

Pushy Air!

The wind is like the air, only pushier.

4-H Project:
Science Discovery

Life Skill:
Acquiring and evaluating information

National Education Standard:
NS.K-4.4 Earth and Space Science

Success Indicator:
Describe how air moves in the atmosphere.

Time Involved:
15–20 minutes

Suggested Group Size:
2–20 children

The rise and fall of air as it heats up and then cools down is a major cause of weather. In this activity children will explore what happens to air as it cools.

Getting started

Read through the lesson and gather the necessary materials. If you need more information about the topic, refer to the “Background Information.”

Do the Activity

1. Fill three identical balloons with air so they are equal size. Measure the circumference of the balloons (at the widest part) and record the results.
2. Place one balloon in the refrigerator, one in the freezer, and leave one at room temperature.
3. After about 5–10 minutes remove the balloons from the freezer and refrigerator. Measure the balloons again and record the results. Is there a difference between the balloons? (You may also compare the circumference of each balloon to its measurement recorded in Step 1.)



Materials Needed

- Balloons
- Access to a refrigerator, freezer or ice chest full of ice
- Measuring tape
- Paper and pencil

Talking it Over

Share What You Did:

- What did you notice about the sizes of the balloons before and after?

Process What's Important:

- Why do balloons placed in cold air decrease in size?
- Discuss – This activity shows that warm air is less dense (lighter) than cold air. The air molecules spread out warm air, pushing against the sides of the balloon and expanding it. Air molecules get closer together in cold air. Therefore, cold air is denser (heavier).

Generalize to Your Life:

- Hot air rises, thus a hot air balloon flies. But why does a helium balloon fly?
- Discuss: Helium gas is lighter, less dense, than the rest of the air. Therefore helium gas can “float” above the heavier air, just as warm air floats above cold air.

Apply What You Learned:

- What differences do you notice in air pressure in your bicycle tires or on the family car when cold weather sets in?
- Discuss: It's important to keep tires inflated; tire pressure often drops when winter arrives so you might have to add more air.

Air and Temperature

Warm air expands and rises, while cold air compresses and falls. Even though hot air rises, the air is generally cooler miles into the sky because gravity keeps the “atmosphere” close to the Earth. This denser air keeps the heat from the Earth close to its surface.

When air is contained (in this activity the balloons are the containers), an increase in temperature makes air molecules exert more pressure on the container. In an “open” system like the atmosphere, the reverse is true. When an increase in temperature makes the air molecules spread out in the sky, there are no “walls” to contain the air and the molecules don't have anything to exert pressure against. Therefore, as warm air rises, it leaves fewer air molecules for gravity to compress against the Earth and be measured as air pressure. An increase in air temperature results in a decrease in atmospheric pressure as measured by a barometer on the surface. On the other hand, as cold, sinking air moves in to replace the rising warm air, it presses against the Earth and yields a higher measure of atmospheric pressure.

Background Information

More Challenges

Refer to numerous activities in the “Weatherwise” unit of the Science Discovery Series Volume 2.



www.n4hccs.org/exploring4h

Science Discovery Serie

This online “bonus” activity is part of the *Exploring the Treasures of 4-H* curriculum. © 2005, National 4-H Cooperative Curriculum System.

See www.n4hccs.org/exploring4h for more information.

Written by Keith G. Diem. Adapted from “Weatherwise” unit Science Discovery Series Volume 2.

