Soda Bottle Water Rocket

By cyenobite in OutsideRockets

Introduction: Soda Bottle Water Rocket

In a couple of hours (or less) you could make this water rocket! Water rockets use water and pressurized air to launch a soda bottle(s) 100's of feet into the air. This instructable will NOT cover the launcher. I hope to later come back and write up an instructable for a launcher. There are many websites with water rocket plans (and launchers) part of the fun is to experiment and come up with your own designs. Feel free to modify, improve, experiment with this instructable and post your results in the comments. The original inspiration for this rocket was from the magazine called "MAKE Magazine" (makezine.com). Issue #5 has full instructions also.

Step 1: Materials
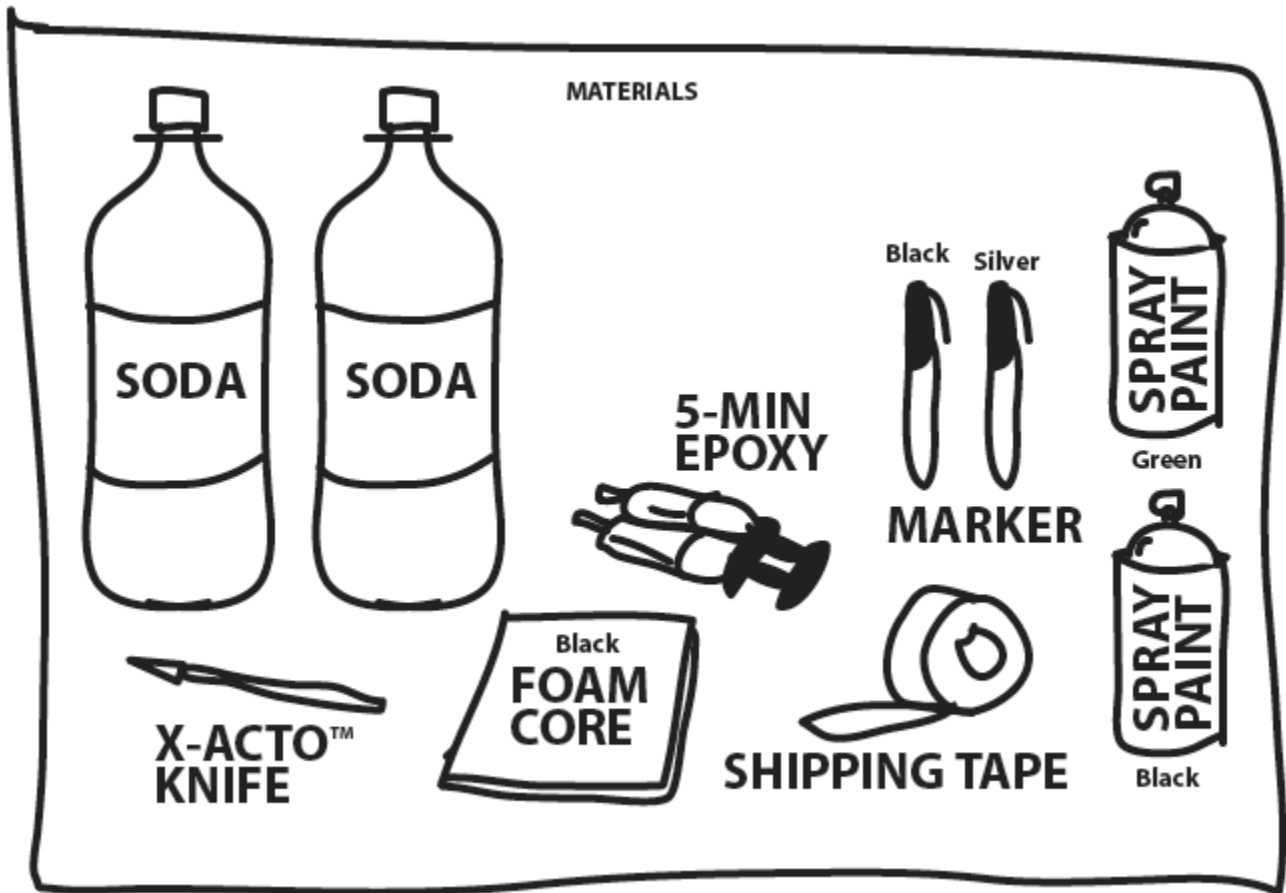
List Of Materials...

