

K-2 Physical Science
Southern Nevada Regional Professional Development Program



How can air be compressed?

INTRODUCTION

This is called a Balloon Rocket. Air inside the balloon is compressed by rubber skin of the balloon. Pressure from the compressed air makes the balloon move. Compressed air can push with a usable force.

WHERE'S THE SCIENCE?

As discussed in *How Can You See Air Move?* air pressure causes weather. It can be compressed when it cools and the molecules move closer together. Air compression has many other uses, though. Compressed air is air that has been put under greater pressure than the air around it. We use it in a number of diverse ways including jackhammers, tire pumps, air rifles, and aerosol cheese. It also has the potential to be a clean, inexpensive, and infinitely renewable energy source. Its use is currently being explored as a new fuel for powering vehicles. To compress air, simply blow up a balloon. The force the air applies expands the balloon. Since air takes up space it creates an incredible force. When an opening is created to release the air, it rushes out to an area of lower pressure causing wind. This wind can propel objects if harnessed correctly. The balloon works the same way as a rocket does. The compressed air inside the sealed balloon is pushing outward in all directions. As soon as you release the pump, the air blows out the back at high speed (action). It pushes the balloon away in the opposite direction (reaction).

MATERIALS

- 1 plastic bag, gallon size
- 1 balloon, oblong
- 1 balloon pump
- Fishing line
- Duct tape
- 1 Straw

PROCEDURES

1. Tape the plastic bag to a straw.
2. Cut a piece of fishing line about 4 feet long.
3. Thread the fishing line through the straw.
4. Use the duct tape to attach the ends of the fishing line to a wall or the back of two chairs. A tight string helps the straw move freely.
5. Slide the plastic bag to one end of the fishing line with the opening facing the wall.

6. Place the balloon inside the bag with the mouth of the balloon facing the opening in the bag and pump it up until it can't get any bigger. (You can also try taping the balloon itself to the straw; just remember to use long pieces of tape so the balloon can expand and contract.)
7. Let go of the balloon and watch what happens. (*The balloon should push the bag along the string.*)
8. How does air make the balloon move? (*As the air escapes from the balloon, it creates a wind that propels the balloon along the string.*)
9. How can you get the balloon to travel the farthest? (*Experiment with blowing the balloon up different amounts, loosening or tightening the string, or form a different "vehicle" for the balloon to push. Design a balloon rocket or car that travels without a string. The more compressed the air, the farther the trip.*)

***An extension to this activity is to make bottle rockets. Black film canisters work very well. Add a crushed up Alka-Seltzer with a little water then quickly snap on the lid and place it lid down on the ground. The gas inside will compress until it finally explodes out, launching the film canister into the air.*

ADDITIONAL RESOURCES

*FOSS Air and Weather Kit Investigation 1

*<http://www.billnye.com/>

*http://kids.earth.nasa.gov/archive/air_pressure/index.html

*<http://www.soinc.org/> (Site for Science Olympiad that uses balloon rockets in competition)

Nevada State Standards

P2A3 Students know matter can be categorized by observable properties such as color, size, shape, and weight. E/S