

AIR

SECTION 3: AIR IS A GAS

From *Hands on Science* by Linda Poore, 2003.



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STANDARDS:

Students know solids, liquids and gases have different properties.

Students know the properties of substances can change when the substances are mixed, cooled, or heated.

Students will record observations and data with pictures, numbers, or written statements.

Students will record observations on a bar graph.

IN ADVANCE:

Get 1 helium balloon and inflate a second balloon with air.

Tie the balloons on strings and place the strings under a book so students cannot tell which is the helium balloon.

MATERIALS:

1 helium balloon
1 air balloon
string, for balloons
perfume on cotton ball

DEMONSTRATE:

DISCOVERING GASES

WHAT ARE THE PROPERTIES OF GASES?

1. WHAT'S INSIDE BALLOONS?

(Hold the 2 balloons together)

Guess what is inside the balloons. (students often predict helium)

How can you find out what is inside? Let go of both balloons.

Why does helium gas float on air? (It's less dense or 'lighter' than air)

Name other gases: oxygen, carbon dioxide, methane (natural gas)

2. Have students put their heads down and close their eyes.

Tell the students you have a gas their parent wears.

Ask them to raise their hand when they know what gas is in the room. Put perfume on a cotton ball and walk around the room so all can smell it.

How does the smell get to your nose? (It is a gas.)

Can you see the perfume in the air? (no)

(Gases fill the container they are in, which is the room in this case.)

Perfume changes form a liquid to a clear, colorless, gas due to heat.)

ASSESSMENT:

Title the paper, *Gas is all around us*, and have students draw pictures to show where gas is found. [e.g., a balloon floating, (helium) a balloon on the ground (oxygen), the gas burning on the stove (methane gas), a person breathing out (carbon dioxide), air (air is 20% oxygen and 78% nitrogen)]

MATERIALS:

1 gallon bags

EXPLORE:

MEASURING AIR INTAKE

HOW MANY BREATHS DO YOU TAKE IN 1 MINUTE?

1. How much air do you need?

Have students: Take in one breath and let it out.

If they close their mouth and put their hand under their nose they will feel the air come out.

Tell them to make a mark on their paper every time they feel their breath come out for one minutes. (30 seconds may be long enough)

Tell the students to take in a breath when you say start and then breath normally. Say *start*.

Discuss how many breaths they counted

Write the average number on the board.

2. **WHAT DETERMINES HOW MUCH AIR YOU NEED?**

Have students: Jog for one minutes and then count the number of breaths they take in the next minute. Discuss.

(You take more breaths when you are running as more oxygen is needed by your cells.) *Have students:*

‘Hug’ their neck gently to find their pulse. Discuss what causes it.

Practice counting the beats for 10 seconds. Share results.

Take their pulse for one minute at rest and after jogging. Compare.

When does the pulse go faster? When does it go slower?

(When you’re active you use energy, and the heart pumps harder to provide your cells with more oxygen.)

3. **HOW BIG ARE YOUR LUNGS?**
HOW MUCH AIR CAN YOUR LUNGS HOLD?

Have the students put their hands on their chest and take in a big breath.

What do they feel? (lungs expand)

What is the gas we need to live? (oxygen)

Where does the gas go? (lungs→to blood→to cells)

Show the students a picture of the human lungs.

4. **HOW MUCH AIR IS IN YOUR LUNGS?**

Predict: Who has larger lungs?

Have one student take a deep breath and blow all the air from one breath into a large empty 2-gallon bag. (in the kit)
Close the bag, twist the opening, and show how much air it contains.
Pass out bags to all students, flatten bags, and do the experiment together. (For overachievers: Stop them before they faint!) Hold up each bag and compare.

5. **DISCUSS:** Volume is measured in liters.
Do your lungs hold more or less than a 2-liter soda bottle?
Do taller students have more lung capacity?
Compare the teacher's lung capacity to the students' results.
People who exercise develop more lung capacity.

6. **SMOKING DAMAGES LUNGS:** Cigarettes leave a black tar coating in the lungs so many of the air sacks cannot collect air. The blood collects less oxygen from the lungs and the person's heart has to work harder to provide enough oxygen for the cells.

MATERIALS:

straws
5 trays with same objects to test (marble, feather, small block, pencil, crayon, Kleenex, balloon, leaf, paper clip, etc.)

TEACHING TIPS:

This activity works great on a tile floor as the students stay behind one line and measure how far they move an object with one blow by counting the number of lines it crosses. You can also mark the floor or a sidewalk with chalk lines for each foot. Ask one student in advance to blow on each object, to determine how much space will be needed for this activity.

ASSESSMENT:

MOVING THINGS WITH YOUR AIR PRESSURE

1. Use the worksheet *How far does it move?*
Make a bar graph showing how far each object moves.
Students get only one big blow through a straw to move each object.

2. **PREDICT:**
Have students: Write which object will go the farthest.
Draw a picture of each object on the chart under its name.

3. **EXPERIMENT:**
Give each student a straw and a set of objects.
Students should practice, explore, and play with the materials first.
Discuss which objects went the farthest.

4. **GRAPH:**

This can be done as a group activity with one student blowing and everyone counting the squares and coloring together.

Students should count up the number of squares on the graph, color in the top square, and then color *down the column*.

They can color part of a square when it does not pass the line.

8								
7								
6								
5								
4								
3								
2								
1								
	marble	pencil	leaf	crayon				

My best experiment was the _____.

It went _____ feet.