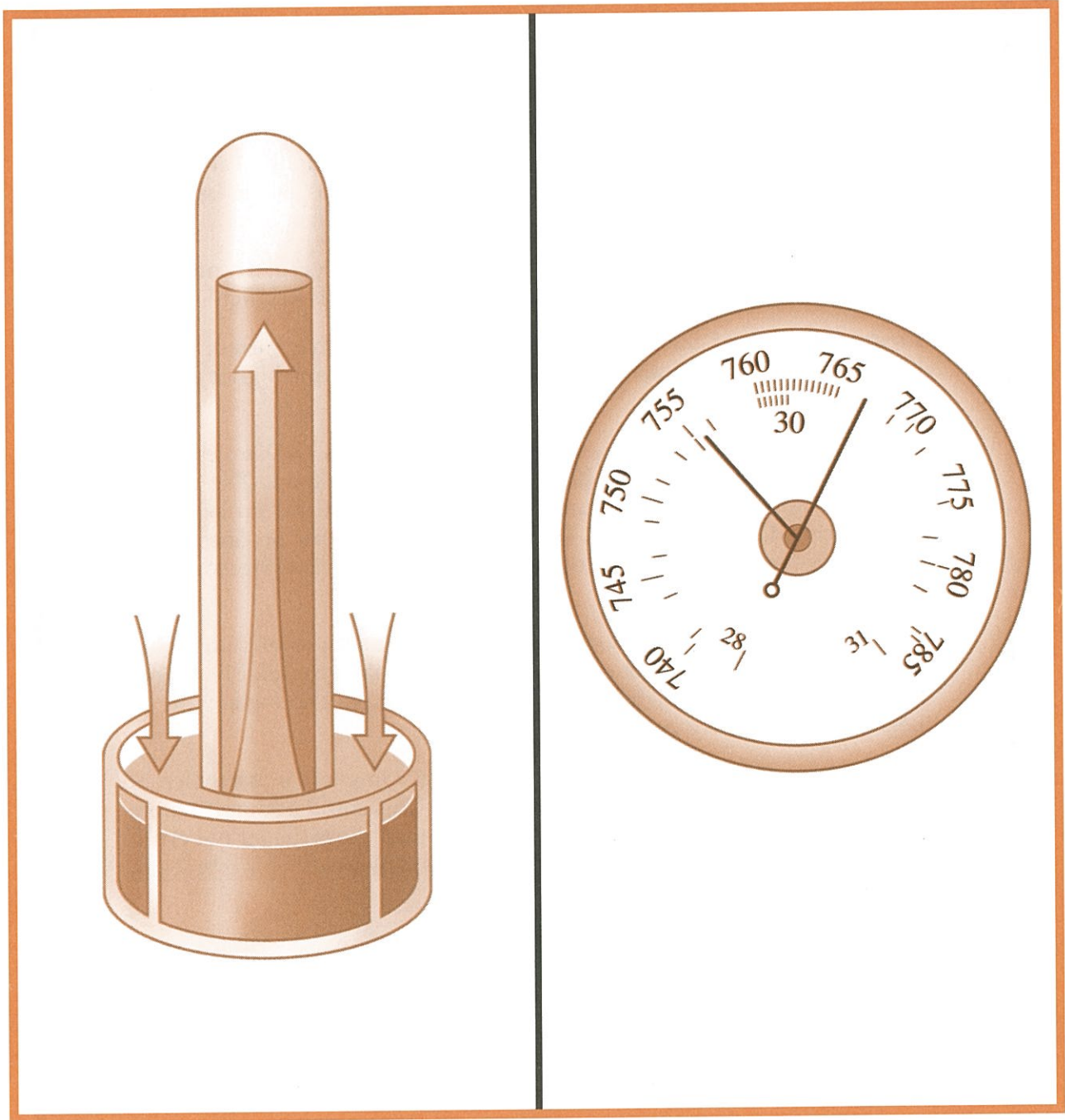


What is air pressure?



LESSON | What is air pressure?

13

What keeps you from floating into space?

There is a force called gravity that pulls things towards the earth. This force keeps you from floating away. Gravity also keeps the gases of the air from escaping into space.

The pull of gravity is stronger the closer you are to the earth's center. The pull becomes weaker the farther you go from the earth's center.

Most molecules of the air are held close to the earth's surface where gravity is strong. There are fewer and fewer molecules the higher up you go.

The atmosphere reaches up almost 1,000 kilometers (600 miles). You have already learned that air has weight. Weight is a force. The weight of the air above the earth's surface pushes down on the surface. This force is called **air pressure**. At sea level a column of air on one square centimeter weighs about 1 kilogram. Air pressure is 1 kilogram per 1 square centimeter.

The pull of gravity results in more gas molecules at sea level than higher up. Therefore, the air pressure is greater closer to the ground. The higher you go above sea level, the lower the air pressure. The lower you go below sea level, the greater the air pressure.

