = Density of the substance / Density of water at 4 °C.

36. Which among the following equation defines Density?

- a) **Mass / Volume**
- b) Volume / Mass
- c) Mass / Temperature
- d) Temperature / Mass

Explanation

Density = Mass / Volume

∴ Relative density = (Mass of the substance/Volume of the substance) \ (Mass of water/Volume of water)

Since the volume of the substance is equal to the volume of water,

Relative density = Mass of certain volume of substance / Mass of equal volume of water (at 4°C)

37. Which among the following is used to measure relative density?

- a) Lactometer
- b) **Pycnometer**
- c) Barometer
- d) Hydrometer

Explanation

Relative density can be measured using Pycnometer also called density bottle. It consists of ground glass stopper with a fine hole through it. The function of the hole in a stopper is that, when the bottle is filled and the stopper is inserted, the excess liquid rises through the hole and runs down outside the bottle. By this way the bottle will always contain the same volume of whatever the liquid is filled in, provided the temperature remains constant. Thus, the density of a given volume of a substance to the density of equal volume of referenced substance is called relative density or specific gravity of the given substance.

38. You have a block of a mystery material, 12 cm long, 11 cm wide and 3.5 cm thick. Its mass is 1155 grams. What is its density?

- a) Density = 0.3 g cm^{-3}
- b) Density = 1.8 g cm^{-3}
- c) **Density = 2.5 g cm^{-3}**
- d) Density = 3.2 g cm^{-3}

Explanation

Density = Mass / Volume

$$= 1155 \text{ g} / (12 \text{ cm} \times 11 \text{ cm} \times 3.5 \text{ cm}) = 1155 \text{ g} / 462 \text{ cm}^3$$

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

The mystery material is denser than the water. So, it sinks.

If the density of a substance is less than the density of the liquid it will float.

39. A direct-reading instrument used for measuring the density or relative density of the liquid is called ____

- a) **Hydrometer**
- b) Pycnometer
- c) Barometer
- d) Saccharometer

Explanation

A direct-reading instrument used for measuring the density or relative density of the liquid is called hydrometer. Hydrometer is based on the principle of flotation, i.e., the weight of the liquid displaced by the immersed portion of the hydrometer is equal to the weight of the hydrometer.

40. Which among the following is incorrect about Hydrometer?

- 1) Hydrometer consists of a cylindrical stem having a spherical bulb at its lower end and a narrow tube at its upper end. The lower spherical bulb is partially filled with lead shots or mercury. This helps hydrometer to float or stand vertically in liquids. The narrow tube has markings so that relative density of a liquid can be read directly.
- 2) The liquid to be tested is poured into the glass jar. The hydrometer is gently lowered in to the liquid until it floats freely. The reading against the level of liquid touching the tube gives the relative density of the liquid.
 - a) Only 1
 - b) Only 2
 - c) **Both 1 and 2**
 - d) None

41. Which among the following instrument is used for measuring the density of sugar in a liquid?

- a) Barometer
- b) Lactometer
- c) **Saccharometer**
- d) Tachometer

Explanation

Hydrometers may be calibrated for different uses such saccharometer for measuring the density of sugar in a liquid and alcoholometer for measuring higher levels of alcohol in spirits.

42. Which among the following instrument is used to check the purity of milk?

- a) Tachometer
- b) **Lactometer**
- c) Alcoholometer
- d) Barometer

Explanation

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.

43. The lactometer consists of a long-graduated test tube with a cylindrical bulb with the graduation ranging from what to what?

- a) **15 at top to 45 at bottom**
- b) 20 at top to 50 at bottom
- c) 45 at top to 15 at bottom
- d) 50 at top to 20 at bottom

Explanation

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. 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.

44. The correct lactometer reading is obtained only at the temperature of what?

- a) **93° F**
- b) 82° F
- c) 70° F
- d) 60° F

Explanation

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 °F. 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.

45. Where the pressure is more in Liquid?

- a) Top
- b) Bottom**
- c) Centre
- d) Uniformly distributed

Explanation

We already saw that a body experiences an upward force due to the fluid surrounding, when it is partially or fully immersed in to it. We also know that pressure is more at the bottom and less at the top of the liquid.

46. The pressure difference causes a force on the object and pushes it upward. This force is called -----

- a) Inertia force
- b) Joule force
- c) Buoyant force**
- d) Magnitude force

Explanation

The pressure difference causes a force on the object and pushes it upward. This force is called buoyant force and the phenomenon is called buoyancy.

