

COOL UNDER PRESSURE



EXPERIMENT: WATER BLASTER AND TARGET

Witness the never-ending struggle as air and water battle it out to equalize the pressure in an enclosed container as you make your own water blaster. Then build a target for your own version of a carnival water gun game.

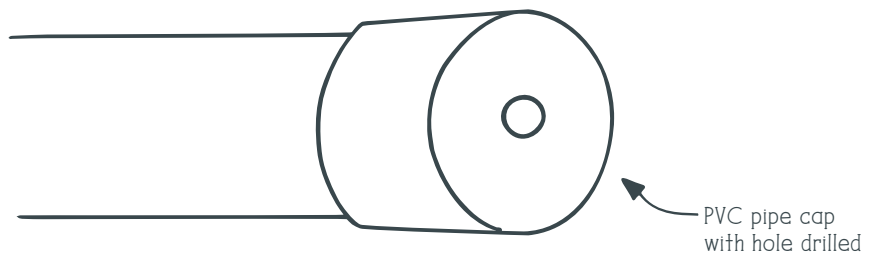


MATERIALS

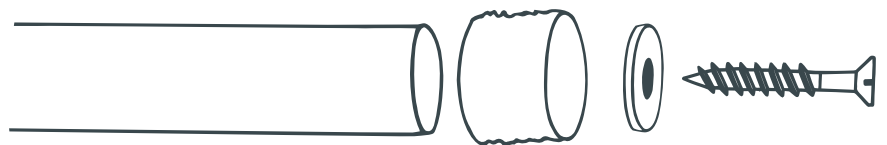
2 feet of 1-inch PVC pipe
 PVC pipe end cap
 3 feet of 1-inch dowel rod
 Expanding glue
 (like Gorilla Glue)
 Metal washer
 Screw
 Pool noodle
 Two 2-liter bottles
 Tape
 Ping pong ball
 Large bucket
 Rocks or sand
 Scissors
 Screwdriver
 Drill
 Water

INSTRUCTIONS

The blaster has two parts: the housing (PVC pipe and cap) and the plunger (a pool noodle plug attached to a dowel rod). Make the housing by gluing the PVC pipe to the cap with an expanding glue and following the directions to let it dry. Once dry, drill a hole in the middle of the PVC end cap; this is your blast nozzle. A small hole will shoot water farther while a large one will drench someone quickly!



Make the plunger plug by cutting a 2-inch piece of pool noodle so that it lays flat. Firmly press the open end of the PVC pipe onto the pool noodle until you see an impression of the pipe. Cut around the impression so that your piece is slightly bigger than the inside of the PVC pipe. Test to see if it fits firmly in the end of the PVC, and don't be shy about making new ones. Place the pool noodle plug on one end of the dowel. Put a washer on top of it, then screw the washer and plug to the end of the dowel.



To use, put the plunger into the housing and push it almost all the way to the end. Put the capped end into a pail of water and pull back on the plunger. If you have a good seal with the pool noodle plug, the water should not drip out of the nozzle. Aim the blaster, push the plunger and soak the world!

TIPS

If your piston blaster doesn't hold water, the seal between the pool noodle plug and the housing isn't airtight. Make the plug a little bigger so it fits snugly.

The pool noodle plug in the piston blaster will eventually get worn out. When that happens, remove the old one and attach a new one.

MORE WAYS TO PLAY WITH WATER

Shoot streams of water at targets in MSI's *Idea Factory*.

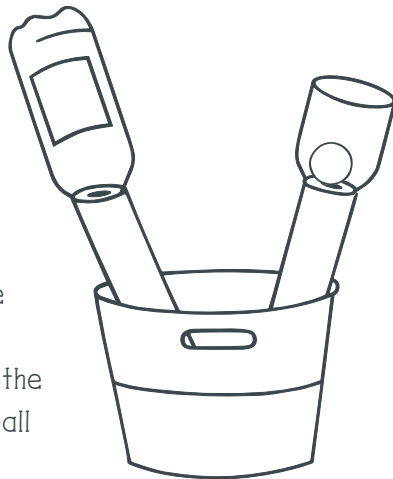
LIKE THIS ACTIVITY?

You could be a ...

- Hydraulic engineer
- Water treatment specialist
- Mechanic

GAME ON

Build a target to see how well you can aim your blaster. Cut an empty 2-liter bottle in half and discard the bottom. Take another 2-liter bottle and cut a square window in one side. If the edges are rough, cover with tape. Cut a 2-foot piece of pool noodle and push each bottle mouth into the pool noodle ends. Curve the pool noodle so the bottles are vertical. Make sure the pool noodle isn't pinched because water needs to flow through it. Place the curve of the pool noodle into a bucket and fill with rocks or sand to stabilize. Position the bottles so that the bottle with the window opening is higher than the other. Put a ping pong ball in the shorter bottle and mark a "finish line" about an inch from the top edge. Squirt water into the window opening until the ping pong ball rises up and passes the finish line!



WHAT'S HAPPENING?

The blaster works by using pressure. When you put the blaster in the water and pull back, the pressure on the water outside the PVC pipe pushes it into the empty pipe. This happens because you are increasing the volume, or space, inside the blaster and "stretching" out the air trapped inside. If you think of the trapped air as a spring, when you stretch it out it is going to try and return to its original size. The only way it can do that is by drawing water up inside the blaster.