

Community in the Classroom Presentation Plan

Lesson Name The Power of Air Pressure

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Grade Level 5 Standards Connection(s) Earth Science and some Physical Science

Abstract:

The concept of air pressure, air composition, and air movement will be introduced. Students will learn how clouds/fog forms and how to read a weather map they would find on their local TV news.

Vocabulary/Definitions:

Air pressure, "high" pressure, "low" pressure, humidity, condensation, aerosol

Materials:

What you'll bring with you

Soda can, hotplate, tongs, bowl for water, jars, ice, spray aerosol (air freshener), periodic table, overhead transparency of weather map, safety goggles (for myself) for the can experiment

What students should have ready (pencils, paper, scissors)

Several clean, empty jars (if possible), dark/black paper

It would be nice to have one jar per group of 3-4 students

Classroom Set-up:

Student grouping, power, water, overhead projector

Set-up: ~5 mins to organize

Clean up: ~5-10 mins to gather materials

Classroom Visit

1. Personal Introduction: 5 Minutes

I am a graduate student studying gases that are emitted into the air by trees and their role in air quality and climate change. I want to show them that science can be fun and practical. Science can help us understand everyday life.

Topic Introduction: 5 Minutes

What is air pressure? What is air? What makes it so powerful? What is air made of?

2. Learning Experience(s): 30-35 Minutes

Air pressure

What is it?

How powerful is it?

EXPERIMENT: *I will put a small amount of water into a soda can and heat it on a hotplate. The water inside boils, wait 30 seconds. Invert can into a bowl of cool water and the surrounding air pressure will crush the can!*

What is air? Why is it so powerful?

Composition (*leave list on the board entire time and refer back to it*)

Mostly N₂ (78%) and O₂ (21%)

EX: Buy a plastic water bottle up I the mountains, drink it, keep the bottle (now closed) in the car with you as you drive back to the Bay Area. When you get home, the bottle is "crushed". Why? The sea-level pressure is much larger than the trapped low pressure air inside.



EX: Your mom gets on an airplane with a tiny bottle of hand lotion. It's a long flight and her hands are dry, so she opens the bottle in mid-air. It squirts out! Why? The air pressure inside the bottle was higher than the new surroundings.

What else is in air? H₂O vapor, *include particles if it is mentioned*

What can H₂O in the air do?

EXPERIMENT: 1 person from each group of ~4 students come up and put a small amount of water in your jar. Turn the lid upside down and put ice on lid. What do you think will happen? (*Have them try it*). What happened? (*nothing*) Now, I will come around and spray some air freshener in your jar. Once I spray it, quickly put your lid of ice back on. (*Go around and do so.*) Now, what did you observe? (*a cloud/fog!*) It is easier to see the cloud/fog if you put a piece of black paper behind the jar.

So, what does a cloud/fog need to form? Water, cool temperatures, particles/**aerosol** (*add to composition list if not already there*). What are examples of particles in atmosphere? Dust, sea salt spray from waves crashing, pollen, stuff put in the air after burning like smoke, and even some gases!...

When water is in the air it is called **humid air**. Humidity causes changes in air pressure. Let's talk about why.

Do you think dry air or humid air weighs more? Let's calculate the weight of each. That is why the can was crushed in our first experiment.

Now let's look at a weather map. What do you think the weather man will say about this big L on the map?

What do you think causes wind? Moving between different pressures takes a constant rebalancing of pressure. If you move too quickly (car/airplane), your ears "pop".

3. Wrap-up: Sharing Experiences and Building Connections 5-10 Minutes

What did we learn today?

What is air pressure?

What crushed the soda can, and why?

How does a cloud form?

What will you bring to school if the weather map shows a big L over (*the city Berkeley/Oakland*)?

What causes wind?

4. Close: 5 Minutes

For more experiments:

<http://www.spartechsoftware.com/reeko/MoreExperimentsSortCategory.htm#Pressure%20and%20Compression>

http://scijinks.jpl.nasa.gov/en/educators/weather_maps.pdf

<http://eo.ucar.edu/webweather/activities.html>

TOTAL 50 – 60 Minutes

Follow-up – After Presentation

Suggest students write a letter explaining "How we learned about _____?"

List or attach examples of activities, websites, connections for additional learning.

Attach worksheets, hand-outs, visuals used in classroom presentation.

