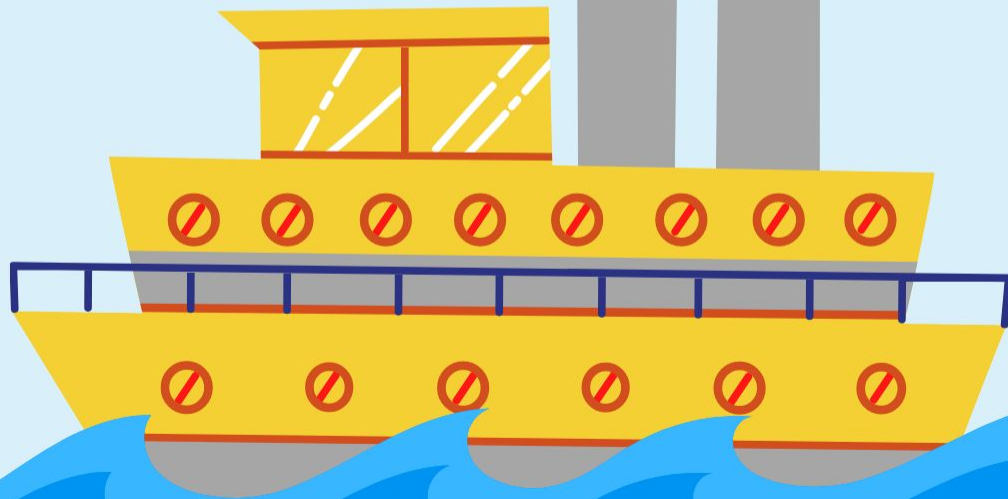


# CARGO SHIP CHALLENGE!



Solar Energy | Water | Environment  
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## **Cargo Ship Challenge Overview**

**Today you will be following the engineering design process: a process that engineers use to solve real world problems. Follow the path of the pamphlet to create the best design for the Cargo Ship Challenge!**

**Click the speaker button throughout the presentation to hear more information!**





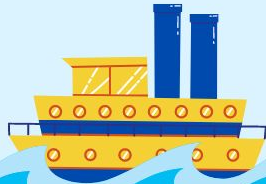
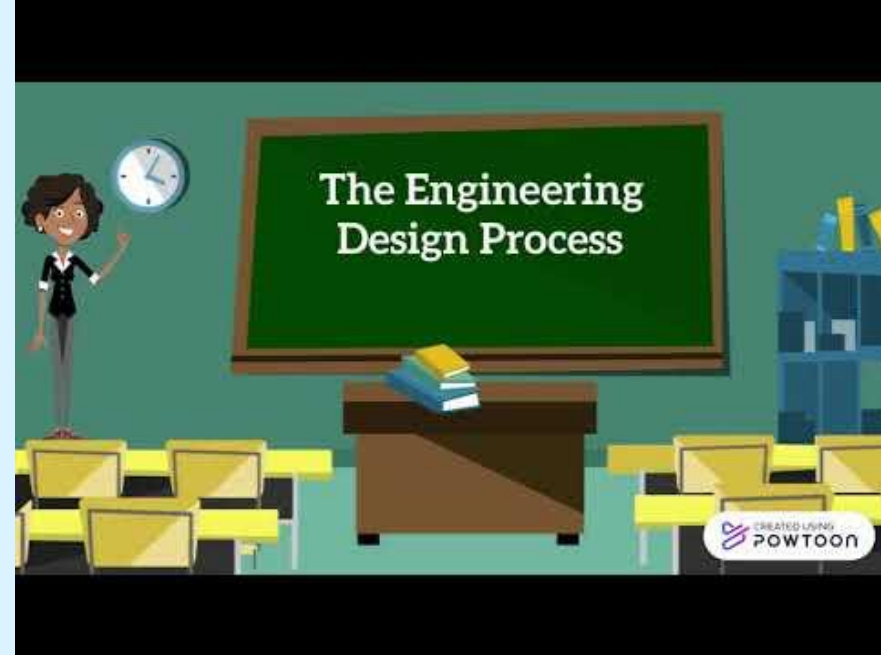
## **Materials Needed:**

