

Quiz.

1. Would it be slightly more difficult to drink water through a straw at sea level or on top of a high mountain?
 - a) It would be more difficult at sea level.
 - b) It would be more difficult on top of the high mountain.
 - c) It would not be any more difficult in either situation.

2. A steel tank filled with helium gas does not rise in air, but a helium balloon rises easily. What concept explains this?
 - a) Bernoulli's principle
 - b) Archimedes's principle
 - c) Boyle's law

3. When an air bubble rises in water, its _____ increases, its _____ decreases , and its _____ stays the same.
 - a) density, volume, mass
 - b) volume, mass, density
 - c) volume, density, mass

4. Would a bottle of helium gas weigh more, less, or identical to a bottle of air at the same pressure?
 - a) less
 - b) more
 - c) the same

5. Why are ocean waves higher on windy days?
 - a) The air moving between the waves causes them to separate, pushing the waves up higher than usual.
 - b) The air moving over the tops of the waves is moving more quickly than the air near the surface, so the higher pressure from below pushes the waves up and amplifies their height.
 - c) The air moving between the waves causes a swirling motion that causes waves to grow and curl.

6. Why do airplane cabins need to be pressurized?
 - a) The higher the altitude, the less atmospheric pressure, and the cabin will try to expand.
 - b) The higher the altitude, the less atmospheric pressure, and the cabin will try to compress.
 - c) The higher the altitude, the more atmospheric pressure, and the cabin will try to expand.
 - d) The higher the altitude, the more atmospheric pressure, and the cabin will try to compress.

7. A barometer is used to measure atmospheric pressure. When atmospheric pressure increases,
- the mercury level falls. The atmosphere is suctioning it.
 - the mercury level rises. The atmosphere is pushing it.
 - the mercury level rises. The vacuum inside is suctioning it.
 - the mercury level falls. Its own pressure is pushing it.
8. What is the cause of atmospheric pressure?
- The weight of the air per unit area causes atmospheric pressure.
 - Solar wind causes atmospheric pressure.
 - The gravitational field of the moon causes atmospheric pressure.
 - The vacuum of space causes atmospheric pressure.
9. Why does a candle flame in a jar behave counter-intuitively when the jar is being whipped about?
- The heated air around the flame is less dense and pushes its way through the air.
 - Plasmas do not have inertia.
 - The air in the jar has mass.
 - It is a matter of perspective.

Answer Key.

1. b)

Remember that atmospheric pressure is what forces the water up the straw when you create a pressure difference. With greater height there is less atmospheric pressure to push the water up the straw.

2. b)

According to Archimedes's principle, an object in a fluid is buoyed up with a force equal to the weight of displaced fluid. In order to float, an object's weight must not be greater than the buoyant force.

3. c)

This is an application of Boyle's law and the definition of density.

4. a)

In a rigid container, density only depends on the mass and volume of the gas, not the pressure.

5. b)

According to Bernoulli's principle, when the speed of a fluid increases, internal pressure in the fluid decreases.

6. a)

Fluid pressure increases with depth, and according to Boyle's law, pressure and volume are inversely proportional.

7. b)

Gravity pulls on the water as much as it pulls on the fish, so their weights would change by the same factor, therefore the ratio of their densities would remain unchanged.

8. a)

A barometer's mercury level changes in order to maintain a constant pressure with the atmospheric pressure. Increased atmospheric pressure pushes the mercury up, and decreased atmospheric pressure causes a fall as mercury pushes against the air pressure.

9. c)

Air has mass; therefore, it has inertia. When air moves intuitively, we do not notice this, but since the heated air around the flame is less dense, it rushes to fill the slight vacuum created by the movement of the air, and this we notice.