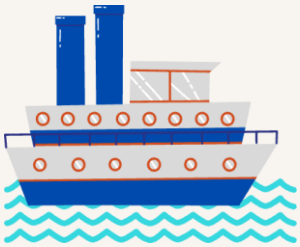
CARGO SHIP CHALLENGE!

Name: _____

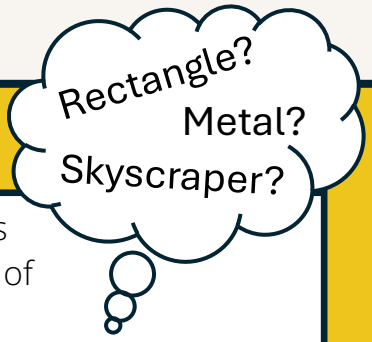
Materials Needed: Aluminum Foil (5-inch x 5-inch sheet recommended), Bucket or Tub filled with water, Weights (pennies, washers, marbles, etc.)

Engineers design all types of ships. One of their tasks is to figure out how to make gigantic pieces of metal float! How do you think engineers design ships in a way that they can carry heavy cargo across an ocean?

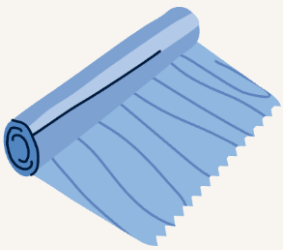


Scenario: You are moving to Australia and you need to cross the Pacific Ocean. However, there are no flights to Australia, so you have to travel by ship.

BRAINSTORM



Think about the following questions: What causes ships to sink? What allows ships to float? What ships have you seen in real life or in movies? What kind of materials are they made of? **Write down your ideas in this box.**

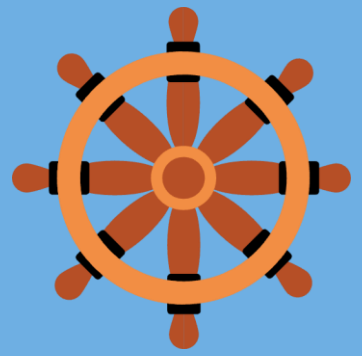


LIMITATIONS AND CONSTRAINTS

You just found out that the only metal your supplier can afford is a singular sheet of aluminum foil! This will be the only material you will have to build your ship. Keep in mind these limits and constraints for the following steps.

DESIGN

Draw and plan out the ship that you are going to build. Come up with **3 different designs** you believe will make your ship hold the most weight it can. Don't forget to include markings of where you will be folding your aluminum foil sheet.



Design A:

Design B:

Design C:

BUILD

Now that you have designed a few different ships, choose the design you think is the best. It is time to bring your design to life. Have fun building it!

TEST AND EVALUATE

STEPS:

1. Place your ship into the water. Observe whether it floats with no weight on it.
2. Slowly fill your ship with your weights.
3. Count the weights as you go.
4. Once your ship sinks, write down your observations in the box to the right.

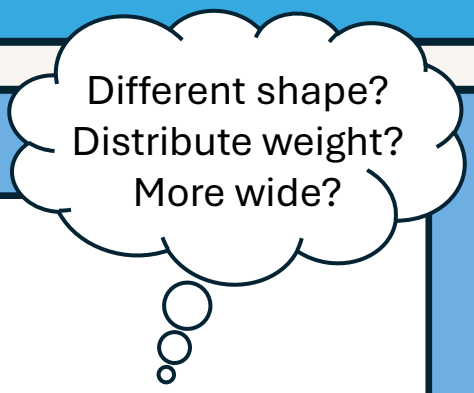
My ship was able to hold _____ weights before sinking.

Explain what happened to your ship when it finally sank:

SHARE SOLUTION

Time to share your results with your classmates! Think about why you think their designs were able to or were not able to hold a lot of weight. Additionally, think about which of your classmates made the best ships and about why their ships were the best.

REDESIGN



Think about the following questions: What were the issues with your design? How can you improve your ship to make it able to hold more weight? **Draw and mark your new design in this box.**

REBUILD, RETEST AND REEVALUATE

Build your new and improved design and then test it with the same steps as before. Have fun!

Explain what you did differently for your redesign and retest:

My ship was able to hold _____ weights before sinking for my retest.

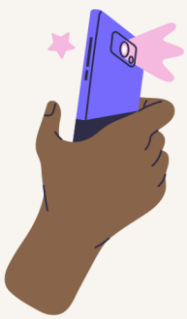
Explain what happened to your ship when it finally sank:

SHARE SOLUTION

Once again, it's time to share your results with your classmates! This time, think about what your classmates did differently than before. Which classmates made the best designs, and why do you think these designs were able to hold a lot of weight?

COMMUNICATE SOLUTION

Write any final thoughts or notes in this box:



EXTENSION

Next time you see a ship or boat in real life, think about how it was designed so that it could hold a lot of weight. Try to spot the differences in different ones you see. Take a picture if you can!