> 2 Soda Bottles (empty)
- Note: There are slight differences in the openings of the bottle depending on the soda brand. Pepsi is just a tad smaller than Coke. -
This Instructable is set up for 2 liter sized bottles - feel free to adjust for any size though.

> 1 sharp knife (kids get your parents help here!) I prefer X-acto brand for cutting foam core.

> 1 Large sheet of Foam Core (I prefer Black, but any color will do). Foam Core can be found at almost any arts and crafts supply store. To learn more about foam core try wikipedia: http://en.wikipedia.org/wiki/Foamcore

> 5 Min Epoxy (This stuff is nasty! Do not inhale, and use in a well ventilated area. Do NOT get it on your skin or eyes, or hair, etc... read all safety warnings before using.) Feel free to experiment with other glues. This can usually be found at any hardware store - kids, ask your parents for help with this glue.

> 2 (or more) Markers - I used Sharpies, one black and one Silver

> Clear Shipping Tape - It's thicker than regular scotch tape and about 2" wide.

> 2 (or more) cans of spray paint - Pick your own favorite colors!

## Step 2: Step One - Cut Bottle

Peel all labels off of the bottles.
Measure up from the bottle about a Third and cut the bottle. Try to keep your cut line as straight as possible. It may help to mark a straight line around the bottle first. Be sure to recycle or reuse any scrap pieces.

Step 3: Bottle Merge

Take the cut bottle from the previous step and insert it directly over the bottom of the other bottle - this becomes the nose cone of the rocket. Try your best to keep everything straight. If you put the nose on crooked, your rocket will fly crooked. Place the nose cone on loosely at first, then gently press down until firm. Turn bottle upside down and let it drop on a hard surface several times. If you press the nose cone on too hard, you'll start to get "crinkles" in the plastic. Crinkles are bad.
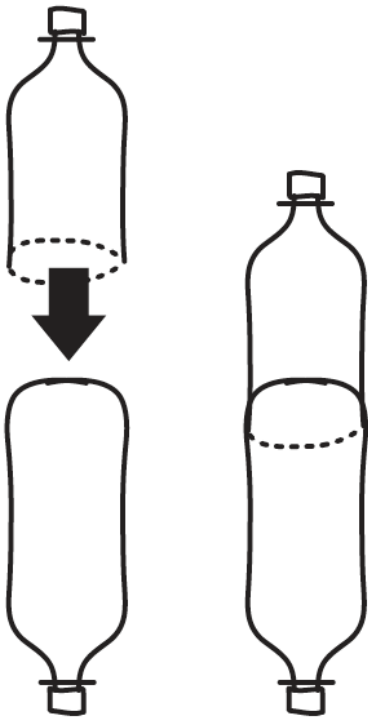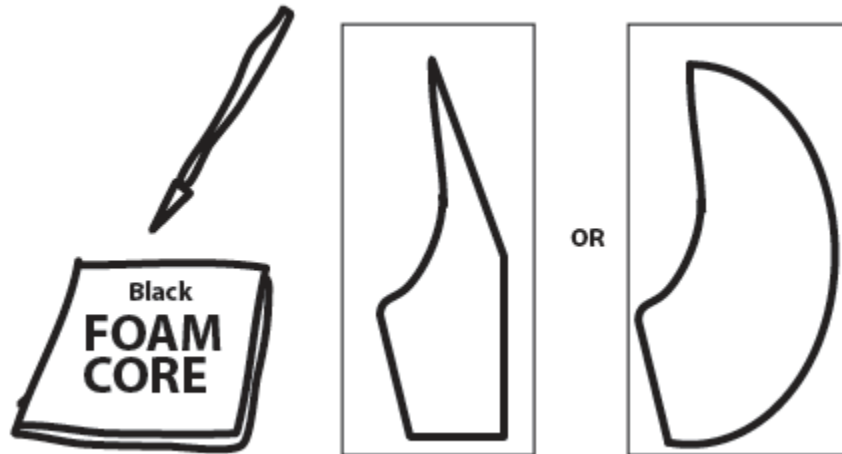
Step 4: Tape Bottles Together

