Rocket Activity

Pop! Rocket Launcher

Objective

To construct a simple air pressure launcher for paper rockets.

Description

Students stomp or jump on an empty 2-liter soft drink ("pop") bottle and force the air inside through connected plastic pipes to propel a paper rocket.

Materials

Empty (and rinsed) 2-liter plastic soft drink bottle
2 1/2" PVC tee connectors
1 1/2" PVC connector
2 1/2" PVC caps
1- 5' length of 1/2" PVC pipe
Duct tape
Ruler
Optional: PVC cutter

Eye protection for anyone near launcher

National Science Content Standards

Physical Science
- Position and motion of objects
- Motions and forces

Science and Technology
- Abilities of technological design

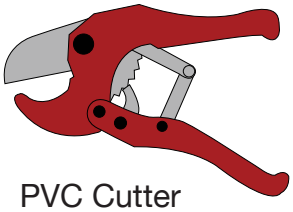
National Mathematics Content Standards
- Measurement

National Mathematics Process Standards
- Connections

Management

The Pop! Rocket Launcher, although fun for all students, is an ideal launcher for younger students because they love to stomp on the bottle to launch the rocket. The launcher can be used for any kind of large paper rocket, including the high-power paper rockets described on page 91. However, the Pop! Rockets described in the activity starting on page 66 are well-suited for this group of students because of their relatively easy construction.

Take the shopping list on the next page to the hardware store to obtain the PVC parts. The PVC pipe will be cut into smaller pieces. Use a fine-tooth saw or a PVC cutter (available from the hardware store). The PVC parts do not have to be cemented together. Friction will hold the parts with occasional adjustments. Leave the label on the bottle. This gives students a target to aim for when stomping. If the end of the bottle is accidentally squashed, the bottle becomes difficult to reinflate and has to be replaced. If you prefer to remove the label, use a marker and draw a bull's-eye on the side of the bottle.



PVC Cutter

The launch rod can be aimed at different angles by tilting to one side or another. Rotating the entire launcher horizontally changes its direction.

When using the launcher, place it in an open space. It can be used inside a gymnasium or cafeteria. If using inside, aim the launch tube at a low angle towards a far wall. Select a target to aim for. If using outside (choose a calm day), the launcher should be aimed at a clear area. For fun, place a basketball in the landing zone. Tell students to imagine the ball is the planet Mars (it's the right color!) and have them launch their rocket to Mars.

Make sure the student doing the launching and any other students near the launcher are wearing eye protection. Do not permit any students to stand in front of the launcher or in the landing zone while "launch operations" are taking place.