- **Container/Bucket**
- **Aluminum foil**
- **Scissors**
- **Pennies (or any other object like marbles, beans, etc.)**



## **Engineering Design Process**

**Before you start, take a look at this video about the engineering design process to get familiar with the process and steps of this experiment!**

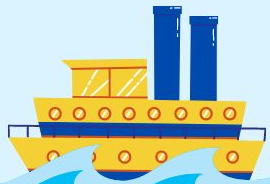




## **Step 1 : Identify the Problem**

**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.**

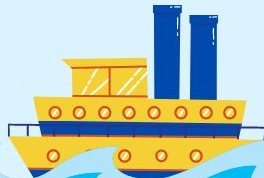
**Your goal: build a ship that can hold the most weight without sinking.**





## **Step 2: Brainstorm**

**In the brainstorm section, write some ideas on how you can make the ship that can hold the most weight.**





### **Step 3: Limitations and Constraints**

**You just found out that the only metal your supplier can afford is a singular sheet of aluminum foil (6 inches by 6 inches)! You will need to consider this material restriction when designing your ship.**







## Step 4: Design

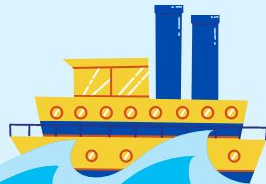
**In the design section, sketch 3 different designs of what you plan to build. Make each design as detailed as possible and remember to keep in mind the limits and constraints.**

Design A:



Design B:

Design C:

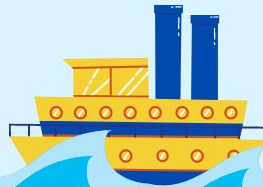






## Set Up

- **Fill the container/bucket with water**
- **Cut the aluminum foil into squares (approx. 6 inches x 6 inches)**





## **Step 5: Build**

**Choose the design you think is the best and build it!**



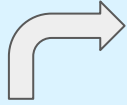


## **Step 6: Test and Evaluate**

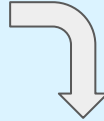
**Now that you have a completed ship, test it to see how much weight it can hold. Once tested, answer the questions provided in the test and evaluate section of your pamphlet.**



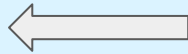
**Click on buttons to go  
to designated slide**



**Redesign**



**Retest and  
Reevaluate**



**Rebuild**

## **Step 7: Redesign, Rebuild and Retest/Re-evaluate**

- **Repeat the last 3 steps this time using your new sheet of aluminum foil**
- **This is your chance to improve your design!**





## **Step 8: Share Your Solution**

**Why do you think your own design could hold a lot of weight?**

**If your ship was not as successful, why do you think it could not handle the weight?**

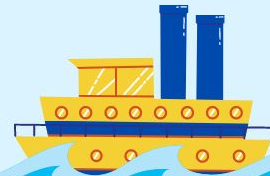
**How can you improve your design?**





## **WARNING!**

**The next slide will provide the explanation (solution) on what makes the best ship for this experiment. Make sure you have completed the previous steps before moving on.**

