Soda Bottle Water Rocket

by cyenobite on August 10, 2007

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Intro: 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 O 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. -

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

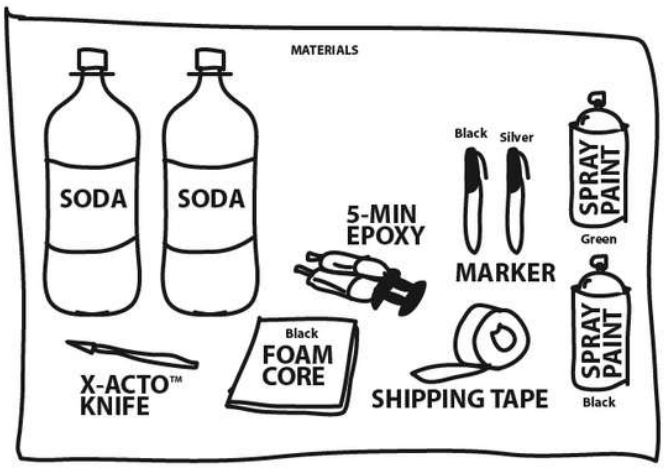
> 1 Large sheet of Foam Core (I prefer Black, but any color will do). Foam Core can be found at almost any arts and crafts supply store. To learn more about foam core try wikipedia: http://en.wikipedia.org/wiki/Foamcore

> 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

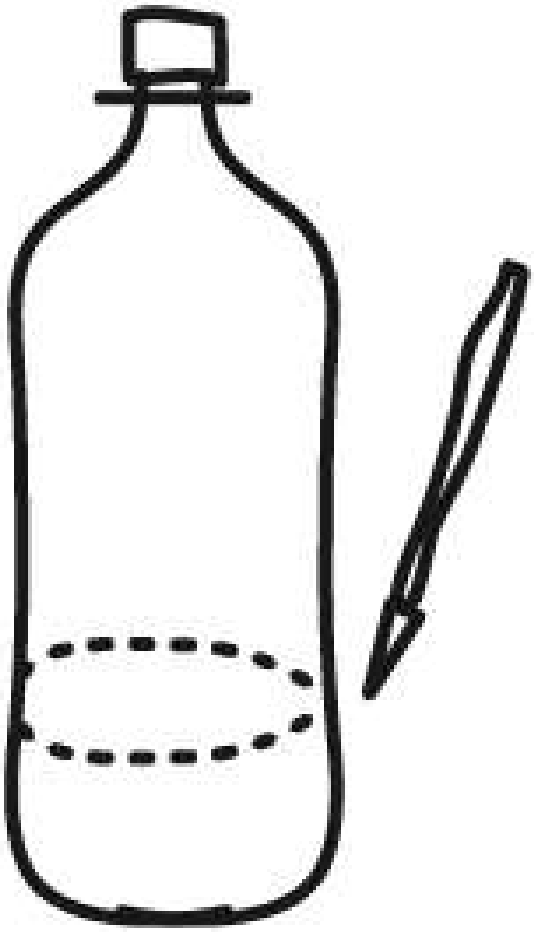
> Clear Shipping Tape - It's thicker than regular scotch tape and about 2" wide.

