

Build a Boat, Hope It Floats

CHALLENGE:

Build a boat capable of floating as many pennies as possible.

GUIDELINES:

1. You may only use the materials provided.
2. Your final boat may be no larger than 4.0 cm x 6.0 cm x 10.0 cm.
3. You have 15 minutes from the time I say "Build Your Boat" to construct your boat.
 - For each design you make, test your boat in your sink by adding pennies until it sinks.
 - Continue to make changes and improvements on your boat so that it can hold the maximum number of pennies.
 - Use the masses listed below to estimate the mass of your boat while you are building it. *(Remember you are trying to get the lightest boat that can hold the most pennies.)*
4. After 15 minutes, the Build a Boat Hope, It Floats Boat Float-Off begins and you cannot make changes to your boat.
 - Take a photo of your final boat while you are testing it. *(All partners need a photo on their phone.)*
 - Mass your final boat BEFORE the competition begins using an electronic balance.

MATERIALS (with approximate masses):

Paper 0.20 g for each 5 cm²

Aluminum Foil 0.17 g for each 5 cm²

Clear Plastic 0.02 g for each 5 cm²

Cardboard 0.75 g for each 5 cm²

Paper Clips 0.37 g each

Rubber Bands 0.50 g each

Plastic Straws 0.90 g each

Clear Tape 0.11 g for each 1 cm length

Duct Tape 1.16 g for each 1 cm length

HOW TO WIN: The winner of the Boat Float-off is the group earning the **LOWEST** score based on the following equation below.

5. Calculate your boat's mass to penny score using the formula below. Show your calculations in the space below beside the formula.
 - Don't forget units in the formula! The final unit will be g/penny.

$$\text{Score} = \frac{\text{Mass of Boat}}{\text{Number of Pennies}}$$

6. How do you know your boat held the maximum number of pennies that it could?

7. Describe at least one thing that could you do to make your boat better.