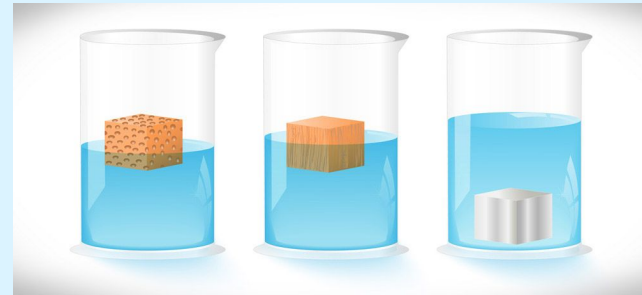
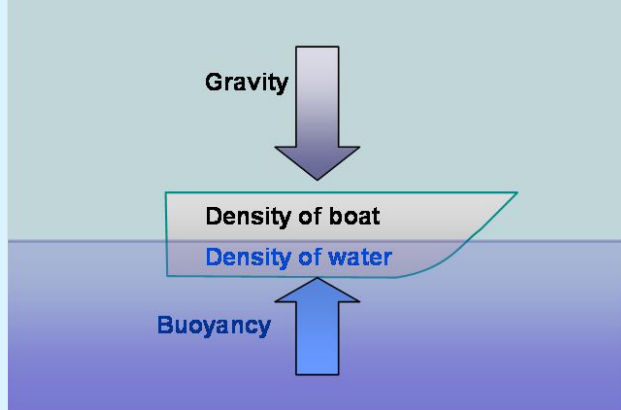




## Explanation



- **Gravity pushes down while buoyant force pushes up**
- **Having a greater surface area (more boat touching the water surface) means that the boat can hold more weight**
- **Engineers need to keep density in mind in order to ensure that larger objects are able to float**





## Build



## Test and Evaluate

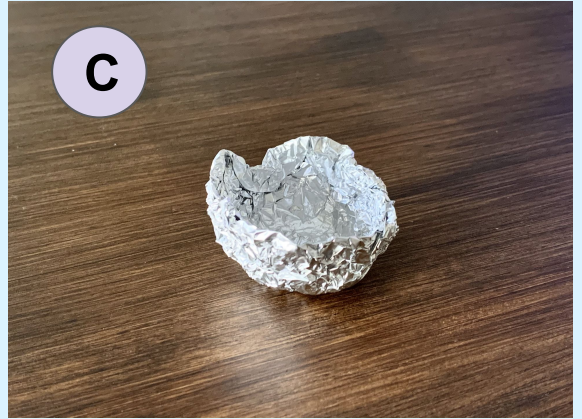
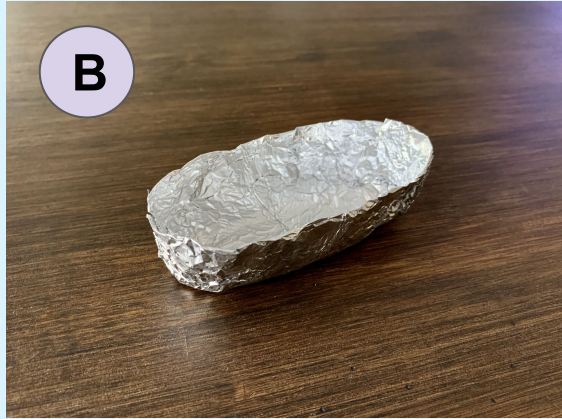


Music: <https://www.bensound.com/royalty-free-music>





## Other Ideas



# THANK YOU!







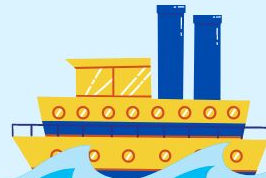


## Redesign

**In the redesign section of your pamphlet, sketch a design for a new and improved ship. How can you improve your previous ship? Make each design as detailed as possible and keep in mind the limits and constraints.**

**Return**

New and Improved Ship Design

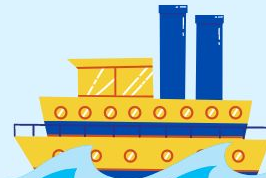




## Rebuild

**It's time to build your new ship!  
Use a new sheet of aluminum  
foil and build your new ship  
based off your redesign.  
Remember that you can only  
use this 6 inch by 6 inch sheet.**

**Return**



## **Retest and Reevaluate**

**Using the same steps as before, test your new ship to see how much weight it can hold. Then answer the questions provided in the retest and reevaluate section of your pamphlet.**



**Return**

