

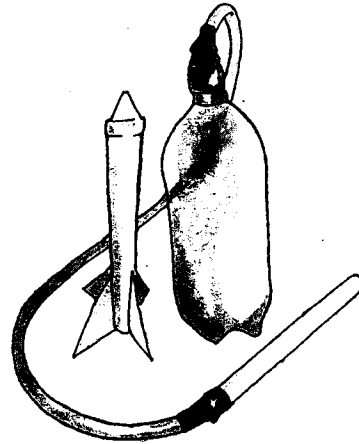
Bottle Blast-Off

In this activity, you'll make a rocket launcher and a rocket, and investigate how rockets fly.

What do I need?

For the launcher:

- 2-liter plastic bottle
- 1/2-inch inner diameter flexible vinyl tubing (available at a hardware store); about 2 feet (60 cm) long
- hair dryer (optional—to straighten out the vinyl tubing if it's too curled to work with)
- tape (vinyl tape, masking tape, duct tape, electrical tape)
- 1/2-inch inner diameter PVC pipe (also available at the hardware store); 1 foot (30 cm) long



For the rocket:

- 8 1/2" × 11" sheet of construction paper or card stock
- transparent tape
- scissors
- index card
- ruler
- pencil

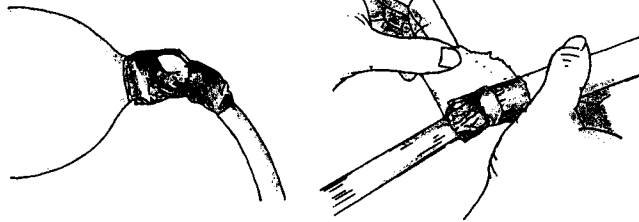
What Do I Do?

Building the launcher

- 1.** Remove the cap from bottle.
- 2.** Cut about two feet of vinyl tubing.
(If the tubing is tightly curled, you can heat it with a hair dryer and straighten it out.)
- 3.** Put the vinyl tubing into the neck of the bottle and create a tight seal with the tape so air can't escape. Use a generous amount of tape.

- 4.** Put the other end of the vinyl tubing just up against the PVC pipe and,

using tape, make an airtight seal.



Building the Rocket

- 1.** Make a tube by wrapping the paper the long way loosely around the PVC pipe. Then slide the tube off, making sure not to tighten it.
- 2.** Using transparent tape, tape the tube along the seam.
- 3.** Make a point at the top of the rocket. First flatten the tube at one end. Then, using your scissors, cut the flattened part into a point. You could also cut it just shy of a sharp point.
- 4.** Make a tight seal on the point with transparent tape to prevent air from escaping.

You can use the rocket as is, or add fins to the rocket.

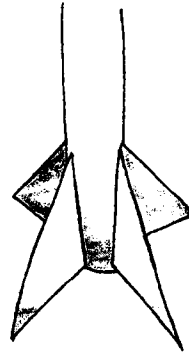
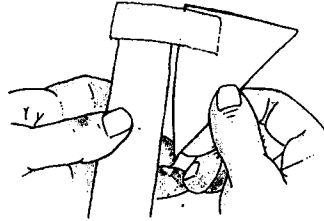
To add four fins

- 1.** Take a 3 x 5 index card, fold it in half, open it at the fold, then cut it along the fold into two pieces.
- 2.** Using the ruler, draw a diagonal line from corner to corner on each piece of the card, then cut along those lines to form four fins.
- 3.** Tape the fins to the bottom of the rocket so that the distances between them are equal. Put a fin



flat against the rocket and tape it,
then bend it flat to the other side

and tape it again.



Flying the Rocket

1. Slide your rocket about halfway down the PVC pipe.
2. Put the bottle on the ground.
3. Hold the PVC pipe with the rocket on it and point it upwards or away from people.

4. Step on the bottle and watch your rocket fly!

Going Further

- Try making a rocket with a different number of fins, like three or five.
- When launching the rocket, try pointing the rocket at different angles.
- Try making a rocket with different kinds of paper to see if it goes faster.

Note: If the bottle flattens out, curve your hand around the top of the PVC pipe and, resting your lips against your hand (not the pipe) blow into it. This should reinflate your bottle so you can blast off again. It's a good idea to have some extra bottles on hand, though, in case that doesn't work.

What's Going On?

As a rocket travels, air is forced to move around it. Because of the rocket's pointed nose, the air can change direction smoothly and gradually, so it doesn't strongly resist the movement of the rocket. If the nose of the rocket were flat, the air would have a harder time moving around it, so the rocket would be confronted with a much greater resistance, and it would fly less far. Fins on the back of a rocket give it stability so it will fly straight.

