

AIM | Does air have pressure?

4

What keeps you from floating into space?

There is a force called *gravity* that pulls things towards the earth. This downward 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 1000 kilometers (600 miles). This means that there are 1000 kilometers of molecules piled on top of one another. A column of air this high is quite heavy. In fact, at sea level a column of air on one square inch weighs about 15 pounds (1 kilogram per 1 square centimeter). **THE WEIGHT OF ALL THESE GAS MOLECULES IS CALLED AIR PRESSURE.**

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 lesser the air pressure. The lower you go below sea level, the greater the air pressure.

How many square inches of surface area does your body have? Try to figure it out sometime. On every square inch of your body there are 15 pounds of air pressure. This could add up to over 10 tons of pressure on your body.

Why doesn't the air crush you? Air doesn't press downward only. **AIR PRESSES IN ALL DIRECTIONS.**

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

GRAVITY AND AIR

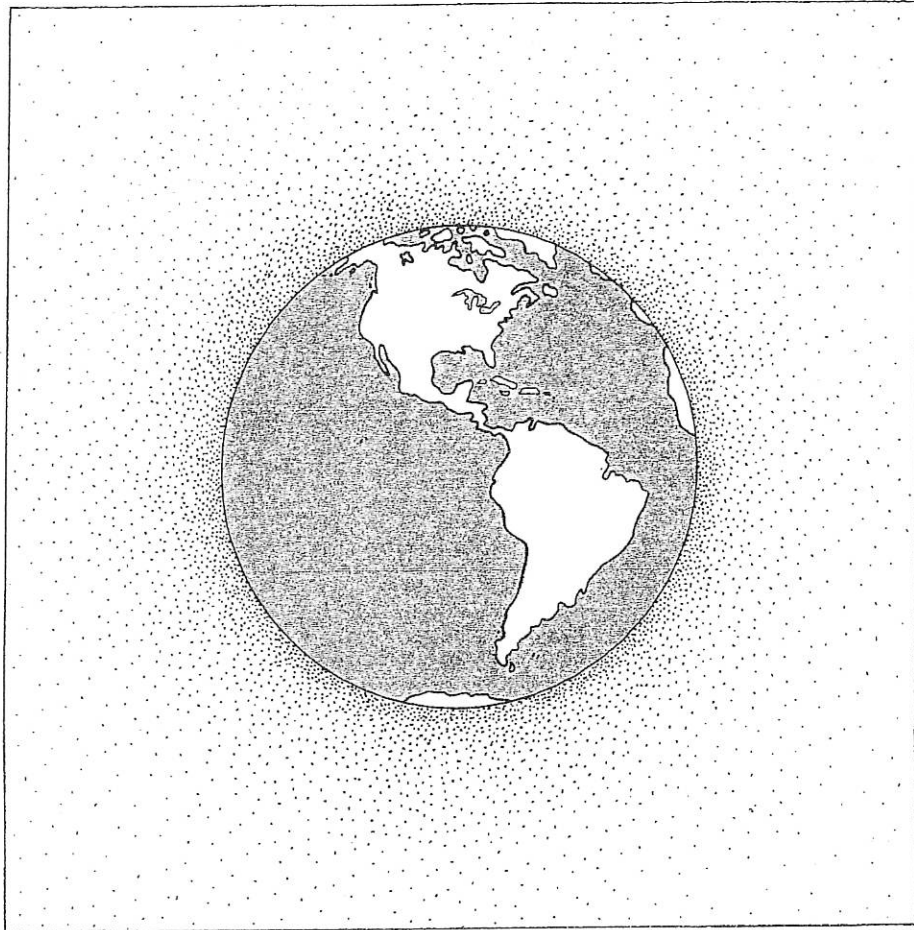


Figure A

1. The force that holds the air close to the earth is called _____.
2. Gravity is _____ force.
an upward, a downward
3. Gravity is strongest _____.
on the earth's surface, high up
4. Gravity is weakest _____.
on the earth's surface, high up
5. There is more air where gravity is _____.
strongest, weakest
6. There is less air where gravity is _____.
strongest, weakest
7. Most of our air is _____.
close to the ground, high up
8. There is less air _____.
close to the ground, high up
9. About how high does the atmosphere reach? _____