Air presses on every surface, even your body. On every square inch of your body, there is 15 pounds of air pressure. This could add up to more than 10 tons of air pressing against you. Why then, does the air not crush you? The answer is simple: Air does not press downward. Air presses in all directions.

There is air inside our body too. This air presses outward with the same force as the air that is pressing inward. This keeps you from being crushed.

AIR PRESSURE

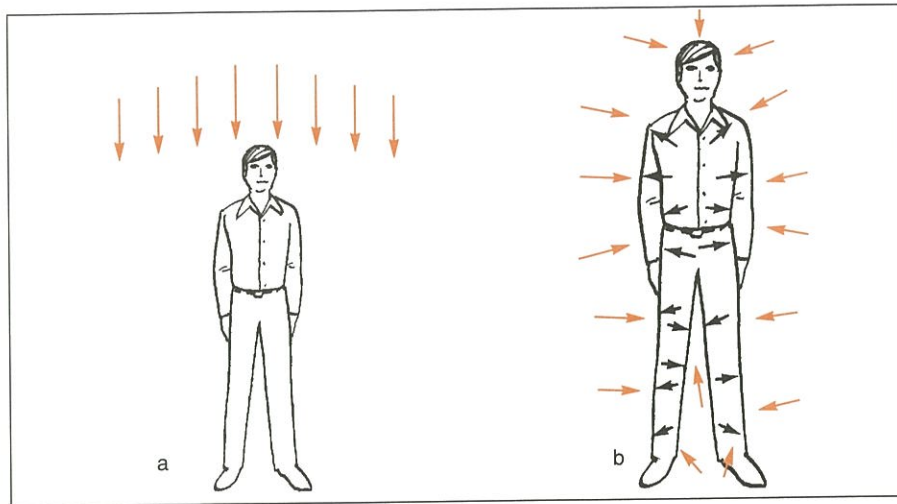


Figure A *Air does not press like this.*

Air presses like this.

Look at Figure A.

1. Air presses _____ .
only downward, only upward, in all directions

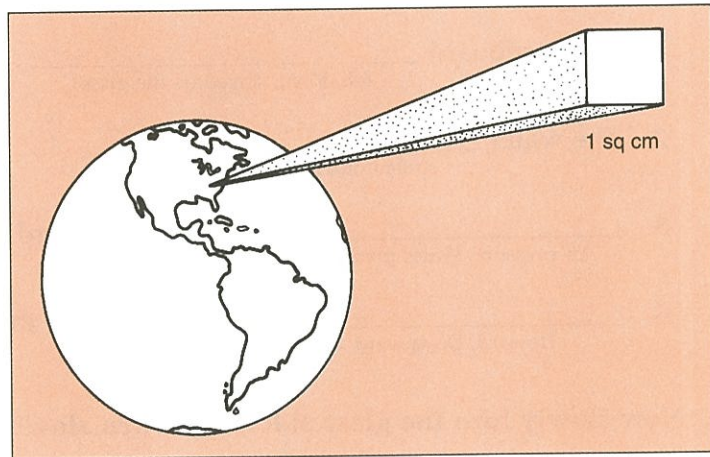


Figure B

At sea level, a column of air resting on one square centimeter (1 sq cm) weighs 1 kilogram (kg).

2. What gives air its weight? _____
3. The air pressure at sea level is _____ kilogram per square _____ .

EXPERIMENTING WITH AIR PRESSURE

What You Need (Materials)

glass tumbler
water
thin cardboard



How to Do the Experiment (Procedure)

1. Fill the tumbler (to the brim) with water.
2. Place the cardboard on top.
3. Hold a finger on the cardboard. Turn the glass upside down and take your finger away.

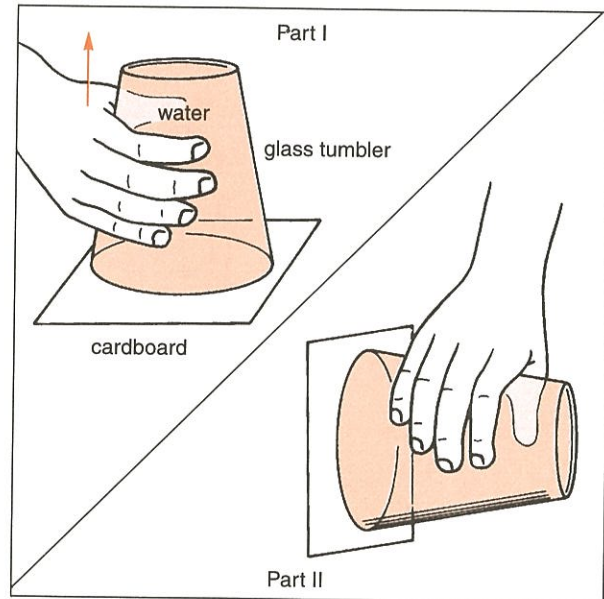


Figure C

What You Learned (Observations)

1. The cardboard _____ .
fell down, stayed on the glass
2. The water _____ .
spilled out, stayed in the glass
3. _____ kept the cardboard from falling.
Air pressure, Water pressure
4. _____ air pressure kept the cardboard from falling.
Upward, Downward

Now slowly turn the glass sideways. Then slowly turn it in all directions.