Once the nose cone is on tight (but not too tight) use the clear shipping tape to tape the seams. Try to keep tape smooth.
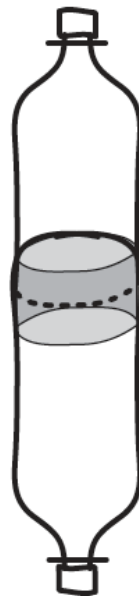
Step 5: Cut the Fins

Next you gotta cut some fins to keep your rocket flying straight. I will attempt to upload a PDF file here, so that you can use it as a template. I used a Pepsi bottle, so again, you may need to adjust the curves to fit your bottle. **Kids - this is the step that you will need your parents help.** Parents... cutting foam core can be tricky. The key is to cut one time all the way through in a smooth motion. You'll need to press hard to make sure the knife is all the way through the foam core. If you feel more comfortable using a utility knife by all means. Be Careful!

Please! Experiment with your own fin designs. I chose a more squared off design, but you can use curves if you like, etc... I chose 3 fins. You'll need a minimum of 3, no more than 4 (unless you really really want to!). If you do 3, you need to split your bottle into 3rds, which equals 120 degrees. I'll try to upload a second PDF file with a 120 degree template. 4 fins, you'll just need 90 degrees.
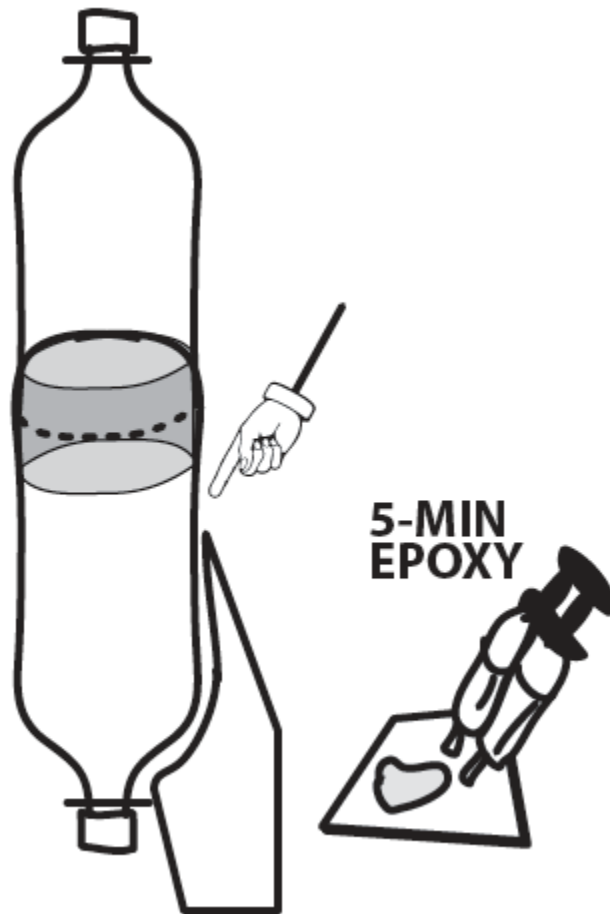
Step 6: Fin Supports
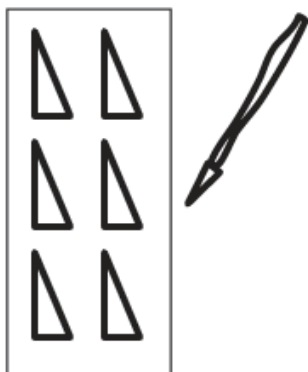
This step may not be needed, but I figured better safe than sorry...
Using some of the scrap pieces of foam core, I cut 6 small triangles. (approx 1" x 1.5"). These will be added to your fins later for extra support.

Step 7: Attaching the Fins

Ok, this is the tricky part. Open your adhesive (or glue of your choice). Squeeze out a small amount (enough to do one fin). Mix the epoxy with a scrap piece of foam core (this will be your "brush" too). PRE-Mark your bottle (with the marker) where you want your fins to line up. Make sure the fins fit your bottle BEFORE putting any glue on them. Trim, or adjust if needed. Apply the Epoxy to your fin, and attach it to the bottle. WARNING: This step requires patience! 5 minutes is a LONG time. If you can figure out a way of setting up some clamps, more power to ya. While holding the fin, don't let it shift... you will be able to move and adjust the fin while the epoxy is drying, but once it starts to set, it gets difficult to adjust. You'll feel it start to set. Once it gets to the point where you can't really adjust it anymore, you can place the bottles and fin, on the table to set without holding it. Prepare your next "glob" of glue for the next fin. REPEAT for all of your fins.

