Make a Stable 2 Liter Bottle Rocket

By craftknowitall in OutsideLaunchers

Introduction: Make a Stable 2 Liter Bottle Rocket

Many years ago, I went to a Cub Scout activity and came home with a piece of PVC pipe with an O-ring on one end and a tire stem on the other. You could launch a 2 liter bottle rocket from this piece of pipe and it was very precious to me. Over the years, my rocket launcher has improved and so has my rocket. This Instructable is about how to make a 2 liter bottle rocket that will fly straight, true and far.

I wrote the above in 2013. Yeah, 7 years ago and I never finished it. Why? Because when my Hubby and I went to blast off my rocket and get pictures, my hubby, while I was getting my camera out of the car, choose to shoot it off. It went up, according to my hubby, and came back down and landed in the top of a 60 foot tree. I never saw it fly and I never saw it again. It took a while to forgive him, and by then I was living life and not even thinking about it. Recently I started publishing Instructables again. I realized that I needed only to publish one or 2 more and I will have published 200 Instructables. I decide to finish this one because all I had to do was make a rocket and get pictures and I would be done. So here I am adding some pictures and finally publishing this Instructable. Be aware I am not a good photographer if the subject is moving. Yet some how I "got 'er done". Lets Get Started.

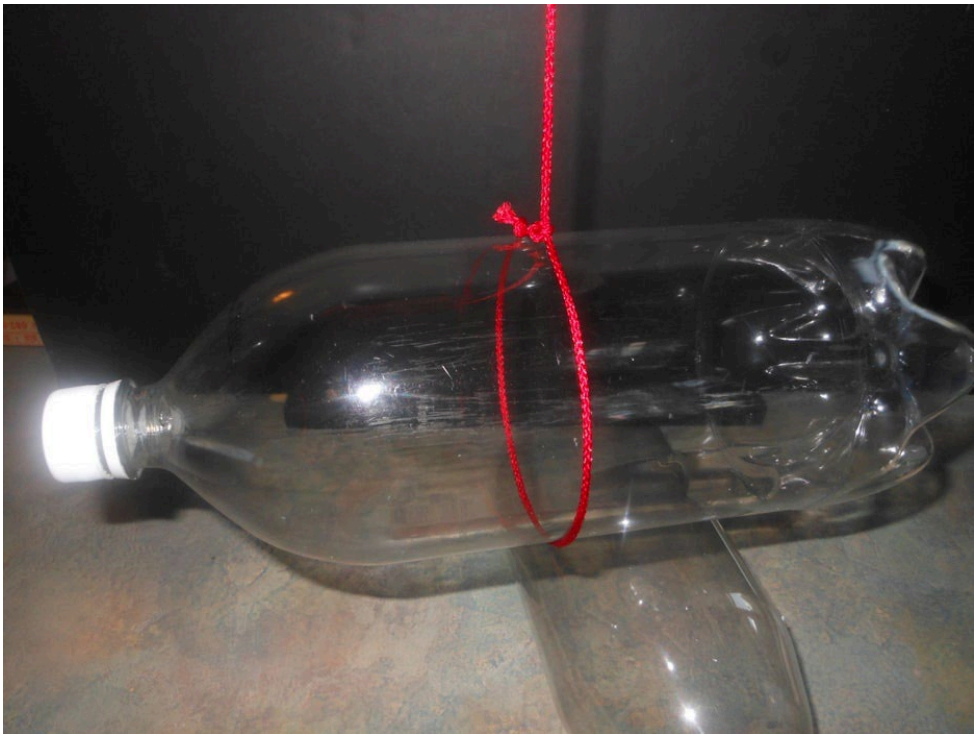
Step 1: Supplies

2 –empty 2 liter soda bottles
Clear packing tape
Scissors
Marker
Piece of string (not shown)
Clay
Scrape of mat board
Pencil (not shown)
tape measure (not shown)

Step 2: Clean Up

Clean off the labels on your 2 liter bottles, and clean the inside of your bottles. Choose one to be the main gas chamber of your rocket. The other will become the nose cone.

Step 3: Center of Pressure



Make a loop in your sting and tied it around the center of your gas chamber bottle. Adjust the string so that when you pick up the end of the string, the bottle is perfectly balanced. Use the marker to mark where that line is. This is your center of pressure.

Step 4: Nose Cone

Cut the bottom off the nose cone bottle.

