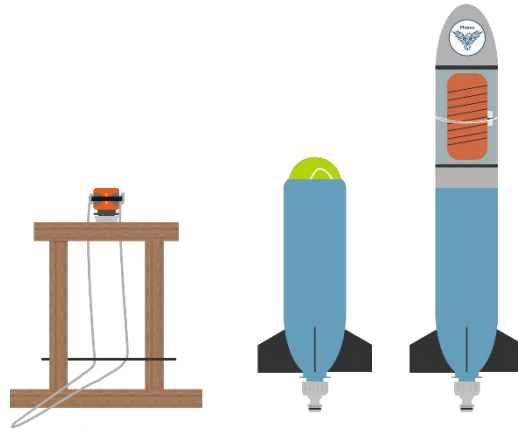


HOW TO BUILD A SIMPLE WATER ROCKET

WITH LAUNCHER AND PARACHUTE MECHANISM



Whether for a school project or just for fun, building and launching an own water rocket is a challenging but awesome experience. In this tutorial we'll show you how you can get started with your own, very easy water rocket and how to make one.

Before you start building your own rocket, you should know which materials and tools you need. But don't worry, all materials we're using in this tutorial are available in your local hardware store.

MATERIALS FOR ROCKET & LAUNCHER

- Gardena standard coupling ½"
- More than 5 meters garden hose (1/2")
- Gardena tap nut adaptor with 1"thread
- Hose clamp ½"
- Car tire valve
- Teflon tape
- Big cable ties
- Thick wooden planks (15-25mm)
- 10 meters of nylon cord
- Plastic bottle
- Thin plastic or wooden plate
- Tennis ball
- Aluminium pipe
- Epoxy
- Duct tape
- Hot glue

CONSTRUCTION OF THE LAUNCHER AND NOZZLE

A water rocket is basically just a pressure vessel, filled with air and water. If you launch the rocket, the water is pressed out of the vessel by the air pressure, and the rocket accelerates in the opposite direction. But besides a bottle, which is used as a pressure vessel, we'll need a safe and secure launcher too. In this case, we'll use garden hose connectors for the launcher, because they're water-proof and easy to open.

You'll need a ½" garden hose, which should be as long as possible. Attach a car tire valve at one end of the hose. You maybe have to file off some parts of the valve, but after that you should be able to push it in, and secure it with a clamp. Attach a coupling at the other end of the hose. We'll add a tap nut adaptor to the rocket later, and if we put this adaptor into the coupling we have our basic launcher mechanism.

If you want to have a good launch, you'll need a stand for your garden hose system. You can use whatever you want for a stand, but if you want to keep things simple, just use a construction made of four wooden planks. It's very important that you can pin the launcher to the ground. The stand should have a 16mm drill hole for the garden hose, and a 35mm drill hole for the coupling. Now you can push the hose through the small hole, and glue the coupling into the hole using a hot glue gun.

Now it's time to start with the construction of the nozzle, which is the adaptor between the rocket and the launch pad. Just drill a hole into a bottle cap, and increase the diameter to 14mm. Remove the seal from a 1" tap nut adaptor, and glue the bottle cap in it using epoxy resin. Let the nozzle dry at least 48 hours, to make sure it is ready for your launch.



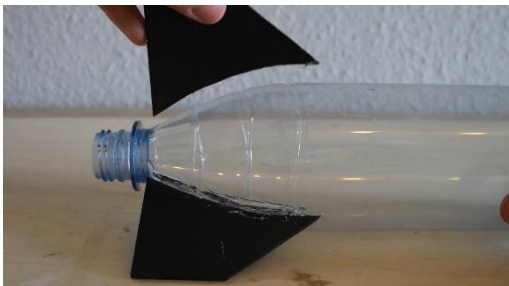
Launcher construction made of wooden planks



Tap nut adaptor with bottle cap glued in

CONSTRUCTION OF THE ROCKET

But what about the rocket itself? You need a stable and thick-walled plastic bottle, and that's basically it! You just have to add some fins, made of wooden or plastic plates. In this case, we're using Gutttagliss Hobbycolor. Feel free to try different fin shapes, but if you want you can use our fin templates (last page of this tutorial) as well. Use a cutter to cut out the fins and attach them to the rocket using a hot glue gun. But be careful: Don't wait until the glue is so hot, that it melts the plastic of the bottle! We also suggest attaching a piece of duct tape.