Step 8: Glue Your Fin Supports

5-MIN EPOXY
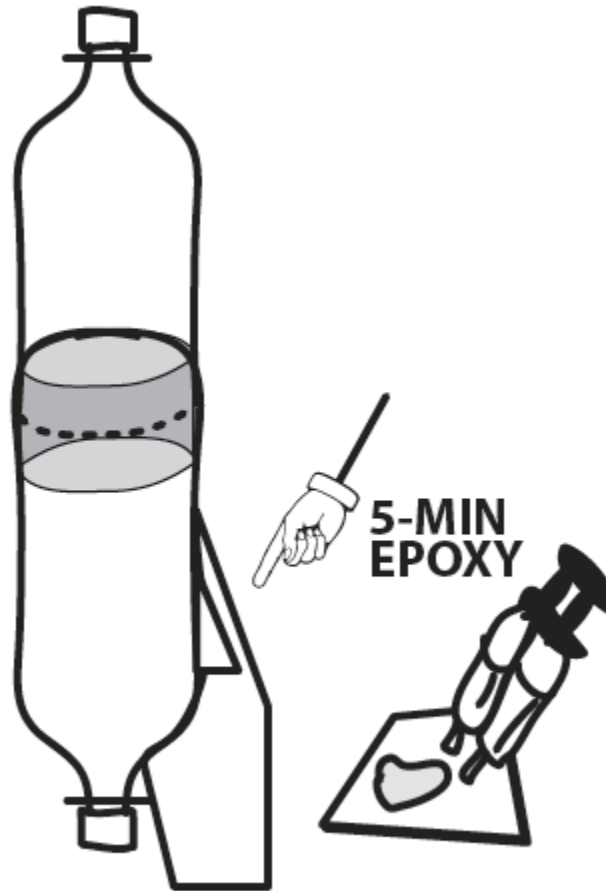
This is the added step for extra support. Glob out another dab of Epoxy and glue your triangle to the bottle and the fin. Glue the Supports on each side of each fin. Wait approx 10-15 minutes to be sure Epoxy has set.

Guess what... Your done all of the assembly at this point!!
You could take this rocket to the launcher at this stage and let it rip!
BUT... it's kinda messy looking isn't it?
One more step...