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



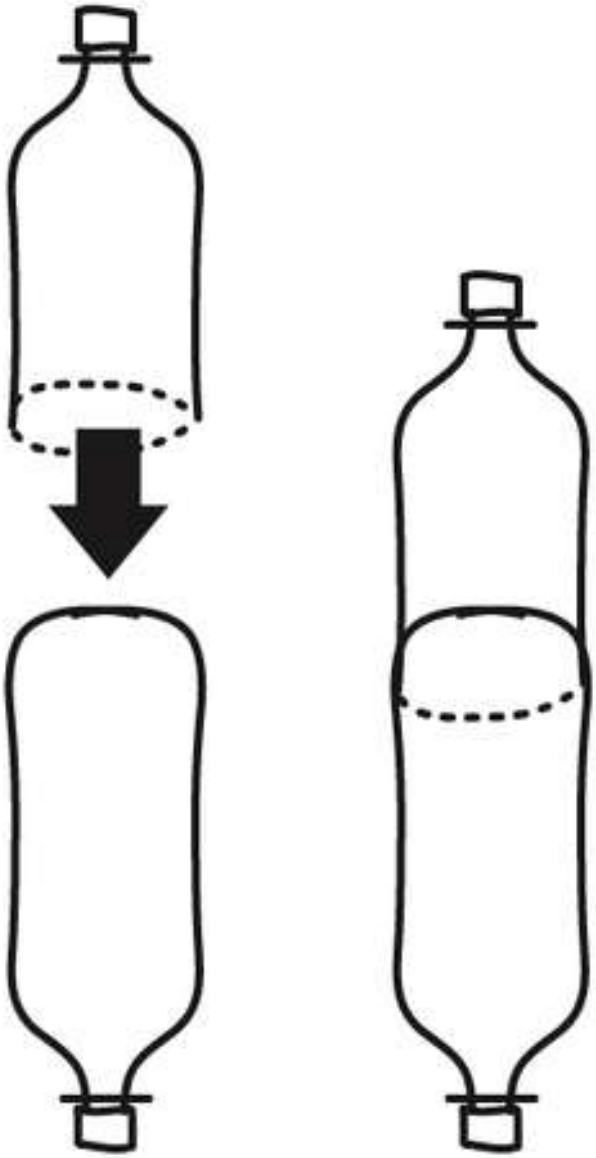
Step 2: Step One - cut bottle

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.



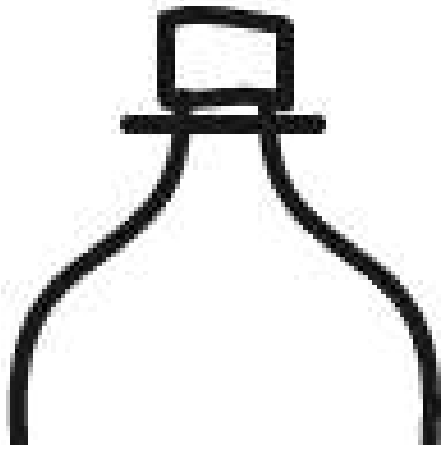
Step 3: Bottle Merge

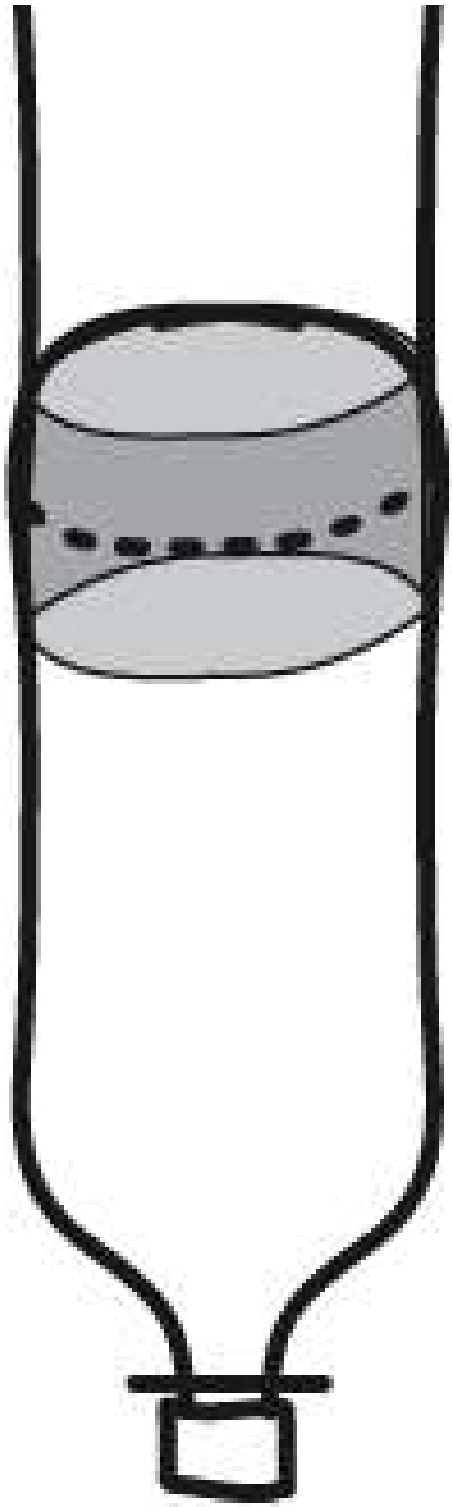
Take the cut bottle from the previous step and insert it directly over the bottom of the other bottle - this becomes the nose cone of the rocket. Try your best to keep everything straight. If you put the nose on crooked, your rocket will fly crooked. Place the nose cone on loosely at first, then gently 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.

