

Air Pressure

This text is from the U.S. National Oceanic and Atmospheric Administration: National Weather Service.

The atoms and molecules that make up the various layers in the atmosphere are constantly moving in random directions. Despite their tiny size, when they strike a surface they exert a force on that surface in what we observe as pressure.

Each molecule is too small to feel and only exerts a tiny bit of force. However, when we sum the total forces from the large number of molecules that strike a surface each moment, then the total observed pressure can be considerable.

Air pressure can be increased (or decreased) one of two ways. First, simply adding molecules to any particular container will increase the pressure. A larger number of molecules in any particular container will increase the number of collisions with the container's boundary, which is observed as an increase in pressure.

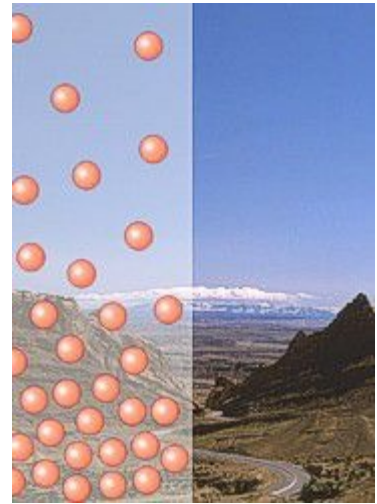
A good example of this is adding (or subtracting) air in an automobile tire. By adding air, the number of molecules increase as well [as] the total number of the collisions with the tire's inner boundary. The increased number of collisions forces the tire's pressure increase to expand in size.

The second way of increasing (or decreasing) is by the addition (or subtraction) of heat. Adding heat to any particular container can transfer energy to air molecules. The molecules therefore move with increased velocity striking the container's boundary with greater force and is observed as an increase in pressure.

Since molecules move in all directions, they can even exert air pressure upwards as they smash into [an] object from underneath. In the atmosphere, air pressure can be exerted in all directions.

In the International Space Station, the density of the air is maintained so that it is similar to the density at the earth's surface. Therefore, the air pressure is the same in the space station as the earth's surface (14.7 pounds per square inch).

Back on Earth, as elevation increases, the number of molecules decreases and the density of air therefore is less, meaning a decrease in air pressure. In fact, while the atmosphere extends more than 15 miles (24 km) up, one half of the air molecules in the atmosphere are contained within the first 18,000 feet (5.6 km).



The number of molecules in the atmosphere decreases with height.



The difference in pressure as height increases

Name: _____ Date: _____

1. According to the text, what is pressure?

- A. the speed atoms and molecules travel in a container
- B. the direction atoms and molecules travel when they strike a surface
- C. the force atoms and molecules exert when they strike a surface
- D. the layer of atoms and molecules in a container

2. Based on the text, what is the effect of adding molecules or heat to a container?

- A. The container's air pressure would decrease.
- B. The container's air pressure would increase.
- C. The container's air pressure would stay the same.
- D. There would be no more air pressure in the container.

3. Read these sentences from the text.

"In the International Space Station, the density of the air is maintained so that it is similar to the density at the earth's surface. Therefore, the air pressure is the same in the space station as the earth's surface (14.7 pounds per square inch)."

What can you conclude about the International Space Station?

- A. Without air pressure maintenance, air pressure in the International Space Station is different than in the earth's surface.
- B. Without air pressure maintenance, air pressure in the International Space Station is the same than in the earth's surface.
- C. With air pressure maintenance, air pressure in the International Space Station is different than in the earth's surface.
- D. With air pressure maintenance, there is no air pressure in the International Space Station.

4. Read these sentences from the text.

"In the International Space Station, the density of the air is maintained so that it is similar to the density at the earth's surface. Therefore, the air pressure is the same in the space station as the earth's surface (14.7 pounds per square inch)."

Based on the text, what can you infer about the International Space Station?

- A. Heat or the number of molecules in the International Space is greater than in the earth's surface.
- B. Heat or the number of molecules in the International Space is less than in the earth's surface.
- C. Heat or a number of molecules was added or subtracted in the International Space Station.
- D. There is no heat or molecule in the International Space Station.

5. What is the main idea of this text?

- A. Air pressure is the same in the International Space Station as in the earth's surface because the density of air is maintained in the station.
- B. Air pressure in a container can be increased by adding molecules or heat, and it can be decreased by subtracting molecules or heat.
- C. Air pressure on Earth decreases as elevation increases because the number of molecules decreases with height.
- D. Air pressure is observed by the exerted force of atoms and molecules, and it can be changed by adding or subtracting molecules or heat.