

# EPAM's Surviving the Stormy Seas Mini Challenge

EPAM, a strong supporter of STEM education, offers this fun engineering mini challenge for students everywhere. With limited materials, students can compete locally to build aluminum foil boats capable of carrying 100 grams of cargo during progressively stormier seas. Which team's boat will weather the waves the best?

## Summary

|                      |                                    |
|----------------------|------------------------------------|
| <b>Group size:</b>   | 2 students                         |
| <b>Minimum time:</b> | 60 minutes                         |
| <b>Key concepts:</b> | weight, volume, density, stability |

## Challenge Materials

- Clear plastic storage bin with these approximate dimensions:  
116 quart/110 liter; 33" (83.8 cm) long x 20 1/8" (51.1 cm) wide x 13 1/2" (34.3 cm) high
- Meter stick or metric tape measure
- Water
- Tennis ball
- Dry beans (100g per team)
- Kitchen scale
- Aluminum foil



## Boat Requirements

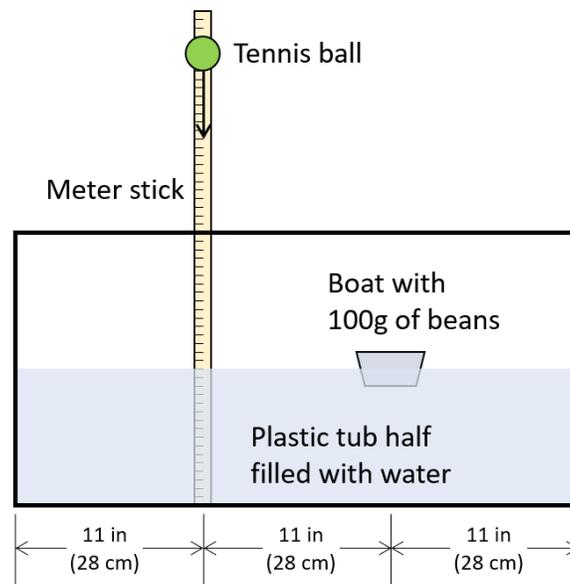
- Each boat can be made from one sheet of aluminum foil, measuring no larger than 12" (30.48 cm) square
- No other materials (e.g. tape) are allowed to be included in the boat
- The boat must support 100g of beans in still water without sinking

## Testing Procedure

1. Fill the plastic tub halfway with water. Let the water settle.
2. Place the boat (filled with 100g of beans) in the tub, approximately 1/3 of the way along the length (see diagram).
3. Using the meter stick, drop the tennis ball into the water from 10 cm above the water's surface (e.g. if the water is 17 cm deep, drop the ball from a height of 27cm above the bottom of the container), roughly 1/3 of the way along the tub's length.

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4. Observe whether the boat sinks. If it did not sink, allow the students to empty any water that splashed into the boat and pat dry the beans.
5. Wait for the water to become calm again. Then repeat steps 3-4 from a height of 20 cm above the water's surface.
6. Continue dropping the ball in 10 cm higher increments until the boat sinks. Record the final height.
7. Repeat the testing procedure two more times for each team (a total of three trials per team). Calculate an average height for each team. The team with the highest average drop height required to sink the boat wins.
8. Note: to speed up testing, multiple testing stations (each using one bin filled halfway with water, one metric ruler and one tennis ball) can be set up.
9. If a tiebreaker is needed (locally or as a just-in-case between different competition locations) measure how much weight the winning boat can hold in still water. Place the boat in water and add beans to it one at a time until it sinks. Remove the last bean. Dry all of the other beans and weigh them.



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