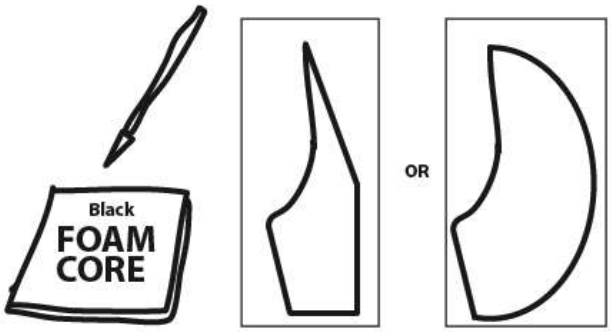




Step 5: Cut the Fins

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.



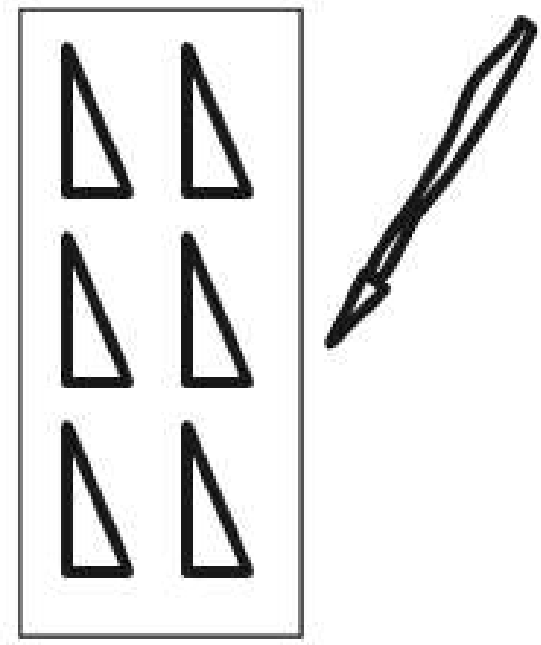
File Downloads

single Fin d1.pdf (153 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'single Fin d1.pdf']

3-4 fins angles.pdf (159 KB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to '3-4 fins angles.pdf']

