



GOING UP!

Title: Going Up!

Objective: To show that air expands and contracts based on temperature.

Material List

- 1 Balloon
- Hair dryer
- 1 Empty two-liter plastic soda bottle



Background

After spreading a hot air balloon's nylon fabric across the ground, the pilot uses a powerful fan to blow air into the envelope. However, the pilot does not blow the envelope up completely full. When the pilot then blasts huge flames into the center of the envelope, the heat quickly warms the inside air. This not only causes the balloon to rise, but also causes the air to fill the remainder of the envelope. This is because hot air expands.

Instructions

1. Stretch out a latex balloon. You want the balloon to be flexible so that it easily inflates.
2. Fit the uninflated balloon over the mouth of the soda bottle.
3. Use the hottest temperature setting on the hair dryer to warm up the soda bottle. Watch the results!
4. Use the cool temperature setting on the hair dryer to cool down the soda bottle. Watch the results. (Optional: place the soda bottle in a pitcher of cold water. That will more quickly cool the soda bottle.)

Discussion Questions

1. What happens to the balloon when the bottle is warmed up with the hair dryer? Why does this happen? What happens to the balloon when the bottle is cooled down?
2. What does this teach us about air when it is warmed or cooled?
3. The air in earth's atmosphere is "thicker" (more dense) at ground level and "thinner" (less dense) at high altitudes. Why do you think this is? Do you think the atmospheric air is warmer near the ground or at high altitudes?
4. The air at high altitudes is cooler and less dense (takes up less space). This air contains fewer oxygen molecules. Because of this, some people find it hard to breathe at altitudes above 10,000 feet. Have you ever been on a mountain? Were you able to run around like normal or did you feel tired more quickly? What would cause you to feel more tired at high altitudes?