Step 9: Paint and Details

Ouch! Minor damage
from when it hit a tree
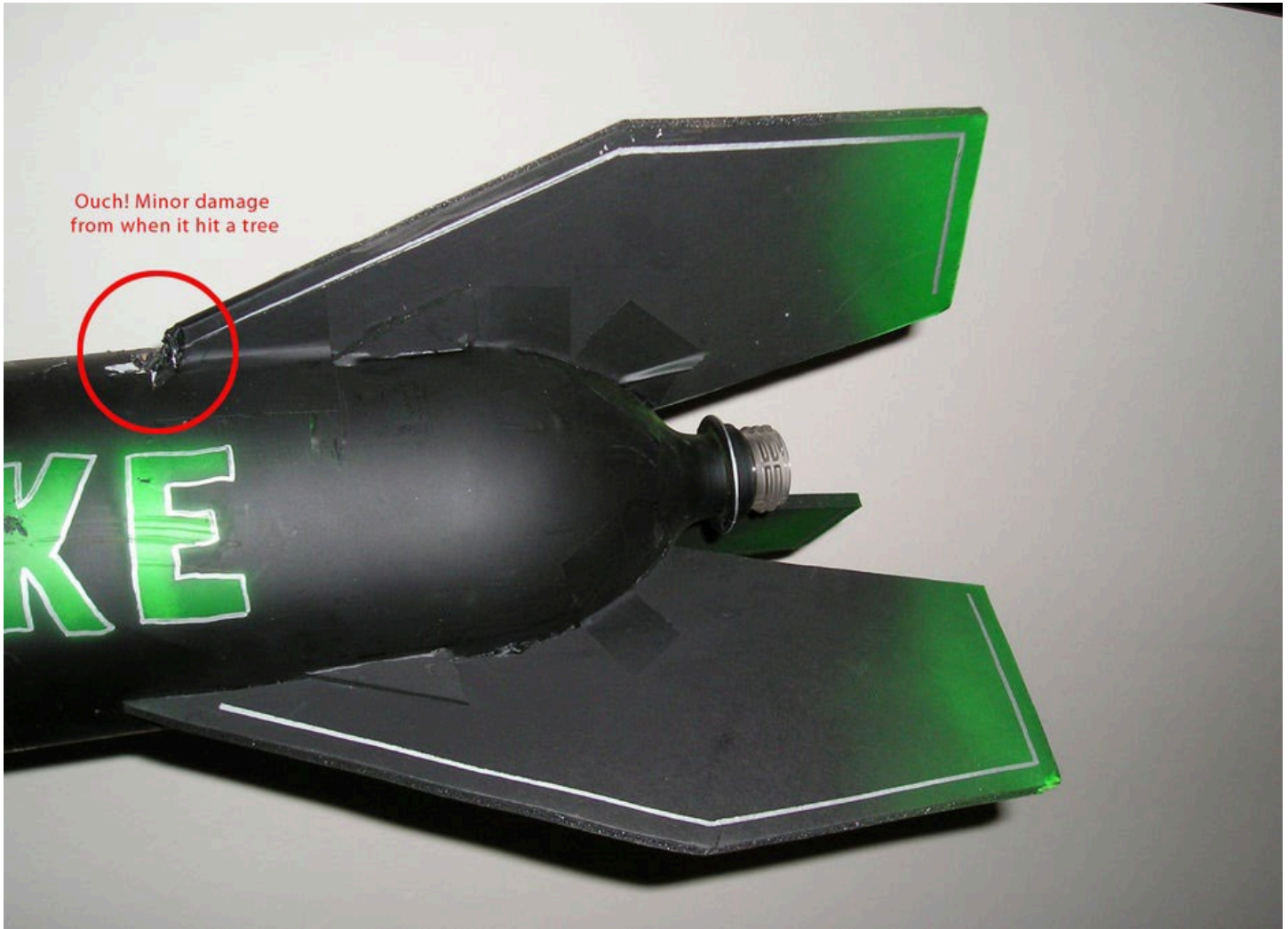
This is where the spray paint comes in.
I used BLACK and a Bright Green so that the rocket would be easy to spot while up in the air!
Decorate your rocket any way you like! Flames, spots, checkers, glitter, etc...
Use your extra markers to add any fine details or words (I put H20 on mine so everyone would know this is a water rocket). Add some pin stripes, etc...

(note: as you can see from this photo, I also added some additional tape to the fins for extra support. Do this BEFORE painting.)

Perhaps, I should have mentioned this before, but this rocket has no parachute! What goes up, must come down.
WORDS OF CAUTION:
DO NOT launch this rocket near people, a crowd, small animals, streets or cars or houses... in other words... take your rocket out to the middle of nowhere and launch it in a safe place. Make sure everyone knows there is no parachute and that this rocket

will be crashing to earth at a high rate of speed. I wouldn't want to get hit by it! The rocket will probably fly higher and farther than you think.

Step 10: Links and Video

Here are some additional links that may help...
http://www.youtube.com/watch?v=kRUt5I-pNuU
Youtube video of my rocket and a group of others from the MAKE:PHILLY Bar-B-Que. (I'll try to embed this video also).