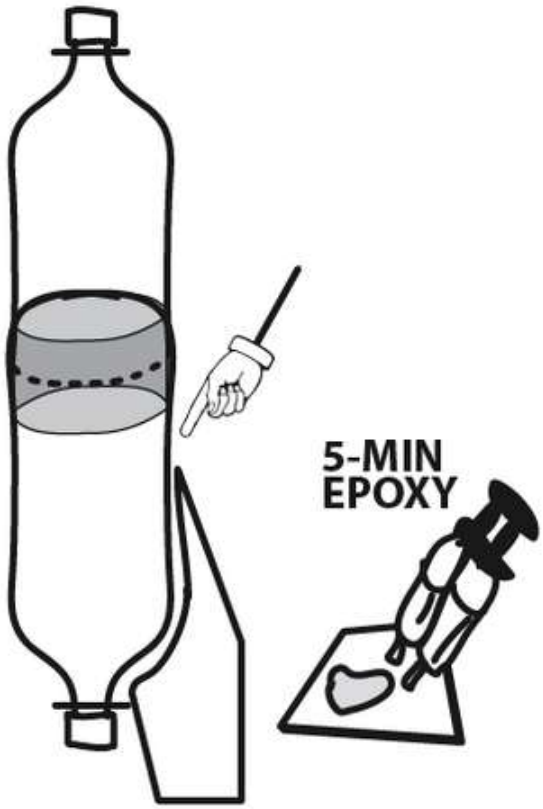
Step 6: Fin supports

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

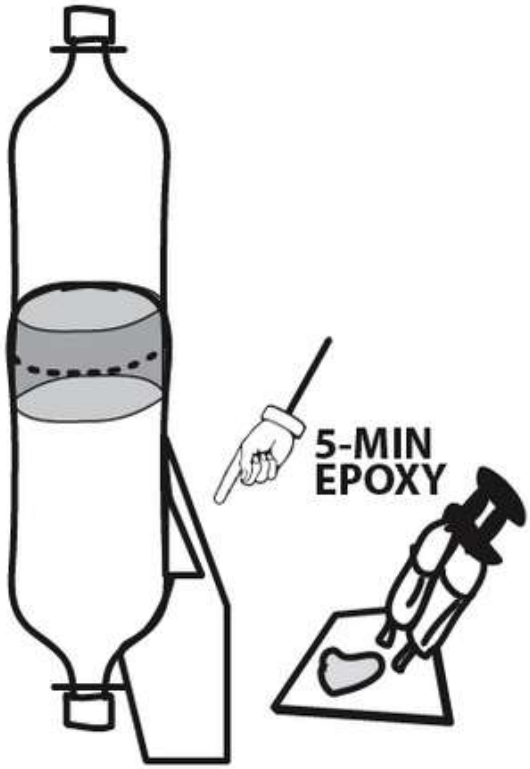
Ok, this is the tricky part. Open your adhesive (or glue of your choice). Squeeze out a small amount (enough to do one fin). Mix the epoxy with a scrap piece of foam core (this will be your "brush" too). PRE-Mark your bottle (with the marker) where you want your fins to line up. Make sure the fins fit 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

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

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

Video:

Related Instructables

Missile Technology on the Cheap. by Kiteman

Water Rocket by qwertyboy

WATER BOTTLE ROCKET by Rebeccaboogirl8

baking soda rocket by THESTU

Water Rocket! by Banduan 9

Bottle Rocket How To by haleyanna

Comments

50 comments **Add Comment** **view all 175 comments**

TheRocker71 says: Jan 29, 2011. 2:47 PM **REPLY**
Could i paint all the components before i assemble it?

cyenobite says: Jan 29, 2011. 3:08 PM **REPLY**
you could - but... it might not be a good idea to paint the parts that will be glued together. The paint could peel, or chip, or generally weaken the area that needs to be glued. So if you can mask those areas off, then go for it!
Good Luck!

TheRocker71 says: Jan 29, 2011. 11:05 AM **REPLY**
Is there a PDF for these supports?

cyenobite says: Jan 29, 2011. 2:40 PM **REPLY**
No, sorry. No need for a pdf, as they are just small triangles. They really don't need to be triangles either, I just decided to put them on for added support using some left over foamcore. Hope that helps.

TheRocker71 says: Jan 28, 2011. 9:42 PM **REPLY**
If i just used the 5 min epoxy without the tape would it work the same?

cyenobite says: Jan 29, 2011. 7:49 AM **REPLY**

It should still work fine, it just may not last as long if you leave out the reinforcement of the tape. You could always bring some extra epoxy with you for a repair if needed.
Good Luck!

TheRocker71 says: Jan 29, 2011. 9:24 AM **REPLY**

Thanks alot, im gonna go with duct tape. Il upload pictures, and a video of the launch later today!

Thanks Alot

TheRocker71 says: Jan 28, 2011. 9:43 PM **REPLY**

Which would be better four or three fins?

cyenobite says: Jan 29, 2011. 7:57 AM **REPLY**

Totally up to you. Personally, 3 worked fine for me. A 4th fin will mean added weight, so it may not travel as high. 4 fins might make it fly a little more straight up though. Do you want height or accuracy?

Bottom-line though, either one should work fine.
Good Luck!

TheRocker71 says: Jan 29, 2011. 9:18 AM **REPLY**

Thank you, I am looking for height so im gonna go with three!

Thanks Again!

fretterd says: Sep 18, 2009. 12:41 PM **REPLY**

made one for my Son last night for Cub Scouts came out great very easy to make thanks!

cyenobite says: Jan 29, 2011. 8:01 AM **REPLY**

Very glad to hear that!

cyenobite says: Sep 21, 2009. 4:41 PM **REPLY**

Cool! I'm glad it worked well for you and your son!

