

# LESSON

## 13

# What is air pressure?

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.

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## AIR PRESSURE

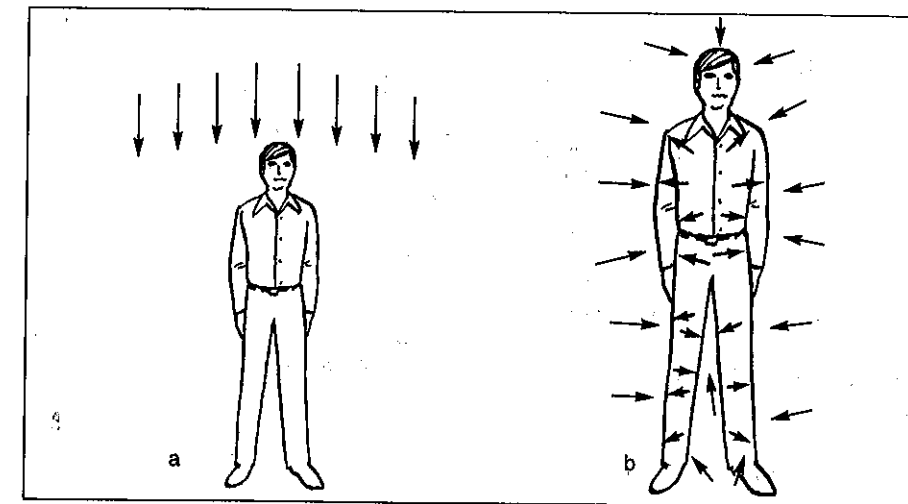


Figure A Air does not press like this. Air presses like this.

Look at Figure A.

1. Air presses \_\_\_\_\_  
only downward, only upward, in all directions

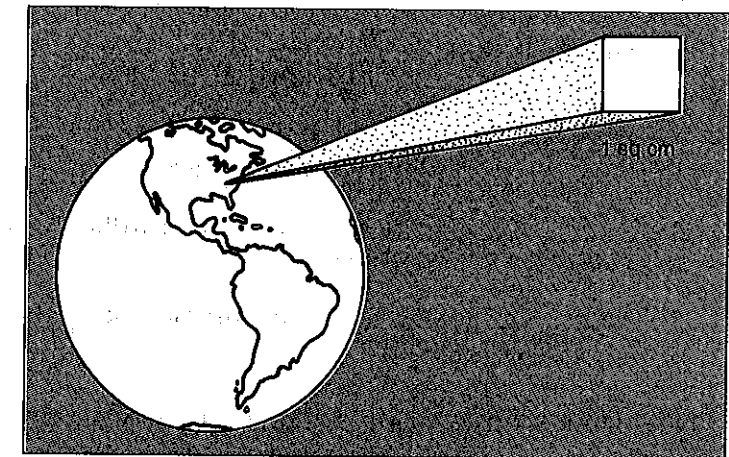


Figure B

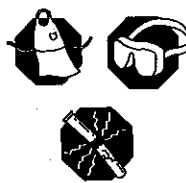
At sea level, a column of air resting on one square centimeter (1 sq cm) weighs 1 kilogram (kg).

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.

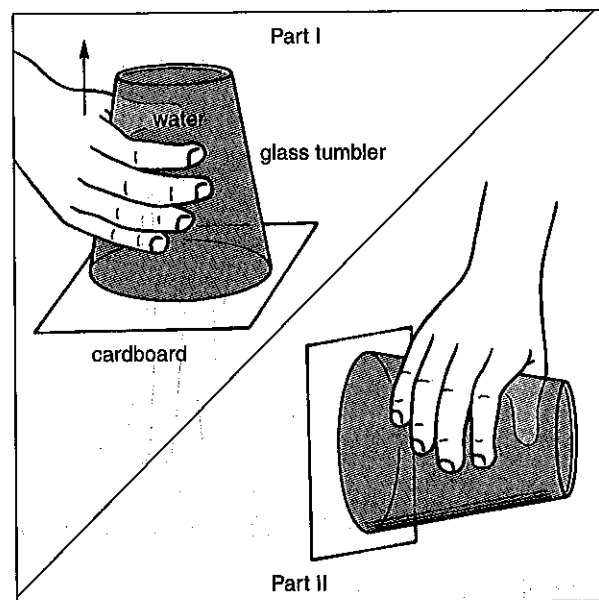


Figure C

### 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*.

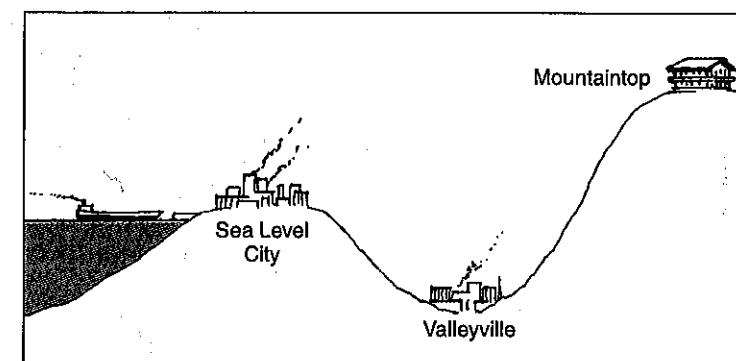


Figure D

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	gravity	weaker	less
1,000 kilometers	1 kg per sq cm	valley	mountain
directions			

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 \_\_\_\_\_.