

## Paddle Boat Design Challenge 2

# Engineering Notes

Test, Analyze, & Improve Your Boat's Design

### Your Challenge:

Design and build a boat that floats and moves by paddle power.

### Test Your Prototype:

Engineers improve their designs by testing them. Watch closely as you let go of your boat. What happens? Does it float? Does it move forward? Does it tip or move sideways?

**Make some quick notes here about what you've seen your boat and others' boats do.**

**REMEMBER!** If your boat doesn't work the way you expect it to, that's not bad. It's an opportunity to solve a problem and make a better prototype.

### Analyze & Share Your Results:

Engineers think carefully about their test results and how their prototypes perform.

**Why did your boat perform the way it did? If it didn't do what you expected, why not?**

### Design Thinking Process

- Identify the Problem
- Brainstorm & Plan
- Build
- Test
- Analyze Results and Improve
- Share Your Solution

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## Brainstorm Improvements:

Engineers use their test results and analysis to guide how they will improve their prototypes. Based on what they learned from testing, they think of possible improvements.

**Write ideas or draw plans to improve your design here.** Use extra paper if you need to!

**REMEMBER!** If you want to, you can make changes to your boat and test it again. That's what engineers do: they design, test, improve, and test again, over and over, until they come up with a product that works the way they need it to.

### Problem-Solving Tips: What if the...

- **Boat leaks**, look for any openings where water can get into the boat. Use duct tape to seal any openings and make the boat watertight.
- **Chipboard paddle warps** when it gets wet. Protect it by wrapping it in duct tape.
- **Boat tips to one side**, try adding weight to the boat with a washer or two. Once you find the right weight and spot in your boat for the washer, you can tape it in place. This creates ballast, weight that helps to balance a boat and keep it upright.
- **Paddles are hard to attach to the cup**, use straws or wooden skewers to build a frame and mount it between two cups. Attach the rubber band and paddle to this frame.
- **Paddle frame bends from the weight of the paddles**, make sure it's securely taped to the cup. Adding a crosspiece of skewers or straws can help stiffen the frame. Also, move the rubber band toward the cup. The closer it is to the cup, the harder it will be to bend the frame.
- **Paddles hit the paddle frame**, try moving the rubber band or changing the size of the frame or paddle.