CHANGE my name says: Jan 27, 2011. 6:14 PM **REPLY**

this is my first time making a rocket (by the way, your page is awesome!) , but can u teach me how to launch it???

E-mail-John93908@netzero.net

i hope you answer some time. :)

cyenobite says: Jan 28, 2011. 5:53 AM **REPLY**

Hello Change,
I never built a launcher before, so I can't really comment. My advice - search google and look for a plan that works for you. There are a lot online. Here's one to get you started: http://www.martinet.nl/articles/20050101

Thanks and good luck!

arhodes18 says: May 8, 2010. 11:42 AM **REPLY**

I used to make these all the time! When I was in the later years of my building, I made them out of FTC (fluorescent tube covers) and those ones were AMAZING!
Maybe I'll pose an 'ible about those? what do you think?

cyenobite says: Jan 29, 2011. 8:01 AM **REPLY**

Sure - go for it! A friend brought one of those to our launch, but he didn't have good luck with it - he had a hard time getting an air-tight seal, but I'm sure it can be done. Maybe your instructable would help others.
Good Luck!

TheRocker71 says: Jan 28, 2011. 8:53 PM **REPLY**

Sounds good

TheRocker71 says: Jan 28, 2011. 9:16 PM **REPLY**

Going to make mine with my friend tomorrow, we designed a special launch pad for the rocket. Hoping for it to launch pretty far! ;)

robo3 says: Jan 24, 2011. 1:49 PM **REPLY**

HI, I dont know if you can anser this but I am making one and I dont know how much psi(air) I need to pump into the bottle, im thinking like 100ft or more less but I want to make it out of pvc pipe

Thanks plz reply!!

cyenobite says: Jan 24, 2011. 3:07 PM **REPLY**

Hi Robo3,
It has been a while since I've done this, but if memory serves we went up to around 70psi. I just did a quick google search and sure enough the numbers range between 60 and 80psi. Hope this helps!
PVC pipe may not work... it's rather thick and heavy compared to 2 soda bottles. I'm sure with enough air pressure it would work theoretically, but I'm not sure at what psi a PVC tube would break. Also flying PVC scraps sounds dangerous to me. I would probably advise against the PVC idea.

robo3 says: Jan 24, 2011. 5:53 PM **REPLY**

Ya true thx :)

Alsius says: Jan 8, 2011. 6:06 PM **REPLY**

Odd question, but I want to see if I can get a really big (like, a year) head start on a science project: How freaking ridiculous of an idea would it be to try to seed a could with one of these? Like, fill it with salt somewhere, shoot it into a cloud, and see what happens. This seems pretty neat, so I was merely wondering. Thanks.

TSC says: Dec 21, 2010. 2:56 PM **REPLY**

Sweet! Cool!!

sssshhhh says: Sep 11, 2010. 10:48 PM **REPLY**

how will a launch it??

taqw says: Dec 16, 2010. 9:33 AM **REPLY**

you aunch it by a pump ike a bike pump then jus keep pumping it and it wi go up

xXInmateXx says: Aug 16, 2010. 2:24 AM **REPLY**

I have all the parts, so I'll make it today. I'll tell u how it works out.

paperclip32 says: Aug 10, 2010. 11:27 PM **REPLY**

Did you draw all the instructions?Great art skills.

cyenobite says: Aug 11, 2010. 6:49 AM **REPLY**

yes, and thank you.

Schober says: May 7, 2010. 3:33 PM **REPLY**

There is a way to splice the two bottles together so that you get an increased pressure chamber instead of having the other bottle being just dead weight on your rocket. Be advised this does take much more time and is far more costly than simply attaching the other bottle, but it seems to me like it would be worth it. I did not make this video I'm simply sharing it with the people.

paperclip32 says: Aug 10, 2010. 11:30 PM **REPLY**

I think getting all the materials to do that would cost too much.This is just for kids,anyway.

