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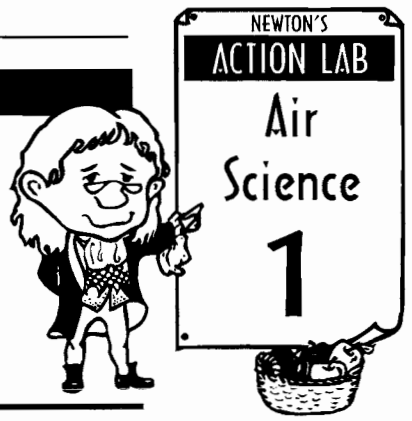
Science Action Labs

Name _____



What Is in Our Air?

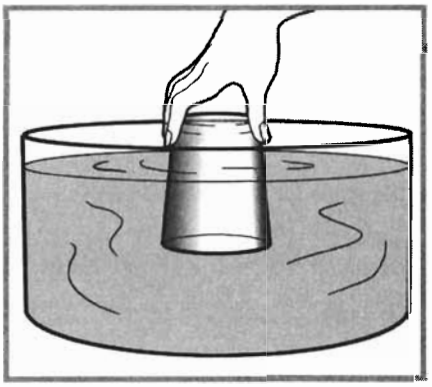
Is Air Real?

You can't see air. You can't smell air. You can't even taste air. You can feel it while riding your bike or when you place your hand outside a moving car.

You can live a month without food. You can live a week or more without water. Without air, you couldn't last five minutes.

The air we must have is in an ocean extending up to 500 miles (805 km) above the Earth. Half of the air in our world is found in the first three miles above Earth.

Feeling Air



Here is a way to "feel" and "see" air.

1. Obtain a small aquarium or large jar and a glass.
2. Fill the aquarium or jar so that it is $^2/_3$ filled with water.
3. Lower the glass *mouth down* into the water until the bottom of the glass is at water level. You are actually compressing the invisible air. Did you feel the glass of air resisting while being lowered?
4. Now tilt the glass of air so that more water enters. Describe what you see.

_____

_____

Newton Challenge: Newton can pour one glass of air into a second glass of water while **both** are submerged. Can you duplicate Newton's pouring trick?

Name _____

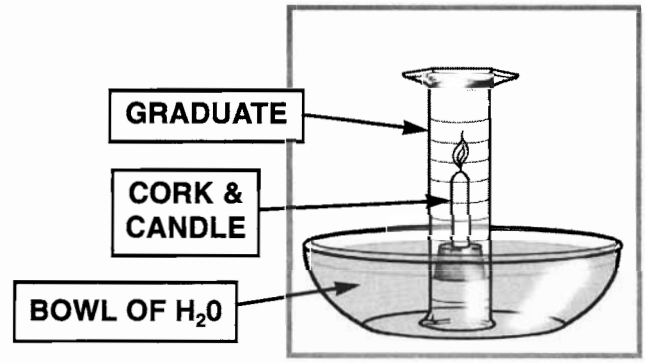
Our Air Is Mainly Oxygen and Nitrogen

Air is about 1/5 oxygen and 4/5 nitrogen. The other gases in the air will be covered in the lab on page 8.

Oxygen is the part of the air we need. We burn it in the cells of our body to give us energy and warmth. Oxygen burns with gasoline to power our cars. Plants and animals could not live without oxygen.

You can prove for yourself that air is roughly 1/5 oxygen.

1. Obtain a large bowl and fill it almost to the top with water.
2. Obtain a tall graduate or a tall thin jar.
3. Measure its total height. _____ inches (_____ cm).
4. Mount a candle on a cork. The candle and cork must fit inside the graduate.



5. **Caution! Have an adult light the candle and place it and the cork on the water.**
6. Place the graduate or tall jar over the burning candle and cork. Push the graduate straight down into the water until the top touches the bowl. Describe what happens as the candle goes out.

_____

_____

_____

7. Measure the height of water in the graduate. _____ inches (_____ cm)

Example: Let's suppose the graduate was 15" (38 cm) high. Let's suppose the water rose 3" (8 cm). Now do the math for your graduate and water rise. Round off to whole numbers.

$\frac{3}{15} = \frac{1}{5}$ equals the amount of the graduate filled with water.

Your answer = _____

What Is in Our Air?

Name _____

Newton Explains: The empty graduate contained mostly nitrogen and oxygen. Nitrogen does not burn. Only the oxygen burned up. Water rose up the graduate to replace the burned oxygen.

After the burning, what was the main gas left in the graduate? _____

Per your math, what fraction of the graduate was filled with water? _____

What gas did this water displace? _____

Newton Apology: This experiment is not perfect. All the oxygen is rarely burned. Some burning gas is trapped inside the graduate. Some of the heated air escapes the graduate as it expands.

Newton Wants You to Research Nitrogen

Nitrogen is the key chemical needed to make the essential proteins of life. Nitrogen in the air dilutes the oxygen so things don't burn too rapidly. A candle in pure oxygen would burn in 1/10 the normal time. Nature uses both lightning and bacteria to convert nitrogen in the air into plant fertilizers.

You can learn more about nitrogen through research. Here are some possible topics suggested by Sir Isaac.

Why is nitrogen called an "inert" gas? _____

How do bacteria and certain algae "fix" air nitrogen into a useful powder? _____

_____

How does lightning "fix" air nitrogen into a solid? _____

_____

What is the role in the nitrogen cycle of "decomposing" bacteria? _____

_____

How do volcanoes affect the Earth's nitrogen? _____

_____

Can you make a chart of the complete nitrogen cycle? _____