

SUGAR PINE CHRISTIAN CAMPS

Water Rocket Construction

materials

20-Ounce Missile Version: (1) 20 ounce soda bottle (available in soda machine), (1) flat washer, cardboard, scissors, directions and patience

2 Liter Bottle Version: (2) 2-liter soft drink bottles, duct tape, (2) flat washers, cardboard, scissors, directions and patience

1.

Before building your rocket, make sure that your bottle fits onto our launcher. Do not wrap tape around the "ring" near bottle opening or it will not work! First of all you need to change the center of gravity of your bottle(s). To do this, attach flat washers (1 for missile version and 2 for the 2-liter version) with duct tape to the closed end of your bottle.

2.

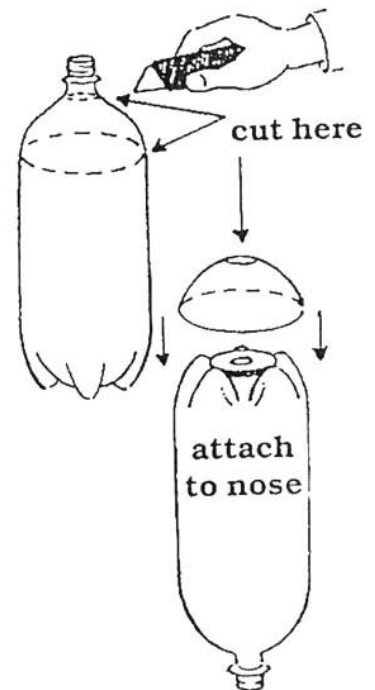
Next, you need to take care of some wind resistance issues. The first thing you will want is to remove the label from your bottle and evenly tape the entire surface of your rocket. One layer of tape is sufficient. This should minimize the amount of drag.

3.

Another source which could cause some turbulence is the attachment of weight to your rocket's nose section. To correct this problem, fasten a nose cone to your rocket.

This can be done by cutting the top from another 2-liter bottle (see picture) and attaching it to the end of your rocket. Just be sure to cover the hole where the threaded portion of the bottle-neck was removed. (Step three not necessary for 20-ounce missile rockets.)

** If you don't have another bottle to use for a cone, try wadding a piece of paper, place it over the washers, and use tape to create a cone-shaped nose for your rocket. Be creative!



rocket trivia

Ever wonder why a real rocket has a pointed nose? It is to provide stability as the rocket breaks the sound barrier. However, the best nose cone design for a low velocity rocket is parabolic (rounded). This also makes it less likely that a camper will head home with a rocket stuck in his head...

4.

To make your Sugar Pine Water Rocket look a lot more like a rocket, the next thing you will add are the tail fins. In reality, the fins are more for stabilization than for looks. The air rushes over the surface of the bottle and comes together at the neck in a swirling motion. This will cause your rocket to spin. By adding tail fins, you not only stop the spin, but the fins will also counterbalance any deflecting force on the nose of your rocket. (And if you understand all of this you should be at Space Camp!)

Tail fin directions on back

Building and mounting your Tail Fins



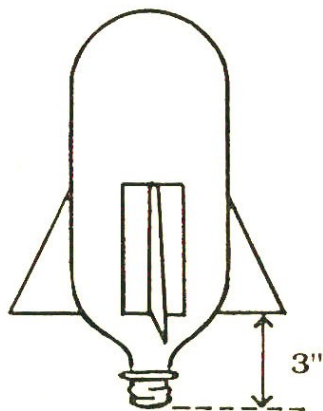
Using a scissors and the pattern below, cut out three tail fins from an 8"x 8" piece of corrugated cardboard. Be sure the pattern is placed parallel to the corrugated "ribbing" of the cardboard.



Once cut, split the 1" section of cardboard that extends beneath the triangular portion of the fin. When opened, this portion should be at a right angle to the fin (see picture below).

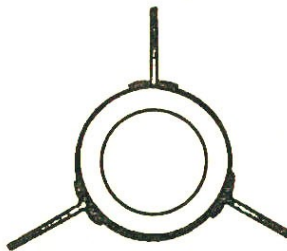


Now mount your tail fins with duct tape to your bottle as shown below. Be sure your fins are properly aligned and spaced. The bottom of your fins should be about 3" away from the "open" end of your water rocket.



Fins, side view

Fin pattern:

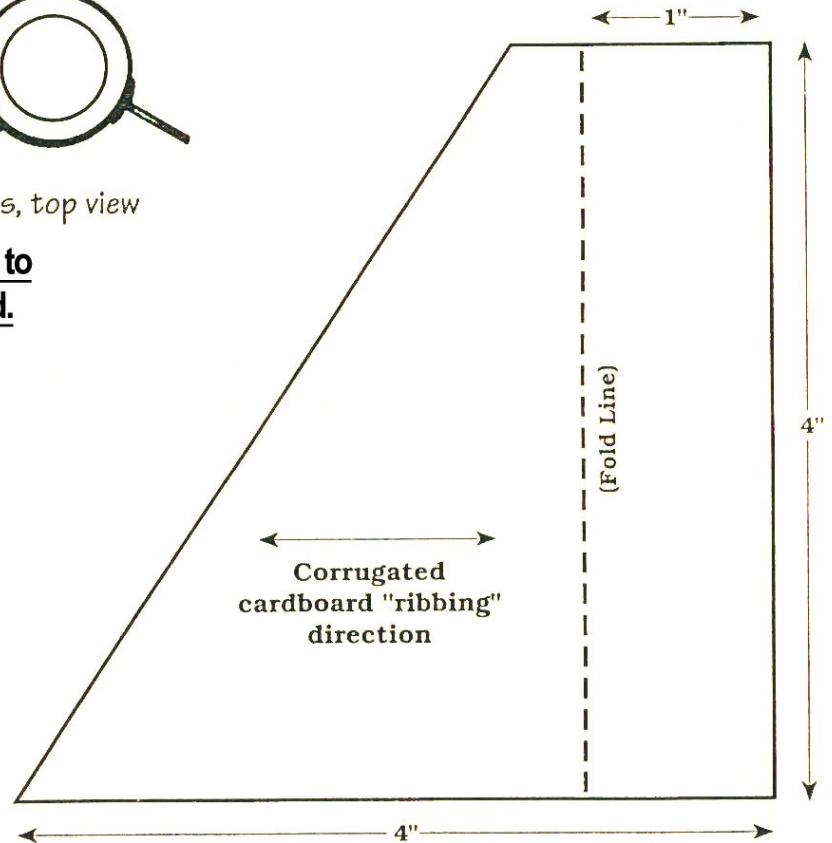
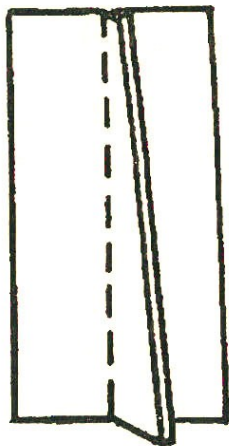


Fins, top view

Adjust fin size for 20-ounce missile rockets. Three fins will work best for rockets of all sizes.

Mounting the fins lower than the picture shown will make it hard to load your rocket on launch platform.

Use minimal duct tape below your tail fins to insure proper "seating" on our launch pad.



Be sure to mark your rocket so you know that it is yours!

(Information adapted from "Rockets Away" curriculum produced by Ohio State University)