AIR PRESSURE AND WEIGHT

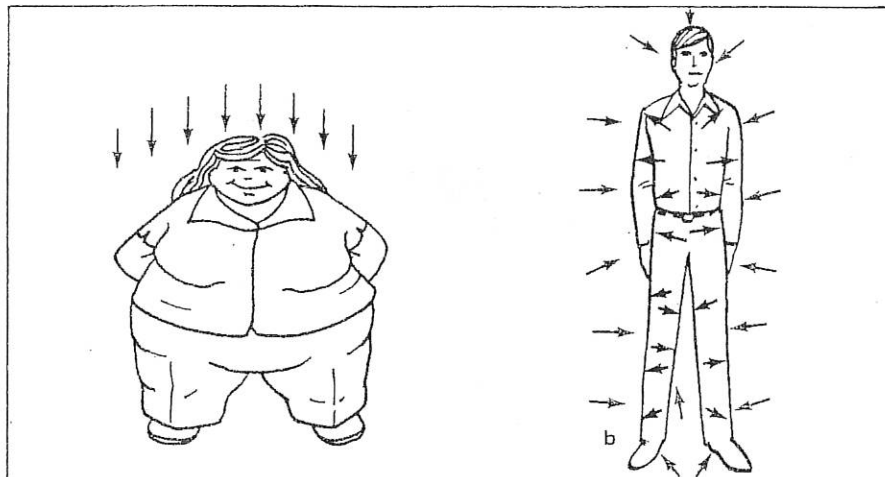


Figure B

Air does not press like this.

Air presses like this.

Look at Figure B.

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

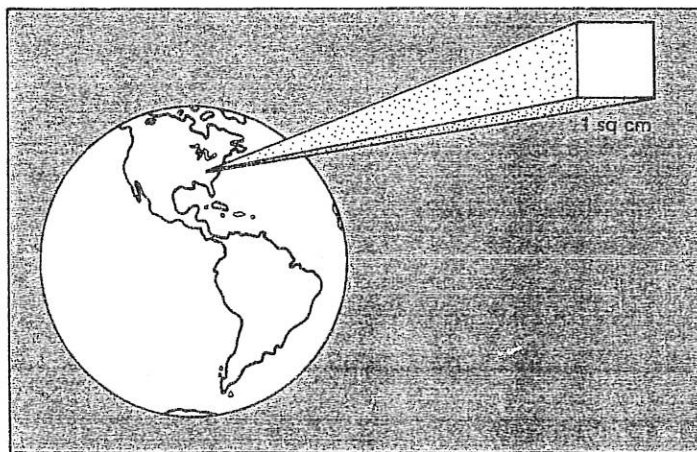


Figure C

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. Which layer of the atmosphere gives most of this weight? _____
(Look back to Aim 2 if you have to.)
4. The air pressure at sea level is _____ kilogram per square
_____.

SEA LEVEL, MOUNTAIN, AND VALLEY

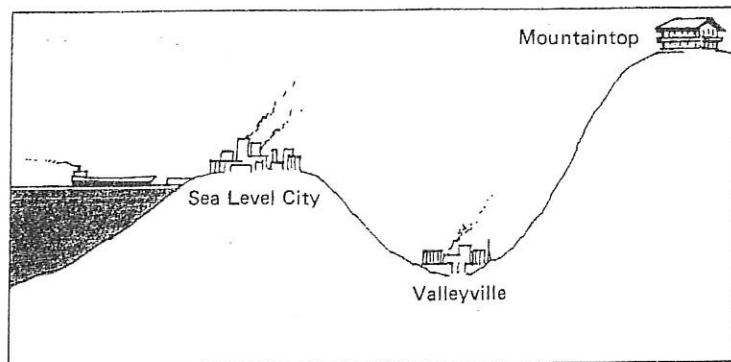


Figure D

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

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 _____.

COMPLETING SENTENCES Complete the sentences with the choices below.

mountain
surface
1000 kilometers
downward

close
1 kg per sq cm
gravity
less

gases
valley
weaker

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