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# STEAM STOP: SURVIVAL

## TRANSPORT & FLOTATION

### SAILBOAT

#### SUPPLIES

- 3 corks
- 2 rubber bands
- 1 toothpick
- 3-4 screws or nails
- wax paper, craft foam, or thin waterproof material
- tap water
- a sink, bucket, or container to test your boat in



**STEP 1:** Fill the container with water. The water should be just deep enough that the nails or screws are completely submerged when standing upright in the water.

**STEP 2:** Line up the three corks side by side. Wrap the two rubber bands around the corks to hold them together. This is your raft. A raft is one type of boat.

**STEP 3:** stick one end of the toothpick straight into the middle cork. The toothpick will hold the sail. The pole the sail(s) attach to is called the mast.

**STEP 4:** Cut a 6cm x 6cm square (2 1/2in x 2 1/2in) out of the waterproof material to use as the sail. Bend the sail slightly into a C shape. Slide the C-shaped sail onto the toothpick so that the toothpick pokes through the top and bottom of the C. If needed, use a bit of waterproof glue around the top hole to keep the sail in place.

**Try it out!** Put your raft in the water and blow into the sail.



### EXPERIMENT & OBSERVE

How well does your raft sail? Does it sail straight? Does it tip over?

Next: change the shape of the boat

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# SAIL BOAT (CONTINUED)

Try sailing in different wind conditions (blow harder or softer and from different directions). Do you think a narrower boat would sail better or worse?

**STEP 5:** remove the rubber bands and outer two corks. Keep the middle cork with the sail in place.

**STEP 6:** Rotate the sail 90 degrees.

**Try it out!** How did narrowing the body of the boat affect its ability to sail? Why do you think this is?

## EXPERIMENT & OBSERVE



How did adding nails or screws to the bottom of the boat affect its ability to sail? Why did the nails or screws affect it this way?

How did adding the foil change the way the boat sailed? Why?

The fin sticking out of the bottom of the last boat design is called a "keel." What happens if you change the shape of the keel?

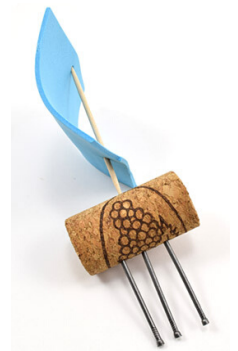
**STEP 7:** Stick a nail or screw into the bottom of the boat, directly under the sail.

**Try it out!** What happens?

**STEP 8:** If it doesn't stay upright, keep adding nails or screws (in a straight line with the first one) until it can float without tipping over.

**STEP 9:** Connect the nails or screws by wrapping a rectangular piece of foil around them, making a fin. Be sure to wrap the foil tight.

**Try it out!**



### References

Finio Ben. (n.d.). *Make a toy sailboat*. Science Buddies. Retrieved May 26, 2020 from <https://www.sciencebuddies.org/stem-activities/diy-toy-sailboat#summary>



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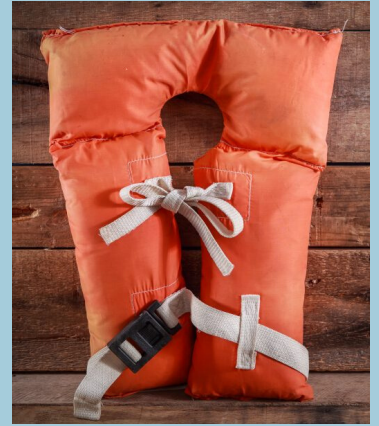
# STEAM STOP: SURVIVAL

## TRANSPORT & FLOTATION

### LIFE VEST

#### SUPPLIES

- 1 can of soup
- sink, bucket, or other container to hold water
- tap water
- craft or household items such as: paper cups, straws, rubber bands, paper clips, tape, balloons, grocery bags, glue, corks, string, foil, etc



**STEP 1:** use everyday materials to make a life vest able to keep a can of vegetables or soup afloat.

Try it! Did it work?

**STEP 2:** make a change to the design of your vest and retest it.

**STEP 3:** repeat until the vest keeps the can *afloat for 1 minute*.

**RULE 1:** the vest must be one piece (it may be multiple items attached together).

**RULE 2:** must attach to the can in 20 seconds or less.

**RULE 3:** some part of the can must be touching the water.

### EXPERIMENT & OBSERVE

What materials were more buoyant (which worked best to float the dense can)? Why do you think this is?

How long can your vest keep the can afloat?

**CHALLENGE:** combine your knowledge! Design and build a wind-powered cargo ship, a sailboat that can move heavy cargo. Use coins, rocks, small wrenches, etc. to add weight to your boat.

How much cargo can your boat carry while staying upright? What shape of boat is best for this task? What shape of keel?



#### References

*Life vest challenge.* (n.d.). Try Engineering. Retrieved May 26, 2020 from <https://tryengineering.org/teacher/life-vest-challenge/>