5. The cardboard _____ .
fell down, stayed on the glass
6. The water _____ .
spilled out, stayed in the glass

Something to Think About (Conclusions)

1. _____ kept the cardboard from falling down.
Air pressure, Water pressure
2. We have shown that air presses _____ .
only up, only down, only to the sides, in every direction

SEA LEVEL, MOUNTAIN, AND VALLEY

Answer each of the following questions with *Sea Level City*, *Valleyville*, or *Mountaintop*.

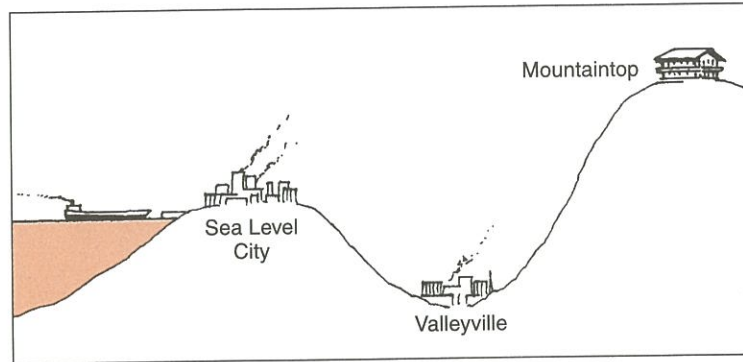


Figure D

1. Air pressure is greatest at _____.
2. Air pressure is weakest at _____.
3. Air pressure is 1 kg per sq cm at _____.
4. Air pressure is greater than 1 kg per sq cm at _____.
5. Air pressure is less than 1 kg per sq cm at _____.

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided.

earth's surface
1,000 kilometers
directions

gravity
1 kg per sq cm

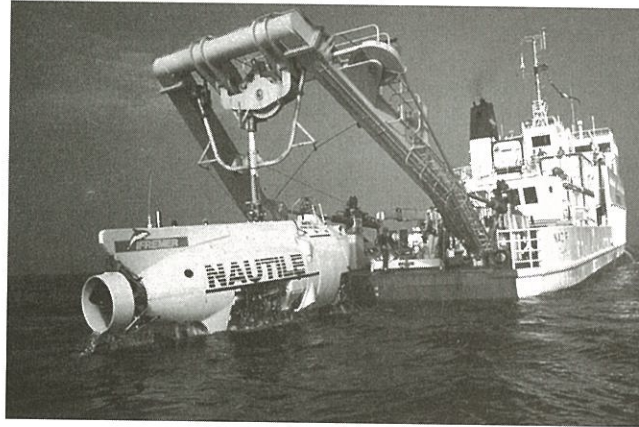
weaker
valley

less
mountain

1. The force that pulls objects toward the earth's surface is called _____.
2. Gravity is strongest close to the _____.
3. As you go higher, gravity becomes _____.
4. Air presses in all _____.
5. The higher you go, the _____ air there is.
6. The atmosphere reaches up about _____ in space.
7. At sea level, air presses with a force of about _____.
8. Air pressure is usually greater in a _____ than it is on a _____.

SCIENCE **EXTRA**

Exploring the Titanic



Imagine that you are aboard the French deep water search vessel known as the Nautilus. You are dropping to a depth of 12,600 feet to study the Royal Mail Steamship Titanic. That is about two and a half miles below the surface of the Atlantic Ocean.

The Nautilus is one of the few vessels in the world able to dive deep enough to reach the sunken hull of the Titanic. It will take the crew more than two hours to reach the ocean floor. That is where the Titanic now rests. Batteries on the Nautilus provide electricity to power the lights, cameras, and other gear. The power from the batteries also turns the propeller of the Nautilus.

The Nautilus carries a crew of three people. They use sensors to study temperature, pressure, course, and speed. They also run the sonar and cameras. Two mechanical arms and a sampling basket are used to collect samples. Since 1987, several thousand items from the Titanic have been brought to the surface. Larger items are raised to the surface using lift bags that are filled with diesel fuel.

At its depth of two and a half miles, the Titanic sits on the ocean floor in total darkness. In the past, lights on the submarines helped the scientists to see and study the wreck. The new way to light the area uses four towers. Each tower gives off 6,000 watts of light. The towers are taken to the ocean floor. After being used on the ocean floor, the towers can be floated to the surface. The batteries can then be recharged.

An iceberg caused the Titanic to sink. We are still discovering exactly how much damage the iceberg actually caused. Finding the answer is difficult because the ship's hull is buried in about 50 feet of sea mud. A new system that uses a sonar signal can penetrate the mud. A computer is used to make an image from the echoes. The damage can then be studied.

The Titanic is slowly corroding. Some of the scientists from the Nautilus are looking at the effect plants and animals might have had on the Titanic. Other scientists are studying the metal that was used to build the ship. They want to learn how long the wreck might remain on the ocean floor.