

# Rocket Derby

## Instructions

1. Sand the inside channel of the rocket with fine sandpaper and seal with polyurethane, or wax.
2. Carefully glue the two halves together (superglue works well), and allow it to set for at least 15 minutes.
3. Pick your design, and carve (a potato peeler and sandpaper work well for shaping the rocket).
4. Carve a groove into the back end of the rocket to hold the back dowel in place.
5. Sand and smooth any rough edges to improve appearance and speed.
6. Paint and decorate your rocket.
7. Cut and attach the fins.
8. Cut a groove for the hanger and firmly attach with plenty of glue, allowing time to dry overnight.
9. Lubricate rubber bands with spray silicon or castor oil, and stretch many times before loading into the rocket.
10. Assemble and attach propeller assembly, back dowel and rubber bands.

## Design & Assembly Tips

### **Lighter is definitely better.**

There is a limited amount of force and energy in two rubber bands wound 100 times so minimizing the mass of the rocket will help. Winning rockets are very light and well balanced. The key is making them light without removing so much material that the winding of the rubber bands actually splits or cracks the rocket.

### **The shape is not the key.**

Lots of different shapes can win, from cigar-like to shuttle-like. As long as the vehicle is symmetrical and light then it should perform well.

### **No glue on the propeller assembly.**

Never use glue on the propeller assembly. It must be removed to make repairs. If the assembly is glued in place, you cannot replace broken propeller parts or rubber bands.

### **Make sure the propeller is on correctly.**

Be careful not to put the propeller on backwards. When looking at the hub of the propeller, there will be rounded end and a flat end. The round end goes towards the rocket ship and should be touching the small metal bushing. The flat end has a little protrusion that is designed to catch the wire when it is bent over. Which leads to the next tip...

### **Don't cut the bent over wire too short.**

If it is too short, during the winding, the propeller can slip and spin around. Cutting is not really necessary, you can just bend the wire over to form an inverted 'U'. The U will grab the prop, and spin it with no trouble.

### **Make sure the red plastic liner covers the entire hook.**

The red plastic sleeve that slips over the metal hook (on the inside of the propeller assembly) MUST be put in place. That is there to prevent the metal hook from cutting through the rubber bands during the winding. It sometimes takes a little effort to pull it all the way on but it can be done. You can always grab the end of the wire with some pliers and work it on slowly, but make sure it goes all the way to the end of the hook.

### **The tail unit needs notches to prevent spinning.**

Carve two "V" depressions into the tail to hold the end dowel and prevent it from spinning. Start shallow and increase as needed. Rockets without the grooves may wind up okay, but will start to spin when released.

### **Don't glue the tail dowel unit to the rocket.**

The reason for this is the same as for the propeller unit. The end needs to be removed to replace a broken rubber band.

**Hold the body upright on a nail to paint.** Tap a long nail into a block of wood. Set the block on a newspaper-covered floor or table with the nail pointing straight up. Slide the rocket onto the nail, inserting the nail into the rocket's hollow center. Paint with a few light coats, sanding lightly between each coat. Warning: using a lot of paint will weigh down your rocket!

**Firmly glue the hanger in place, and allow time to dry overnight!** Cut a groove for the hanger with a sharp knife in the top-center of the rocket body. This 1" groove should be centered, 3" from the front and 3" from the rear of the body. Press the hanger into this groove, rounded end facing towards the front of the rocket, attach with generous amount of glue, and allow to dry overnight. The hanger must not protrude into the hollow chamber in the center of the body or it will interfere with the rubber bands, and it must be firmly glued in place or it may detach during launch with disastrous consequences.

**Rubber bands should be lubricated and stretched before the race.** They are the "motor" and must be strong and flexible. The bands can be lubricated with silicone spray or castor oil. Prep them for racing by twisting the propeller first 20 times and letting go, then 40 times, then 60, 80, and finally 100. This reduces breakage and helps the propeller go faster. Do this with any replacement rubber bands too.