

walking mountainsTM science center

How to Build a Soda Bottle Launcher

Materials:

- ½" * 2' PVC pipe * 3
- ¼" PVC coupling * 1
- ¾" Hose Clamp * 1
- ¾" PVC Coupling * 1
- ½" PVC slip cap * 4
- ½" PVC TEE
- ½" PVC Coupling
- Nylon string
- PVC cement * 1
- Large zip ties * 10
- .453" tubeless bike valve
- 2 liter bottle * 1

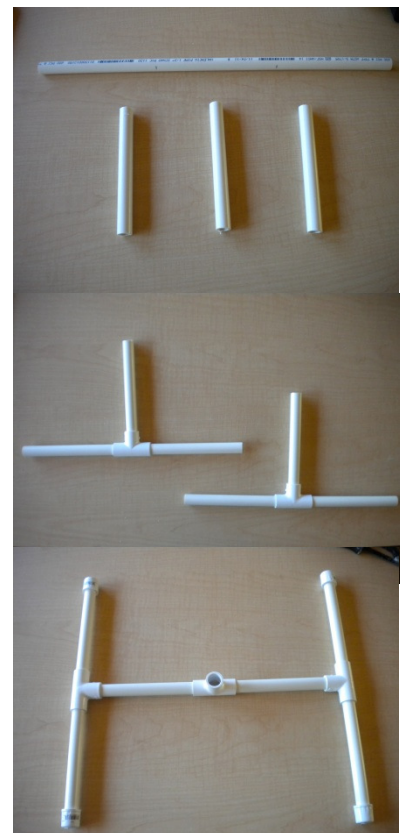


Step 1 (½" * 2' PVC):

- Take two pieces of the PVC pipe and cut them into 8 inch sections. After cutting them you should have 6 pieces of PVC piping.

Step 2 (½" * 2' PVC, ½" PVC TEES):

- Take the 6 pieces of PVC and join them together with ½" PVC TEES
- Take two constructed T's and join them together with the remaining Tee. Make sure that the final tee is 90 degrees to the ground as this will be the firing tube.



Step 3 ($\frac{1}{2}$ "*2' PVC, $\frac{1}{2}$ " PVC coupling):

- Cut the final $\frac{1}{2}$ " PVC pipe in half
- Join the two pieces together with the $\frac{1}{2}$ " coupling unit.
- Place $\frac{3}{4}$ " Hose Clamp on bottom half of tube
- Join launch tube to launch platform.



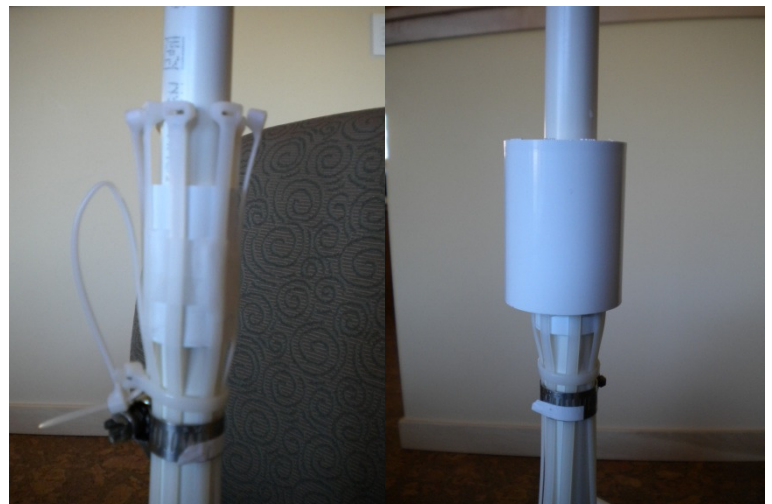
Step 4 (Launch platform, zip ties, hose clamp, bottle):

- Place bottle onto launch tube.
- Using tape attach zip ties to $\frac{1}{2}$ " coupling unit with the small extension hanging on the lip of the bottle.
- Repeat process for 7 more zip ties (take your time with this as it will help form the firing mechanism).
- Once zip ties are tapped in place and all are level raise the hose clamp and tighten it around the zip ties locking them in place.



Step 5 (Launch platform, zip ties, $\frac{3}{4}$ " coupler):

- Remove the bottle from the launch tube.
- Make a large loop with one zip tie.
- Attach loop to tubing so that it works like a spring
- Slide $\frac{3}{4}$ " coupler down onto spring (It should stay in place)



Step 6: (Soda bottle, $\frac{3}{4}$ " coupler, nylon string)

- Slide the $\frac{3}{4}$ " coupler down to expose ends of the zip ties.
- Place the bottle back on launch tube. The ends of the zip ties should hook onto the lip of the bottle
- Slide the $\frac{3}{4}$ " coupler up over the zip ties to test if they lock in place.
- Attach nylon string to $\frac{3}{4}$ " coupler (drill small hole)
- Make sure to have 6ft of nylon string as this will be your trigger.



Step 7: ($\frac{1}{2}$ " end caps and Launch platform, bike valve)

- Take one end cap and drill out a hole to fit the .453" bike valve
- Pull bike valve into the hole until you have the PVC end cap seated in the groove area forming an air tight seal
- Glue all end caps on the base of the stand ensure to let it dry standing up so any glue in the bike valve end cap runs away from it rather than into it.



Directions to launch

Step 1:

- Fill bottle with 1 liter of water.
- Slide bottle down onto launch tube.
- Lock bottle in place with $\frac{3}{4}$ " coupler.
- Slide string under the cross bar in the base, weigh it down with tent pegs or rocks
- Attach bike pump to valve
- Pump air into the bottle until you reach 40PSI.
- Detach bike pump.
- Step back and pull the firing string.
- Watch your bottle fly, and then experiment with adding fins, tails etc.