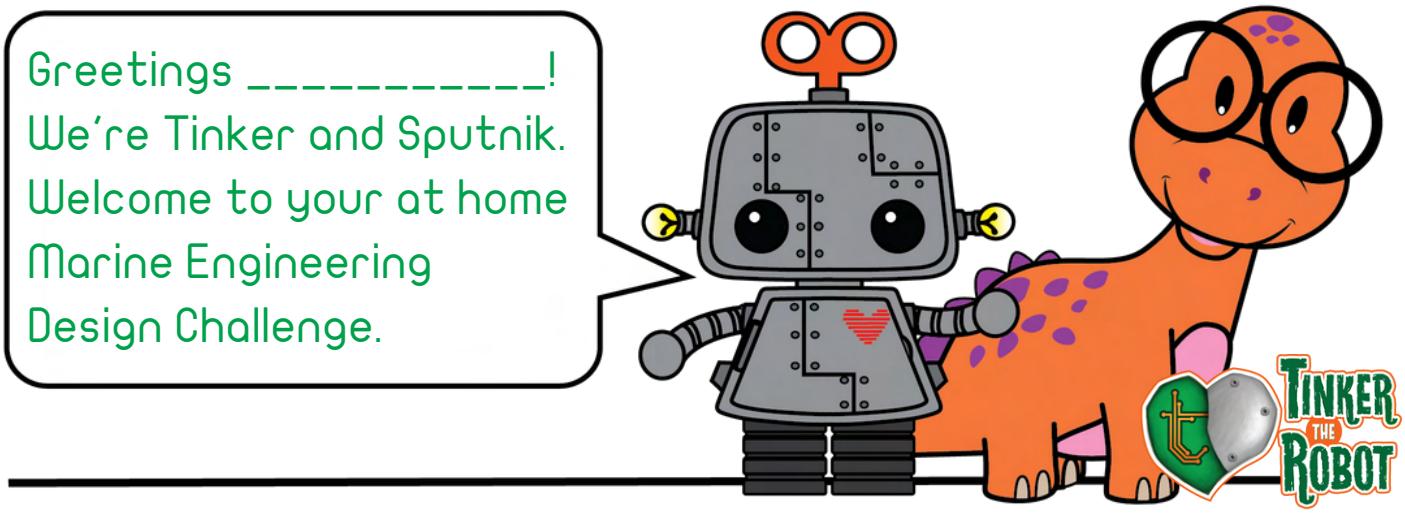
Name

Date

MARINE ENGINEERING

Introduction, How to Use, & Supplies



WHAT IS THE DESIGN CHALLENGE?

Marine Engineering Design Challenge is a great way to learn about Engineering! Use these sheets to do the following -

- ☐ Learn about boats and buoyancy
- ☐ Build a mini boat
- ☐ Experiment with boat designs
- ☐ Complete a Challenge

SUPPLIES

Supply suggestions. We welcome you to substitute or add supplies. :)

- ☐ Aluminum foil - 12" by 12"
- ☐ Wax paper - 12" by 12"
- ☐ 10 X Popsicle Sticks
- ☐ Tape - Masking or Scotch
- ☐ Weights - Coins, water bottles, etc

HOW TO USE

Before you Start - Watch the Marine Engineering video on PBS or the Tinker the Robot YouTube Channel

1. Build a mini-Boat
2. Test your mini-Boat
3. Conduct an experiment with your boat varying surface area and load
4. Using what you learned from your experiments design a new mini-Boat
5. Build and test your ultimate design!!
7. Share your design on social media - #tinkertherobot

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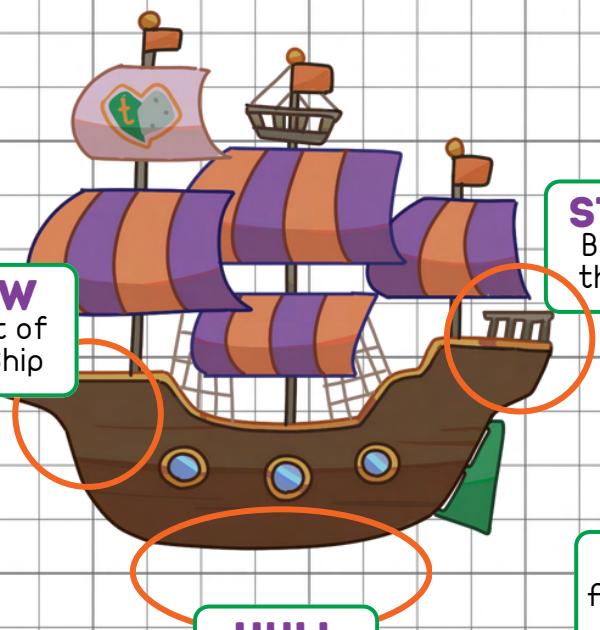
SPEAKING PIRATE

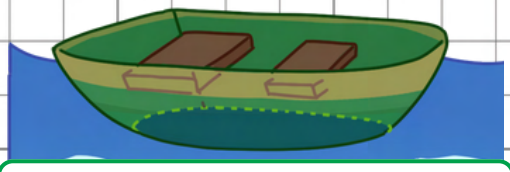
Parts of a Boat and Marine Engineering Vocabulary