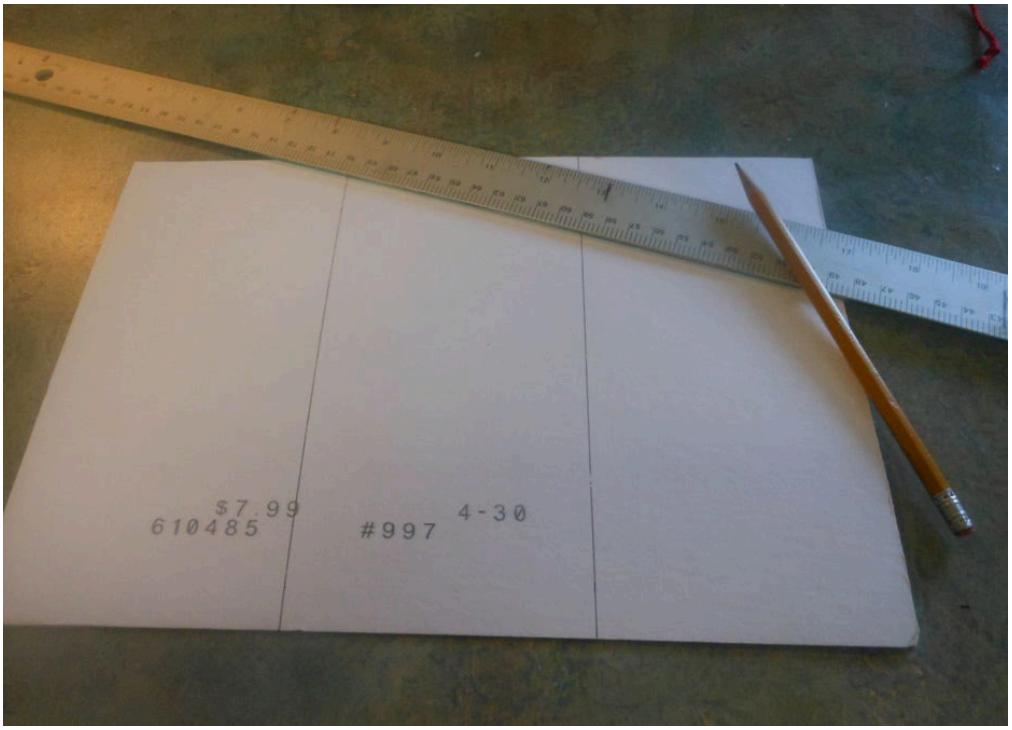
Step 5: Clay

Take a ping pong ball size chunk of clay and soften it up with your hands. Stuff the clay into the inside of the nosecone, stuff it in tight.

Step 6: Attach Chambers

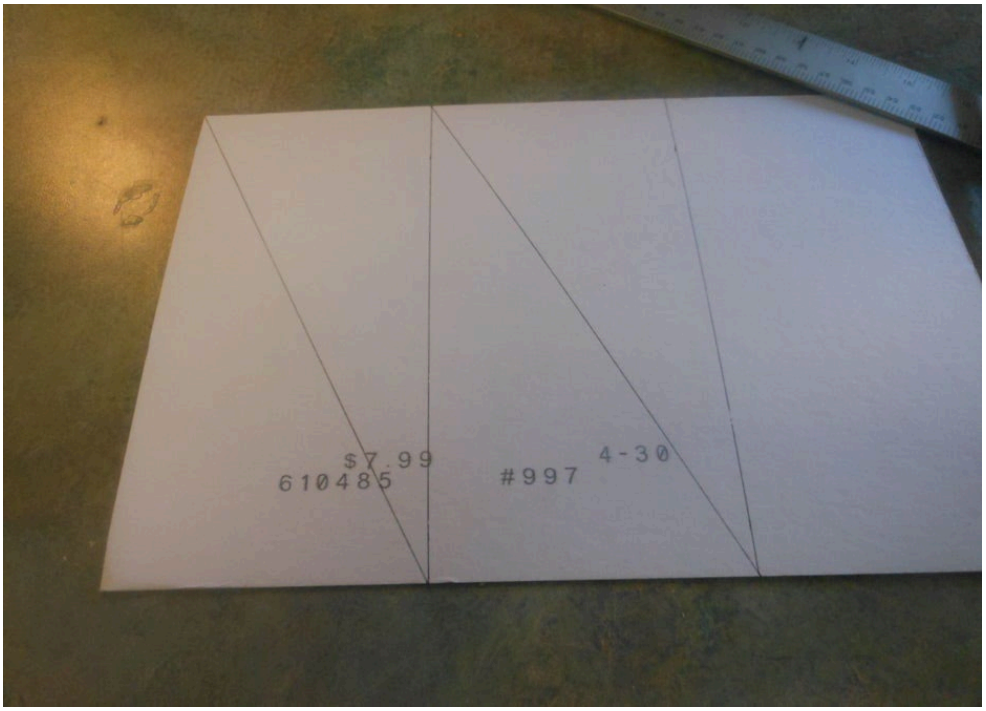
Slide the cut end of the nose cone over the bottle of the gas chamber. Do not tape this piece on yet.