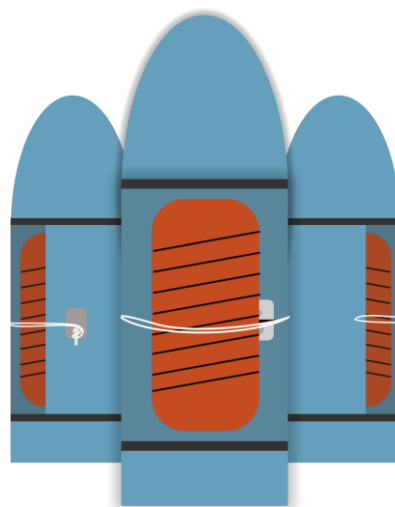


OPTIONAL: RECOVERY SYSTEM

If you want, you can build a parachute mechanism for your rocket as well. This is not necessary for a rocket of this size, but it's great because it allows you attach a small camera to it. You can find a detailed tutorial at our website www.raketfuedrockets.com. If you prefer to use no parachute system, that's fine too! Just use a half tennis ball as nosecone, and glue it in place using the hot glue gun.

Materials you need for a parachute system:

- 3 plastic bottles
- Wire
- Tommy rimer from a wind-up-toy
- Small cable tie
- Table tennis ball
- Super glue
- Rubber band



FINAL STEPS

After the nozzle has dried 48 hours, you can screw it onto your rocket. The only missing part is the release mechanism. Just attach two nylon strings to the coupling with a cable tie and divert them horizontally with a rod. The collar of the coupling should be opened as soon as you pull the strings.



LAUNCH

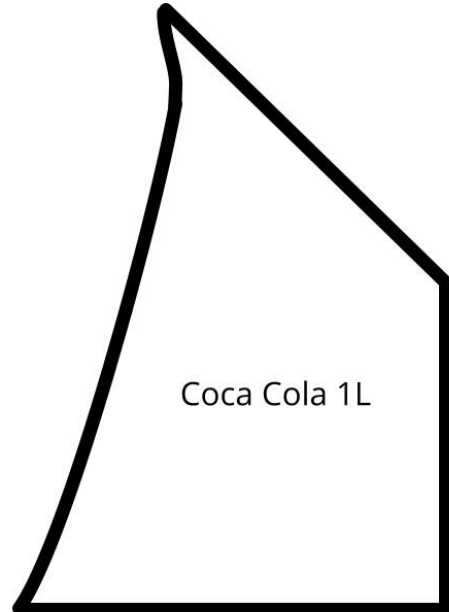
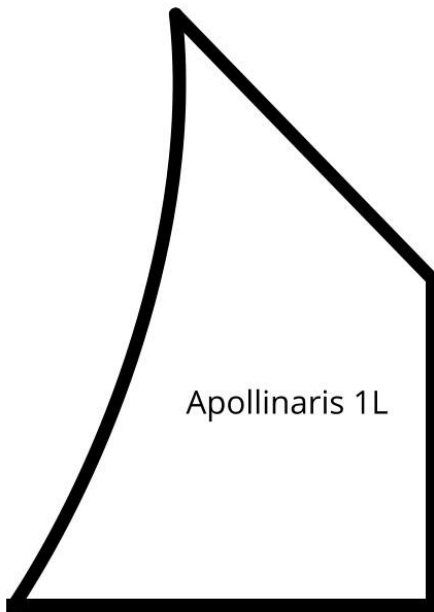


Now your rocket is ready to launch. Choose a launch site, which is far away from houses, streets, trees or power lines. Pin your launcher to the ground and attach your air pump to the hose system. Fill the rocket with 1/3 of water and put the rocket onto your launch pad. We recommend you heighten the garden hose at one part to avoid water damage to the air pump (higher than the water level in the rocket, so that the water can't flow into the air pump). All you have to do know is building up pressure with your air pump. Please be careful and always wear safety glasses. Don't try to use too much pressure, 120 psi is enough for your first try. You can use more pressure later, but always be aware that the bottle can explode. As soon as you have enough pressure, just pull the trigger and the rocket will launch.

We wish you much success in building your own water rocket.

Your Raketfued team

FIN TEMPLATE



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