BOW
front of the Ship

STERN
Back of the Ship

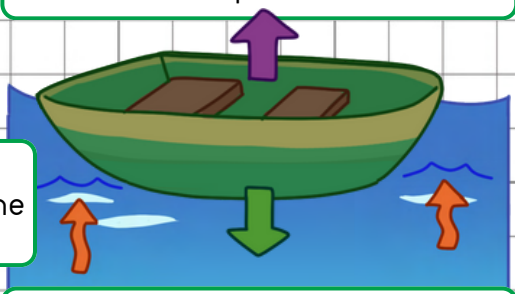
HULL
Body of the Ship



SURFACE AREA
Bottom of the boat contacting water

BUOYANCY
force that keeps the boat afloat

GRAVITY
force the pulls the boat down



DISPLACEMENT
how much the water rises when weight or a load is added

HAVE A CONVERSATION

- [ ] Have you been on a boat?
- [ ] What type of boat was it?
- [ ] What did you notice about the boat design?
- [ ] If you could change anything about the boat, what would you change?

NOTES

TINKER THE ROBOT

Name

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EXPERIMENT

Build 1 boat like the one pictured below. Then place the following items in your boat and measure displacement.

STEP 1 - ASK A QUESTION

How does weight or the load added affect water displacement?

STEP 2 - MAKE A HYPOTHESIS

STEP 3 - EXPERIMENT

Weight Held	Cm (Inches) Displaced
10 Quarters	
20 Quarters	
40 Quarters	

*If you don't have coins use a water bottle and vary the amount of water

DISPLACEMENT
how much the water rises when weight or a load is added

STEP 4 - ANALYZE YOUR DATA

Look over the results of your data. Do you see any patterns?

STEP 5 - CONCLUSION

What did you learn?

Take a Picture & Share

TINKER THE ROBOT

Name

Date

EXPERIMENT

Build 3 boats with varying surface area
then test to see how much weight or load each holds

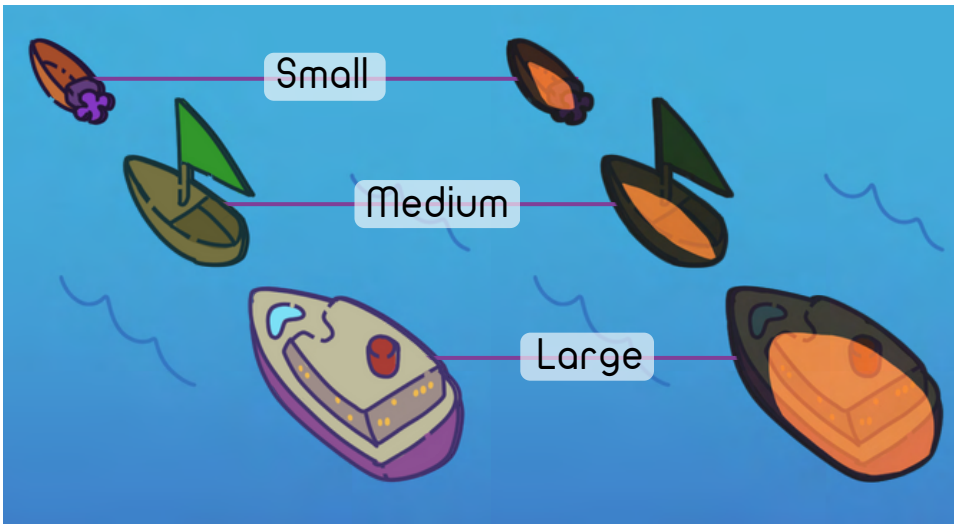
STEP 1 - ASK A QUESTION

How does boat surface area vary buoyancy?

STEP 2 - MAKE A HYPOTHESIS

STEP 3 - EXPERIMENT

Surface Area Size	Weight Held
Small	
Medium	
Large	



STEP 4 - ANALYZE YOUR DATA

Look over the results of your data.
Do you see any patterns?

STEP 5 - CONCLUSION

What did you learn?

Take a
Picture &
Share

TINKER THE ROBOT

Name

Date

EXPERIMENT

Conduct an experiment to learn more!

STEP 1 - ASK A QUESTION

STEP 2 - MAKE A HYPOTHESIS

STEP 3 - EXPERIMENT

Run Number		
1		
2		
3		
4		
5		

STEP 4 - ANALYZE YOUR DATA

Look over the results of your data.
Do you see any patterns?

STEP 5 - CONCLUSION

What did you learn?

Take a Picture & Share

TINKER THE ROBOT

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CHALLENGE

Using what you learned from your Experiments, design and build a boat that can hold as much weight as possible

KEY ELEMENTS TO THINK ABOUT IN YOUR DESIGN

DESIGN SKETCH

BUILD & TEST & SHARE

1. Build your design
2. Use the Experiment sheet to log your results.
3. Share your design & tag #tinkertherobot

TINKER THE ROBOT