

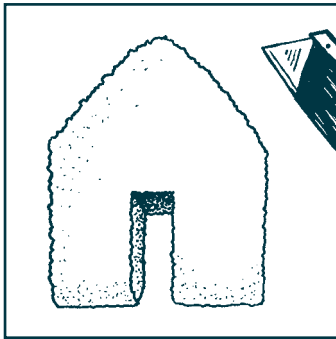
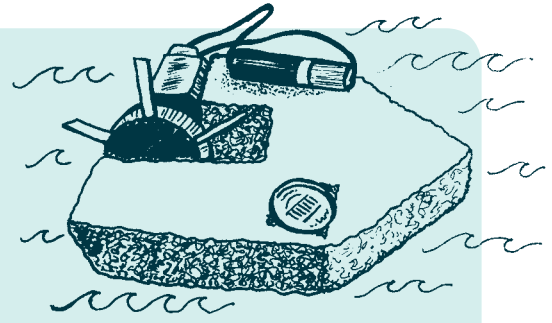
# How to Make a Toy Motor Boat

## 1. Gather the following supplies.

Make sure you have an adult to help with this project.

Watch the video here: [signal.cty.jhu.edu/CompSci/boat.mov](http://signal.cty.jhu.edu/CompSci/boat.mov)

- Protective eyewear
- Motor with 2 short wires attached
- 1 AAA battery
- Styrofoam board – our example is 4.5”x3.5”x 1” but you can use what you have at home
- Sandpaper
- Small plastic bottle cap
- Thin cardboard or Popsicle sticks
- Clear tape and/or electrical tape
- Scissors/box cutter
- Hot glue gun or other strong glue
- Bowl, bathtub, sink for test pool
- Pen/marker
- Pennies/etc. for counterweight

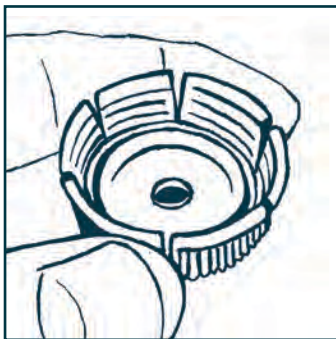


## 2. Cut a boat shape in Styrofoam.

Cut out a rectangle at center back of boat slightly bigger than the width and length of the bottle cap for propeller. Make the shape as even as possible.

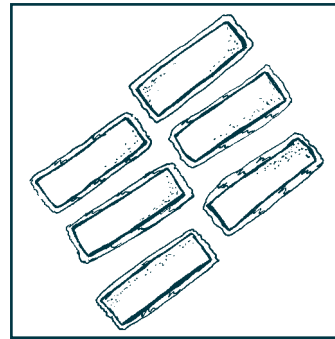
## 3. Improve boat's buoyancy.

Use sandpaper to smooth out bottom edges of boat all the way around.



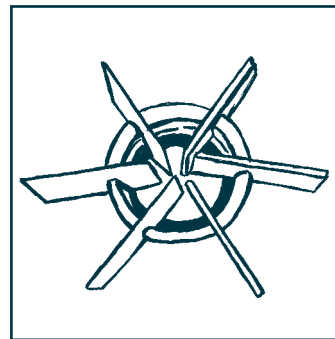
## 4. Prep propeller.

Cut six equal notches in bottle cap with scissors (adult needed for this step). Do not to go all the way through the top of the cap. Make a hole in the top of the cap big enough for the motor pin.



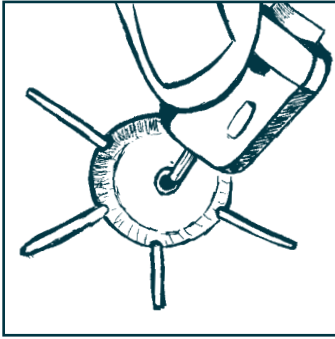
## 5. Make paddle blades.

Cut 6 equal cardboard rectangles. Waterproof paddle blades by covering with clear tape. Trim.



## 6. Make propeller.

Slide the paddle blades into each notch, and make them meet at the center. You may need to wiggle paddles to evenly space. Place a drop of glue in the center and hold until it sets.

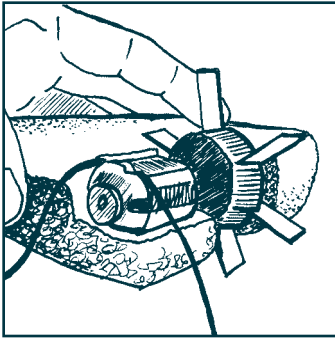


### 7. Insert motor.

Flip cap over. Place a drop of glue over pin hole, then insert the motor pin. Hold until glue sets. Make sure wires are attached.

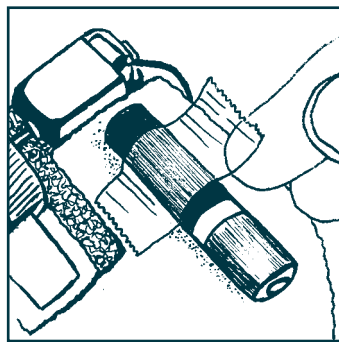
### 8. Test propeller placement.

Make sure paddle fully fits into opening. If not, adjust. If your Styrofoam is too thick, cut a layer off to drop the motor lower so paddles reach water. Make sure motor wires are attached.



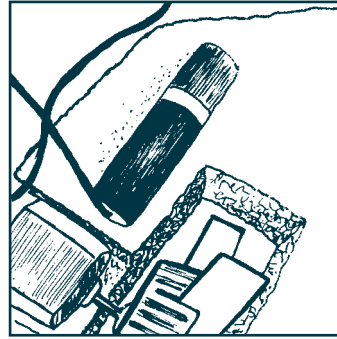
### 9. Secure motor.

With wires facing up glue motor into place. Cover motor with a piece of clear tape to waterproof. Motor should be secured on top of boat's surface.



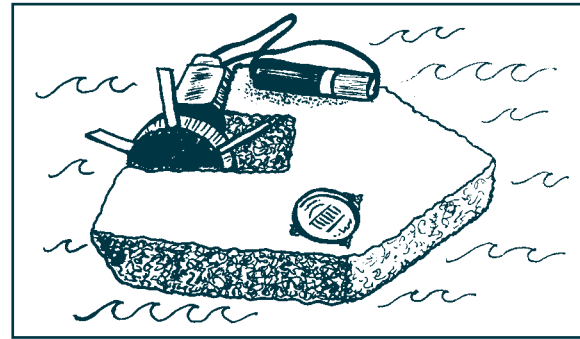
### 10. Attach battery.

Tape battery to the top of Styrofoam surface of boat. Make sure it's close enough for wires to reach either end without interfering with the paddle wheel.



### 11. Connect power and test.

Use a long, thin piece of tape to connect wires to battery ends, connecting positive to positive and negative to negative. Propeller should turn. If it does not, make sure your connections to motor ends and battery are secure. Once it moves, disconnect for now.



### 12. Watch it go!

Fill your test pool with water and reconnect battery. Gently place boat in the water and watch it go!

**Caution: One AAA battery produces 1.5 volts. To be safe, we don't recommend getting into the water with your boat.**

**Troubleshooting:** Use glue to secure paddle blades if needed. If paddle blades get wet, use Popsicle sticks instead. Depending on Styrofoam size, boat may need counterweights. On the opposite side of motor add something of equal weight, like a stack of pennies, to help your boat float properly and move straight.



**SEE THE BOAT IN ACTION**

Watch the video here:

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