Links:
http://www.MakePhilly.com/
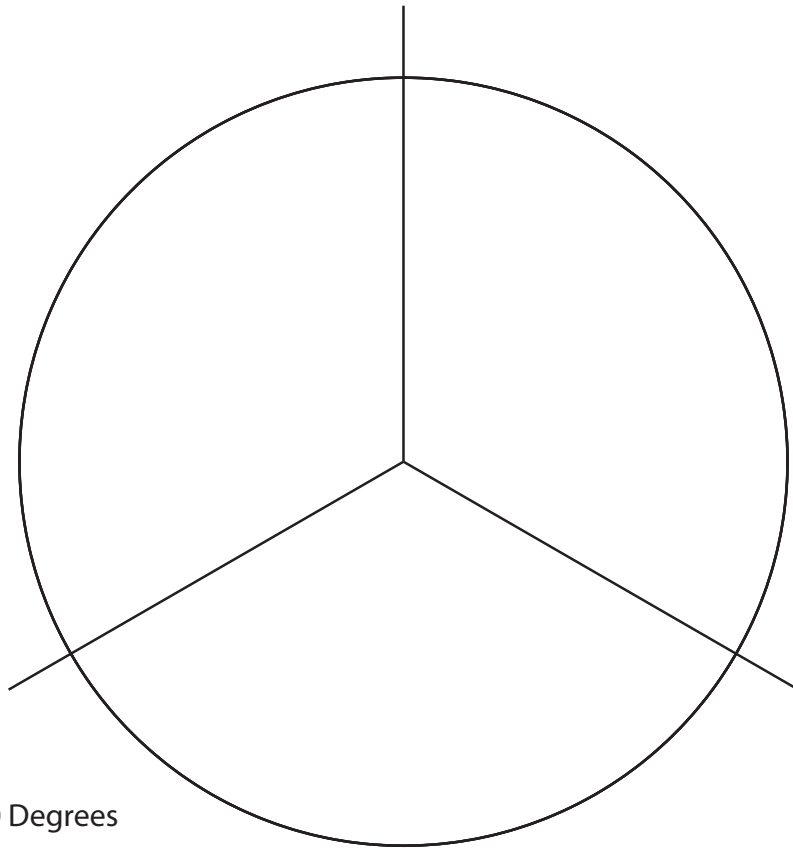http://www.water-rockets.com/
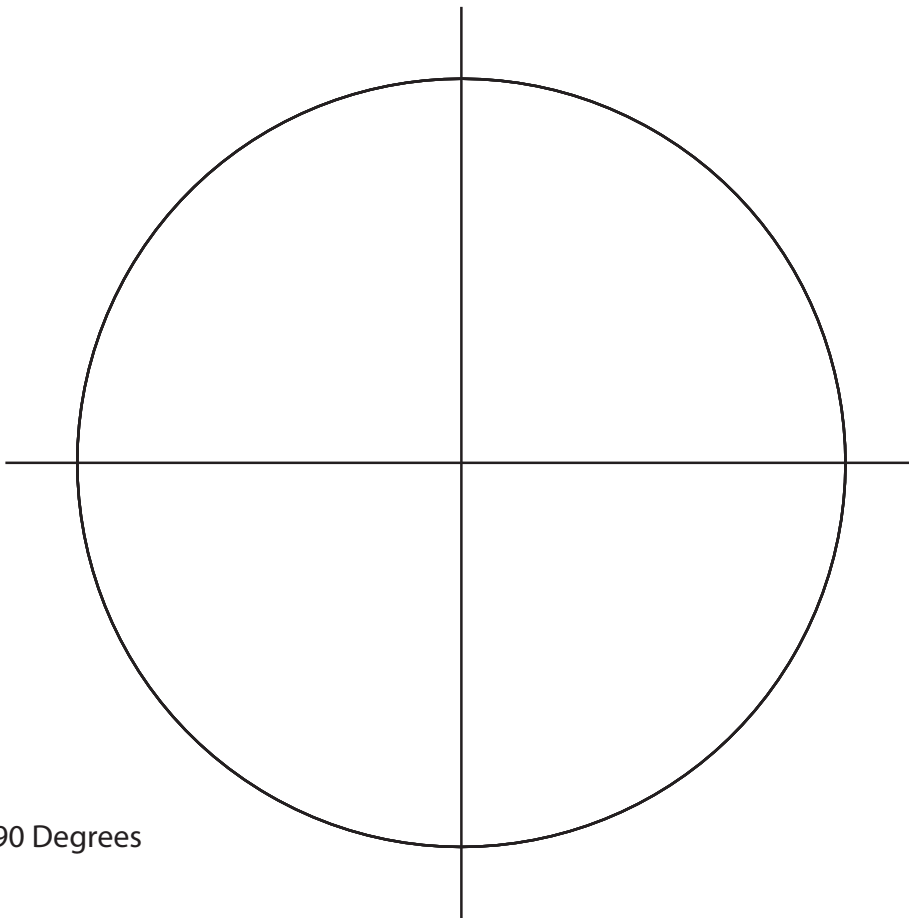http://en.wikipedia.org/wiki/Water_Rockets
http://makezine.com/05/rocket/

Zine:
Make Magazine - Issue #5

3 Fins = 120 Degrees

4 Fins = 90 Degrees