Keep the Boat Afloat!

Activity Rundown:

The task ahead is to get our precious cargo from one side of the dock to the other! It is essential that our cargo does not plunder into the sea and completing this objective falls upon you! Today we will build boats out of household materials to transport cargo of your choice across the ocean (bathtub). There is one twist, you will only be allowed to spend a certain amount of money… We wish you luck!

You will need:
+ Popsicle sticks
+ Straws
+ Tape
+ Paperclips
+ Duct tape
+ Plasticine
+ Craft foam
+ Dixie cups
+ Balloons
+ Pennies (or similar weight)
+ Aluminum foil

Let's do it!

All good engineers must first following these steps before creating whatever task they have ahead of them:

1. Identify the problem / task
   a. What is our problem? We need to carry a load of precious cargo (whatever objects you can find in your home) across the ocean, and that's really heavy. Build a boat that can carry a large load.

2. Generate Ideas - Brainstorm
   a. You can work alone or with the people in your household to come up with potential designs for the boat.
3. Design

a. Draw out your designs on paper first and list the materials you will need for each one.
b. Pick your best or favorite design
c. Plan out budget needed for this
d. Review your design with everyone involved - to show a design was thought out. You will then receive $500 in Monopoly Money or you can draw up your own money with paper!
   ● See budget chart below for material pricing!

4. Build and Test
   a. First test your boat in the sink or in a bucket to make sure it floats!
   b. Then you may fill up your bathtub with a just enough water so that your boat doesn't touch the floor of the tub.
   c. Place your precious cargo (toy cars, rocks, coins, etc) in your boat to see if it holds.
   d. Then you may use a blow dryer or simply push it from end to end in the bathtub to see if its able to sustain the load!

5. (Optional) Redesign
   a. If the boat does not float, find the problem with the design and try another design to get around it
   b. This is kind of like going back to step 1
6. Final Demonstration
   a. see how many pennies the boat can hold before it sinks.

Background:

Buoyancy

- Caused by the difference in pressure between the top and bottom of a submerged object.
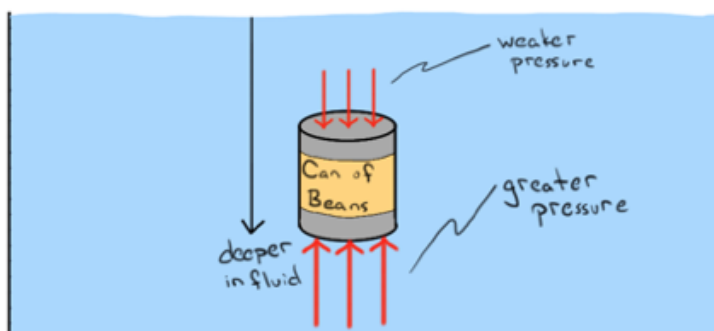
- Pressure increases as you go deeper. This pressure difference occurs because the bottom of the object is deeper than the top of the object, resulting in a higher pressure.
- $F\_Buoyancy = F\_up - F\_down$
- The Buoyant force is equal to the weight of water the object displaces.
- An object floats if the buoyant force is equal to the force of gravity

Budget chart:

Cost ($)	Item	Unit sold by:
10	**Construction Paper**	Sheet
50	**Popsicle sticks**	Each
50	**Paperclips**	Each
100	**Dixie Cups**	Each
50	**Drinking Straws**	Each
50	**Fishing line**	50 cm length
50	**Wire**	50 cm length
100	**Balloons**	each
50	**Twine**	50 cm length
100	**Aluminum Foil**	10cm length
100	**Plasticine**	5x5x5cm cube

Reach out!

We would love to hear from you about all the amazing STEM projects you are doing at home! Show us your finished products on any of the following social media platforms by tagging us or by using the following hashtags. We hope these projects have brought some excitement to your day during these difficult times.

Let us know how we did! Please click here to fill out a short survey on how well we did and what you would like to see more of in the future. Thank you!

Twitter: **@MyMindsInMotion**
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#ucalgarycamps #ucalgarytogether