

UNDER PRESSURE

INTRODUCTION

This series of demonstrations illustrates that air is composed of matter. They could also be done as stations in the classroom, with students more active in the creation of the phenomena observed. The series is designed to emphasize student-created diagrams. The exercise teaches them to make diagrams, which are one of the very important ways that scientists use models to explain phenomena. This is a great time to emphasize notebook practice, and the ways that scientists use notebooks to develop their thinking in words and pictures.

MATERIALS

- + Soda can, boiling water, ice bath—crush the can with air pressure
- + Balloon lung—model of mammalian lung shows how air pressure fills lungs
- + Boiling with ice—shows that boiling and vapor pressure are dependent on temperature (suggested only for middle school students, or groups who are comfortable already with phase change)
- + Fountain bottle—fill a two-liter bottle with colored water and put it in a tray. Poke three holes at different heights in the side of the bottle to show the effects of pressure
- + Two plungers—wet their rims then compress them together, and then try to separate them
- + Tire pump, ball and can of hair spray—show that compression of a gas generates heat and release of a gas uses heat

STANDARDS

NGSS 3-PS2-1

Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

NGSS 5-PS2-1

Support an argument that the gravitational force exerted by Earth on objects is directed down.

NGSS MS-PS2-2

Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

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This series of performance expectations will require students to engage in many experiences trying to explain the behavior of objects due to forces acting upon them. This activity also engages students in the Science and Engineering Practices of Asking Questions, Developing and Using Models, and Constructing Explanations. It provides the opportunity to examine the Crosscutting Concepts of Cause and Effect, Scale Proportion and Quantity, and Systems and Systems Models.

NAME:

DATE:

UNDER PRESSURE

Your teacher will demonstrate for you some examples of how pressure and changes in air pressure can do some surprising things.

Scientists make diagrams to figure things out. For each demonstration, draw a picture of what you or your teacher did. Use arrows, labels, and words to explain how it worked.

DEMONSTRATION 1**DEMONSTRATION 2****DEMONSTRATION 3****DEMONSTRATION 4**

In your own words, explain why air has pressure.