Step 7: Start Wings



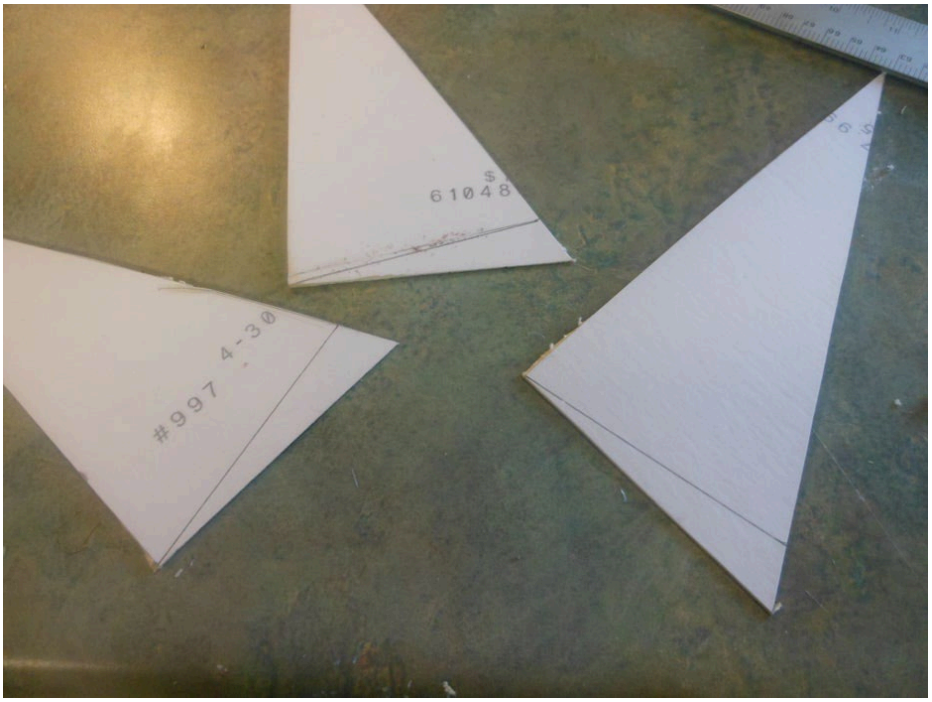
Cut your mat board into 2 – 4inch x 8 inch rectangles.

