



BIG IDEA

We can use objects from around the house to build a boat that has the right amount of counterweight and won't tip over!

MATERIALS

- Screws or nails
- Cardboard or thick paper
- Aluminum foil
- Wooden skewers
- Scissors
- Cork (or other buoyant object for the hull)
- Lab notebook
- Bucket of water

THE SCIENCE

What's going on here? There are many parts of a boat that help it stay upright and sailing in the right direction.

- Sail (cardboard) – this catches the wind and propels you forward.
- Hull (cork) – this is the body of the boat. It needs to be buoyant, which means it will float on the water and not sink!
- Counterweight (screws) – this lowers the boat's center of gravity. A lower center of gravity helps balance the boat, so it stays afloat and doesn't tip over. This is sometimes called a keel.
- Fins (foil) – this helps guide the boat and stay in the right direction.

INSTRUCTIONS

1. Use scissors to cut a small sail out of cardboard. It doesn't need to be big or any particular shape. Experiment with different ones!
2. Stick the skewer through the cardboard to give it some structure. We found it's best to stick it through twice so the sail doesn't fly around. Leave about $\frac{1}{2}$ inch of the sharp end of the skewer sticking out and cut off any excess length.
3. Stick the sharp end of the skewer into the cork to finish your boat! Test it out in your bucket of water. Does it float? Does it stay upright? It will probably tip over. Why do you think that is?
4. Add screws or nails to the bottom of the boat. You might have to experiment around with how many screws to add. This part is mostly trial and error. Remember to write down any results in your lab notebook so you can record what you've done! Try giving it some wind. Does it sail?
5. Lastly, we need a fin. Wrap the screws on the bottom of your boat in aluminum foil to give it a fin shape.
6. Test out your boat and design different ones! You can try different sail shapes, counterweights, fin shapes/sizes, more corks for your hull – anything!