

3-5 Physical Science
3-5 Nature of Science



Southern Nevada Regional Professional Development Program

Properties of Air

INTRODUCTION

Children are often confused when asked about gases. Most gases cannot be seen; therefore, it makes it hard for children to describe the properties of something that is invisible. This lesson explores one property of air, weight.

WHERE'S THE SCIENCE?

Air is a precious resource that surrounds us and is held to the earth by gravity. The **properties** of air include air being colorless, odorless, and tasteless. Air is **matter**. It takes up space and has **mass**. Air is a **gas**, therefore, it behaves like one. Air will expand to fill the container it is placed inside. The **particles** of air move freely and quickly.

MATERIALS

Lesson One (Groups of two)

- 2 Plastic bottles – 16oz
- 2 Plastic bottles with a hole on the side -16oz
- 2 Round Balloons (any size)
- Chart paper
- Markers
- Science notebooks

Lesson Two

- String
- 2 Round Balloons (any size)



- Meter stick
- Balance

PROCEDURES

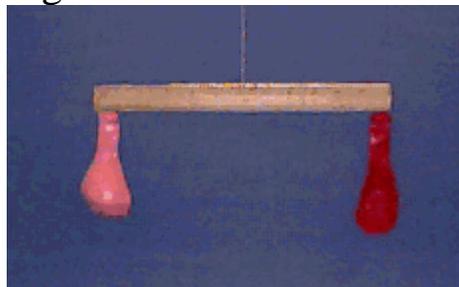
Lesson One

1. Ask the students, “What do you think you know about air?” Tell them to create a circle map of this in their science notebooks. Chart their responses. Ask them for the properties of air. Tell them air is a colorless, odorless, tasteless gas. Ask for examples gases. Then ask, “Does air take up space?” Tell them to think about how we can test to find out if air takes up space. Discuss their ideas.
2. Distribute the materials to each group: two balloons and one plastic bottle. Tell them these are the materials they will use to show air takes up space. Let them explore for a few minutes with the materials. Once they have had an opportunity to talk about what they notice, demonstrate the balloon in a bottle.
3. **Teacher demo:** Place the balloon inside the bottle and adhere the opening of the balloon to the top of the bottle. Ask the students to predict what they think will happen. Tell them to record their responses in their science notebooks.
4. Instruct them to blow into the balloon. Each person in the group must use their own balloon and bottle. Discuss what they noticed. The students will notice that the balloon barely inflates. Chart their responses.
5. Next, investigate what happens when you repeat the same investigation, only this time using a bottle with a hole in the side. Ask them why they think there is a hole in the side of the bottle. Ask the students to predict what will happen and record their response in their science notebook. Discuss their ideas.
6. Instruct them to repeat the investigation using the new bottle. Remind them to use their own balloon and bottle.
7. When all of the groups are finished with the investigation, ask them to meet you at the group area with their science notebooks.

8. Discuss what happened in both parts of the investigation. Chart their responses. Ask, “Does air take up space? How do you know?” (The air already present in the bottle took up space in the bottle making it impossible to blow up the balloon.) Tell them to reflect on this question in their science notebooks. Share out whole group.

Lesson Two

1. Review the concept that air takes up space. Ask, “If air takes up space, does that also mean it has weight?” Discuss and chart the students’ responses. Ask, “How can we find out?”
2. Set up the teacher demonstration. (An optional lesson can be done without the teacher demonstration. In its place, provide the students with the same materials and ask them to set up their own investigation showing that air has weight.)
 1. Using 50cm of string, hang a meter stick horizontally from a place in the room where it will not be disturbed (ex. Ceiling).
 2. Suspend a balloon on one end of the meter stick using 15cm of string.
 3. Hang a balloon (not inflated) 5 cm from the other end of the meter stick. Tie the balloon loosely to the string so that it can easily be removed.
 4. Move the meter stick along the suspension string until you have achieved balance. Show them a balance and demonstrate how to calibrate this tool.
 5. Discuss how the balloon and the eraser both have weight. Right now they are in balance, because the meter stick is in a perfectly straight line.
 6. Remove the balloon and blow it up. Place the balloon back on the 5cm line hanging from the meter stick. This will create an imbalance on the stick showing that the air added to the balloon has weight.



www.k12.wa.us/.../weather/adptcty/weight.html

3. Discuss what the students saw. Challenge them to find another way to prove air has weight. Allow groups to develop a plan to conduct their own investigation. This can be carried out in a future investigation.
4. In closing, ask them to record (in their science notebooks) any further questions they may have after completing this investigation. Ask them to reflect on the original question, “Does air have weight? How do you know?” Discuss and chart their responses.

Additional Resources

<http://www.k12.wa.us/EdTech/Athena/curric/weather/adptcty/weight.html>

Lesson on air and weight.

<http://www.bbc.co.uk/schools/ks2bitesize/science/materials.shtml>

Interactive site on the three states of matter.

Morrison, I., *Matter Splatter*. Rigby, 2003. ISBN 0-7578-6362-0

Walker, S., *Matter*. Lerner, 2005. ISBN: 0-822-55131-4

Vocabulary

Balance: A tool used for weighing objects; when the balance beam is level, the objects on either side are equal in mass.

Evidence: Data used to support claims. Evidence is based on observation and scientific data.

Gas: Matter that is shapeless and expands to fill any closed container it is placed in.

Matter: Anything that has mass and takes up space.

Particle: The smallest building blocks of matter.

Property: A characteristic of an object, such as size, shape, and texture.

State: A kind or form of matter. The three common states of matter are solid, liquid, and gas.

Safety Reminder

N/A

Nevada State Science Standards

P5A1 Students know matter exists in different states (i.e., solid, liquid, gas) which have distinct physical properties. E/S

P5A3 Students know materials can be classified by their observable physical and chemical properties (e.g., magnetism, conductivity, density, and solubility). E/S

N5A1 Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method. E/S

N5B3 Students know the benefits of working with a team and sharing findings. E/L