El Diablo97 says: Jul 1, 2010. 2:11 PM **REPLY**

Hey, try this: Cut the bottom off one bottle and the top of the other. Make sure they fit together. If they do use a strong glue that is water proof like 5-min epoxy or this really really really strong glue/caulk called PL Premium (which is recommended by almost all professional water rocket makers). This glue takes a long time to cure or harden to full strength (about 24-72 hrs or 1-3 days) but the wait is worth it. This glue is almost indestructible when dried. Then add the fins and the nosecone. The fins work best if they are make of Corriflute (Correx) corrugated plastic that signs are commonly made from. It is light weight and strong. The nosecone is best made of medium density foam. If you want to get water rocket designs from professionals, go here: http://www.aircommandrockets.com/construction.htm

Computothought says: Jun 6, 2010. 4:30 PM **REPLY**

We just built our first launcher today. Awesome fun even if you do not make the fancy rockets!

nbagf says: May 9, 2010. 10:09 AM **REPLY**

how do i upload files to an instructable??

nbagf says: May 23, 2010. 4:27 PM **REPLY**

nvm

LEDgonuts says: Mar 13, 2010. 12:43 PM **REPLY**

So would a bottle filled with baking soda and vinegar wok with a quark pluging it?

Vulcanator says: May 12, 2010. 2:44 PM **REPLY**

i doubt that a quark would be large enough to plug the opening.
quarks are tiny.

cyenobite says: Mar 13, 2010. 1:35 PM **REPLY**

it might. But I'm not sure how much pressure would build. You should try it though and post here your results! Good luck!

kavindran says: Apr 6, 2010. 3:10 AM **REPLY**

THIS SATURDAY I HAVE 2 GO USM ...2 DO THIS ROCKET STUFF.....SO SACRED

Vulcanator says: May 12, 2010. 2:42 PM **REPLY**

*scared?

nbagf says: May 9, 2010. 10:13 AM **REPLY**

cyenobite, your second link is broken.

cheesapuffa says: May 9, 2010. 5:39 AM **REPLY**

How would you launch a rocket like this?

REA says: May 9, 2010. 4:51 AM **REPLY**

just in time! my science class is going to be firing bottle rockets this week.

adem70 says: May 7, 2010. 7:41 PM **REPLY**

those rockets werent going very high, we did this in our competetive tech class, they whent way higher, and we had to launch and bring down an egg undamaged with a parachute system... mine was the only one that worked lol

heathbar64 says: May 7, 2010. 10:16 AM **REPLY**

I was wondering about the addition of a parachute. I know on the regular model rockets with the rocket engine, when it gets to the end of the burn it sorta backfires to blow the chute out the top. has anyone done a water rocket with just a loose nose cone and parachute? Does it deploy effectively that way, or what to do to make it work?
Also thinking that if you filled the bottle completely full of water and capped it, it would be incompressible and thus might be easier to jam on the nose cone and glue on the fins without it squishing.

juaninse says: May 7, 2010. 12:57 PM **REPLY**

A simple way of having a parachute deployment system is having the nose cone easily removed, with perhaps a weight at the tip. As the rocket ends its boost phase and begins to fall, inertia separates the nose cone and deploys the parachute folded inside. It's a simple and elegant way of doing it.

http://www.lnhs.org/hayhurst/rockets/

rangua says: May 7, 2010. 10:11 AM **REPLY**

i made one of this for a science fair. the launcher was made with a bicycle manual air pump, and the valve of a tire sticked through a cork. the efficiency would drop with time, but all the materials were more than easy to find (and cheap!).
it was a really cool project! everybody else made manometers :P (it was a pressure themed fair)

scjoshi says: Apr 2, 2010. 2:52 AM **REPLY**

I am trying to build a water rocket for a science fair , but I am unable to get a cork. Please tell me where can I obtain a cork i.e. in what kind of shop could i get the cork (like the one used in wine bottels)?

cyenobite says: Apr 2, 2010. 5:30 AM **REPLY**

Ask your parents to go to the liquor store and buy a bottle of wine. Or just ask some adults if they have an old wine cork, chances are they probably do. Good Luck!

dkfa says: Mar 16, 2010. 10:14 PM **REPLY**

I need to make a parachute for this bottle rocket. I'm graded on how much hang time it has in the air before it hits the ground? What design should I make? Materials? Weight? Ect

view all 175 comments