Step 8: Measure and Draw



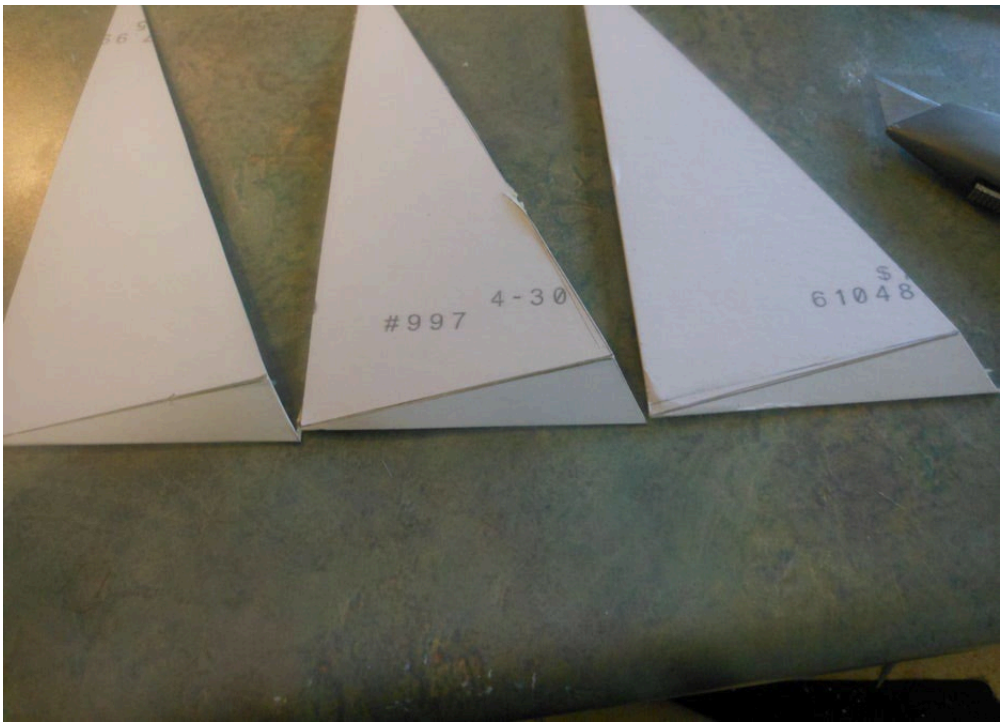
Draw a diagonal line from the upper right corner to the lower left corner.

Step 9: Cut Out Wings



Cut out the rectangle then the triangles. You will need 3 of these for fins. On the lower edge of the fin, draw a line from the 90° corner to ½ inch above the neighboring corner (along the short side).

Step 10: Bend Flaps



Use a straight edge to crease along this line. Bend it a little. Make sure all 3 fins have this bend all in the same direction. The bend in the bottom of the fins will add stability by making the rocket roll in a controlled manner. This controlled roll will add to the stability.

Step 11: Attach Wings

Use the string to determine circumference of the bottle. Measure that distance, and divide it by 3. Use this 1/3 of the circumference, piece of string to space the fins evenly around the nozzle end of the rocket. Use the packing tape to secure the fins to the bottle.

Step 12: Determine the Center of Mass

How take the string and find the center of mass of the whole rocket. Do it the same way you did when you found the center of pressure. Having the center of pressure forward of the nozzle and having the center of mass and quite a ways forward from the center of pressure will prevent the rocket from tumbling and flipping (these unwanted movements are called pitch and yaw).

Step 13: Tape the Rocket Together

When the center of mass is where you want it (this can be changed by adding or subtracting clay from the nose cone), tape the nose cone in place. Also do your best to have two chamber straight above each other. You have to eyeball it. If the whole rocket will balance on the nozzle, you have done a good job.

Step 14: 5, 4, 3, 2, 1...

Add enough water to the pressure chamber so that is 1/3 full. Put it on your rocket launcher (there are more than one, 2 liter bottle rocket launcher Instructables, on this web site) and add +/- 80 psi air pressure,

Step 15: Blast Off

then blast off. Now comes the fun stuff. I really tried to get a video of the rocket flying. I flew and rebuilt my rocket 3 times and still no good video. The first picture is off the rocket leaving the launch pad. The second is a picture the rocket taken as it flew. I really couldn't see it. For me, I can't seem to watch the rocket and keep the camera on it. If anyone can make a rocket like this one and get a good video of it flying, I would love to see it. The second picture I saw a white dot. I blew it up and up and up. Yaaassss! It is my rocket. (Plus, none of the white birds in our neighborhood are that small.) :)

Step 16: Lesson's Learned

Be aware the when a rocket lands, damage can and possibly will be done. This very first rockets (2010) flew long and straight and beautiful. The second rocket (2013) got eaten by a rocket eating tree. The 3rd rocket (2020) flew up and come down beautifully but without video proof. The clay got knocked out of place when it landed. We tried to fly it again, it took a hard turn to the left and landed on neighbors roof. The loose clay totally knocked the balance off and we got if off the roof before they even knew it was even there. I took the rocket apart and re stuffed the clay and tried to align it and make it as balanced as possible. The next day, today (05/30/2020), we tried to fly it again. It flew up straight and still no video proof. When it landed, it looked okay but it wasn't. The last flight was off a little the landing made everything shift so not straight, but a hard landing dislodged the clay as seen in the last picture. It sure wasn't perfect, but it WAS FUN! Enjoy!