47. Which among the following factor is known as positively buoyant?

- a) If the object weighs more than the amount of water it has displaced
- b) If the object weighs less than the amount of water it has displaced**
- c) If the object weighs equal to the amount of water it has displaced
- d) None of the above

Explanation

Most buoyant objects are those with a relatively high volume and low density. If the object weighs less than the amount of water it has displaced (density is less), buoyant force will be more and it will float (such object is known as positively buoyant). But, if the object weighs more than the amount of water it has displaced (density is more), buoyant force is less and the object will sink (such object is known as negatively buoyant).

48. Which among the following is an experiment that demonstrates the principle of buoyancy?

- a) Galileo's experiment
- b) Millikan's driver
- c) Eratosthenes driver
- d) **Cartesian driver**

Explanation

Cartesian diver is an experiment that demonstrates the principle of buoyancy. It is a pen cap with clay. The Cartesian diver contains just enough liquid that it barely floats in a bath of the liquid; its remaining volume is filled with air. When pressing the bath, the additional water enters the diver, thus increasing the average density of the diver, and thus it sinks.

49. Archimedes principle is the consequence of what?

- a) Newton law
- b) Joules law
- c) **Pascal law**
- d) Schrodinger law

Explanation

Archimedes principle is the consequence of Pascal's law. According to legend, Archimedes devised the principle of the 'hydrostatic balance' after he noticed his own apparent loss in weight while sitting in his bath. 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'.

50. When a body is partially or completely immersed in a fluid at rest, it experiences what?

- a) **Upthrust which is equal to the weight of the fluid displaced by it**
- b) Upthrust which is less to the weight of the fluid displaced by it
- c) Upthrust which is more to the weight of the fluid displaced by it
- d) Down thrust which is equal to the weight of the fluid displaced by it

Explanation

When a body is partially or completely immersed in a fluid at rest, it experiences an upthrust which is equal to the weight of the fluid displaced by it. Due to the upthrust acting on the body, it apparently loses a part of its weight and the apparent loss of weight is equal to the upthrust.

51. Which among the following equation gives apparent weight of an object in Archimedes principle?

- a) **True weight of an object in air – Upthrust**
- b) Upthrust – True weight of an object in air

- c) True weight of an object in air + Upthrust
- d) True weight of an object in air / Upthrust

Explanation

Thus, for a body either partially or completely immersed in a fluid,

Upthrust = Weight of the fluid displaced = Apparent loss of weight of the body

Apparent weight of an object = True weight of an object in air – Upthrust (weight of water displaced).

52. Which among the following statement is incorrect regarding law of floatation?

- 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 horizontal line.
 - a) Only 1
 - b) Only 2**
 - c) Both 1 and 2
 - d) None

Explanation

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.

53. Which among the following statement is correct

- 1) Salt water provides more buoyant force than fresh water, because, buoyant force depends as much on the density of fluids as on the volume displaced.
- 2) Flotation therapy uses water that contains Epsom salts rich in sodium. As a floater relaxes, he or she is absorbing this sodium through the skin.
 - a) Only 1**
 - b) Only 2
 - c) Both 1 and 2
 - d) None

Explanation

Flotation therapy uses water that contains Epsom salts rich in magnesium. As a floater relaxes, he or she is absorbing this magnesium through the skin. Magnesium helps the body to process insulin, which lowers a person's risk of developing Type 2 Diabetes.

54. A mercury barometer in a physics laboratory shows a 732 mm vertical column of mercury. Calculate the atmospheric pressure in pascal. [Given density of mercury, $\rho = 1.36 \times 10^4 \text{ kg m}^{-3}$, $g = 9.8 \text{ m s}^{-2}$]?

- a) $P = 7.63 \times 10^4 \text{ Pa}$
- b) $P = 8.19 \times 10^4 \text{ Pa}$
- c) **$P = 9.76 \times 10^4 \text{ Pa}$**
- d) $P = 6.82 \times 10^4 \text{ Pa}$

Explanation

Atmospheric pressure in the laboratory,

$$P = h\rho g = 732 \times 10^{-3} \times 1.36 \times 10^4 \times 9.8$$

$$= 9.76 \times 10^4 \text{ Pa (or) } 0.976 \times 10^5 \text{ Pa}$$