Air Play: Student Guide

Use this guide to assist you with gathering materials and following along with the activities in the *Air Play* video. The video has three activities you can do along with the instructor using simple materials. There is a materials list below that you can use to gather everything you need for the experiments. During the video, the instructor will let you know when you will use the materials you need. Pause the video when you need time to prep your materials or conduct your experiment. If you don't have the materials, you can still watch the video and observe the experiments. There are vocabulary words in this guide to assist you if the instructor mentions a new word you may not yet know. At the end of the video, answer the reflection questions to test your knowledge.

Objectives:

> Explore properties of air.

> Learn the effects of high and low air pressure on an object according to Bernoulli's Principle.

> Create a toy that displays a ring-shaped segment of moving air called a vortex.

Grades: 3 & 4

MATERIALS		
Activity 1: Air Pressure	Activity 2: Bernoulli's Principle	Activity 3: Homemade Air Zooka
☐ Cup ☐ Water ☐ Cardboard ☐ Access to sink or bathtub	☐ Paper ☐ Ruler ☐ Scissor ☐ Pen or pencil	☐ Cup ☐ Rubberband ☐ Plastic wrap ☐ Pen ☐ Scissor ☐ Scrap paper

Activity 1: Air Pressure

MATERIALS

- ☐ Cup
- ☐ Water
- ☐ Cardboard
- ☐ Access to sink or bathtub

WHAT TO DO

1. Do this activity in the sink or bathtub.
2. Take your cup and fill it ¾ full of water.
3. Take the cardboard and place it on top of the cup.
4. Carefully flip the cup upside down while holding the cardboard pressed on the top of the cup. Make sure water isn't leaking from the cup.
5. Let go of the cardboard.
6. The water remains inside of the cup. If the water spills that's OK, try again. Be gentle and try not to squeeze the cup. It takes practice.

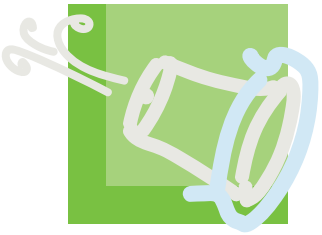
Activity 2: Bernoulli's Principle

MATERIALS

- ☐ Paper
- ☐ Ruler
- ☐ Scissors
- ☐ Pen or pencil

WHAT TO DO

1. Place the paper on the table with the longer side facing you and then mark the paper an inch from the top left corner.
2. Draw a line down on the paper starting from the mark. (See illustration below.)
3. Hold the paper up and cut along the marked line.
4. Place the strip of paper under your lower lip and blow a steady flow of air on top of the paper.



Activity 3: Homemade Air Zooka

MATERIALS

- ☐ Cup
- ☐ Rubberband
- ☐ Plastic wrap
- ☐ Pen
- ☐ Scissors
- ☐ Scrap paper

WHAT TO DO

1. Hold the cup and use your pen to poke a hole at the bottom of the cup.
2. Carefully make the hole bigger using a pair of scissors or keep poking the hole with your pen.
3. Cover the top of the cup with plastic wrap.
4. Secure the plastic wrap with a rubber band.
5. Pull the plastic wrap down on the side to tighten up the plastic over the cup.
6. To make targets, cut a scrap paper into 1-inch squares and then fold the paper in half. Open the folded paper squares like books and stand them on a flat surface.
7. Aim your air zooka a few inches away with the hole facing the target. Then tap on the plastic at the other end of your air zooka to blast the folded paper using air!

VOCABULARY

Air — Though we can't see air, we know that it is made up of molecules of different kinds of gases such as oxygen and carbon dioxide.
Weight — The measure of the force of gravity on an object.
Force — A push or pull on an object. A force can cause an object to accelerate, slow down, remain in place, or change shape.
Gravity — The force that makes everything fall down towards the Earth.
Pressure — Force over a given area.
Bernoulli's Principle — A rule that states that as air moves around an object, it creates different pressures on that object. Faster air means less pressure. Slower air means more pressure.
Vortex — The shape of something rotating rapidly.

STUDENT REFLECTION QUESTIONS

Why did the water stay inside the cup when it was turned upside down?

How does blowing air on top of the strip of paper change the air pressure?

What would happen if you change the size of the hole in your air zooka or change the size of the cup used to make the air zooka?

OTHER ACTIVITIES AND INFORMATION

Explainer TV

Learn how we can manipulate air pressure with fire and alcohol to crush this 5-gallon water jug.
https://www.youtube.com/watch?v=EaOSXk9ztyk

Background Information

When we hear the word air pressure, it refers to the weight of air molecules pressing down on the Earth. The air pressure is measured by a device called a barometer with the units psi or pounds per square inch. At sea level, the air pressure is measured as 14.7 psi and varies as altitudes change. This means that at sea level there are 14.7 pounds of air pressure pressing down on every square inch of our bodies. Our bodies can still move freely and we don't feel like we're getting crushed because the air is exerting pressure on us in all directions and the pressure inside our body is the same.