



LESSON PLAN

Space

GRADE LEVEL: MIDDLE SCHOOL

brainchild.com | grades 6, 7, 8



Space

Middle School Lesson Plan

OVERVIEW OF ACTIVITY

Students focus on concepts of pressure through the guiding question explored in the Brainchild episode, “Space”: What would happen to a body in space? Students will diagram and analyze a teacher demonstration of the force of atmospheric air pressure. Students will then explore atmospheric pressure in a hands on activity that demonstrates what 15 lbs/in² feels like.

DURATION

This collection of activities can be used as a 2 class period activity using all of the provided centers, or as a 1 class period activity if teacher chooses to isolate the forces.

STANDARDS ADDRESSED

Next Generation Science Standards

- **MS-PS1** - Develop models to describe the atomic composition of simple molecules and extended structures.
- **MS-PS1-4** - Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter.

OUTLINE OF LESSON

- Warm Up: “What do you think would happen to your body in space without a suit? Why?”
- View the Brainchild “Space” episode.
- Pressure demo and student activity.

ACTIVITY PROCEDURE

- Students will discuss as a whole group their responses to the warm up question, “What do you think would happen to your body in space without a suit? Why?”
- Class will view the “Space” episode with pressure in mind. *Note: scale of the universe and the goldilocks zone segments are especially useful in the discussion as well.

- Students will independently, in partnerships, or as a whole group read the background information regarding atmospheric pressure on the Student Activity Sheet.
- Teacher should have the air pressure can-crushing demonstration set up at the front of the class: a clean soda can with a small amount of water in it, heating to boil on a hotplate or burner with a small container of ice water next to the hotplate.
- Students diagram the current state of the demonstration in the Student Activity Resource.
- Once steam is visible coming from the opening of the can, teacher should invert the can into the small container of ice water. This will demonstrate how air pressure moves from high to low. The can crushes when the hot steam is rapidly cooled and condensed in the can in the ice bath, causing the pressure to drop, and crush the can. Because there is no longer air in the can, you've created a vacuum.
- After observing the collapse of the can, students will record high and low pressure areas inside and outside of the can using diagram format and respond to analysis question.
- Students will read an extension regarding pressure on airline flights and the effects on everyday objects.
- Teacher will facilitate a class discussion around student responses to the question: How will your plastic/foil sealed gum or sealed water bottle change from lift-off to flight?

FOLLOW-UP / HOMEWORK

In the Space: Pressure Drop Follow Up (see Student Activity Resource), students will work to explore air pressure on a single square inch and then over the many square inches that make up the surface of a newspaper. Students will calculate the air pressure exerted over the surface of the newspaper as they develop their understanding of how pressure affects the universe around us.

MATERIALS LIST

- Student Activity Resource
- Ice bath
- Empty soda can
- Rulers (1/group)
- Heat source (hot plate, burner)
- Newspaper (2 sheets/group and 1 inch square piece/group)