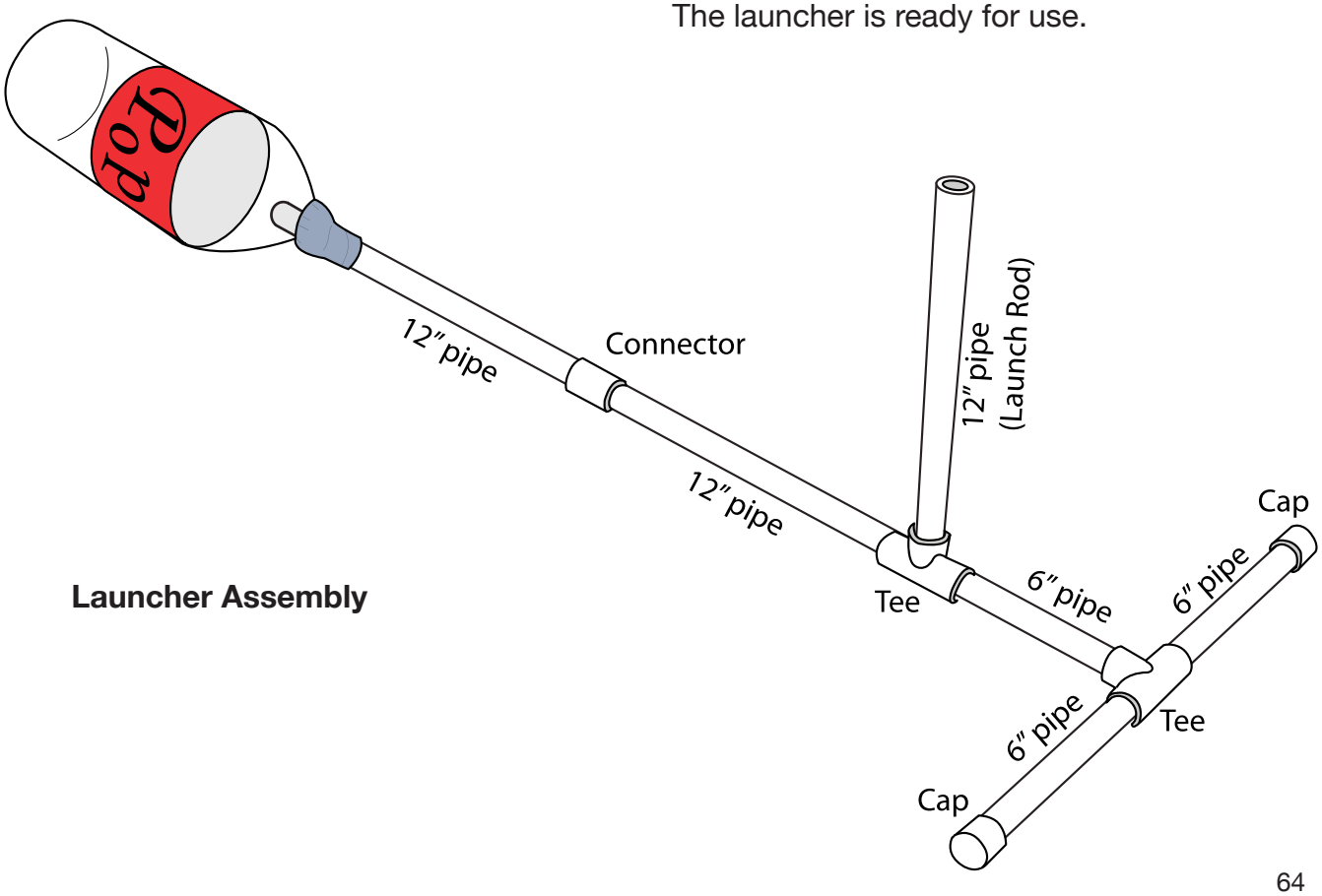
Procedure

1. Cut the PVC pipe into the following lengths:

   3 pieces 12" long
   3 pieces 6" long

2. Insert the end of one 12" pipe a few inches into into the neck of the bottle and tape it securely with duct tape.
3. Follow the construction diagram below for assembly of the launcher.

The launcher is ready for use.



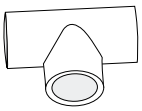
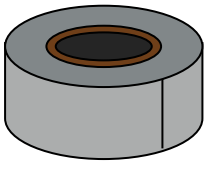
Launcher Assembly

Using the Pop! Rocket Launcher

1. Place the launcher in an open space and tilt the launch tube in the desired direction. If there is a light wind, aim in the direction of the wind. If shooting at targets, have each student aim the launcher for his or her flight.
2. Make sure the landing zone is clear of anyone who might be hit by the rocket.
3. Have the launching student put on eye protection and do a countdown to zero.
4. The student should stomp or jump on the label of the bottle. This will force most of the air inside the bottle through the tubes and launch the rocket.
5. While the student is retrieving the rocket, reinflate the 2 liter bottle. Separate the bottle from the launcher by pulling it from the connector. Wrap your hand around the pipe end to make a loose fist and blow through opening into the pipe. Doing so keeps your lips from touching the pipe. Reconnect the bottle to the launcher and it is ready to go again.
6. When the landing zone is clear, have the next student put on the goggles, slide the rocket on to the launcher, aim the launcher, do the countdown, and stomp on the bottle.

Tip: If you permit students to reinflate the bottles themselves, demonstrate the reinflation procecess. Show them how to blow through their hands into the pipe. Stress that they should not place their lips on the pipe itself. They can practice actual inflation by squishing the bottle and reinflating it.

Shopping List

1 - 1/2" Pipe (PVC) 5 feet long (to be cut into smaller pieces) Hardware store or plumbing supply 	**1 - 1/2" Connector** (PVC) Slip* Hardware store or plumbing supply 	**2 - 1/2" Tees** (PVC) Slip* Hardware store or plumbing supply 
2 - 1/2" Caps (PVC) Slip* Hardware store or plumbing supply 	**Duct Tape** Hardware store 	**TIP:** Be prepared for a damaged bottle by buying extra connectors and pipe. Join the connectors to 12" long pipes and attach 2-liter bottles to the other ends. When a bottle becomes damaged, switching to a new bottle is fast and easy.

* Slip means a non-threaded joint.