

U.S. Navy Water Vessels

Name/Group: _____

USSCLF STEAM Stars Student Worksheet

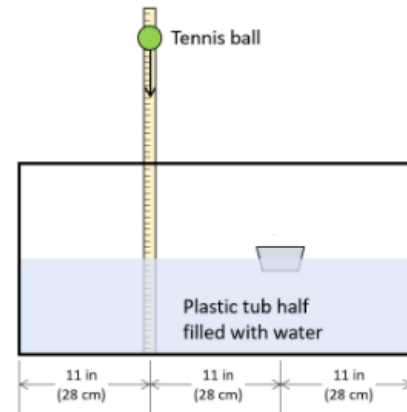
Date: _____

Ship Builder Sea Trials Activity: Lab Worksheet

A fun mini engineering challenge! Use what you've learned about ships to design one that can stand up to the Navy's Sea Trials!

Materials List

- 1 Large Plastic Tub filled with water ($\frac{1}{2}$ - $\frac{2}{3}$ full)
- Towel (to dry with)
- Foil (several sheets)
- 50 Pennies
- 1 Each - Tennis ball, Bouncy ball, and a Rock
- 1 Plastic Straw
- 1 Yard Stick (Optional)



Boat Requirements:

- Draft, Design, Test, and Build ships made of foil. You may make several test prototypes, but only one can go to Builder Sea Trials!
- Each boat must be made of foil only (any size)
- No other materials (i.e., tape, cardboard) are allowed to be used in the construction

Procedure:

- Fill the plastic tub $\frac{2}{3}$ full with water. Let the water settle.
- Draft or test your boat design. Think about ways Naval ship engineers design ships to handle difficult conditions!
- When you're ready with your final design, place the boat in the water. Proceed with trials. Place a check mark (✓) if completed successfully. Place an x (X) if failed.

TRIAL #1: STANDARD CARGO HOLD TEST

- Add 10 Pennies to boat

TRIAL #2: HIGH SPEED TURN TEST

- Using the straw, blow to force your boat to turn sharply across the water

TRIAL #3: PRECISION AIRCRAFT LANDING

- Drop a single penny from 8 inches above, into the middle of the boat

TRIAL #4: EXPLOSIVE SHOCK TRIALS

- Place your ship approximately 1/3 of the length from the side of the tub. Place your yardstick on the opposite side of the tub, approximately halfway between the ship and the other side of the tub. Note the measurement of the waterline on the yardstick.
- Drop the tennis ball/bouncy ball/rock at the yardstick, from approximately 7 inches above the water line.
- Drop the tennis ball/bouncy ball/rock at the yardstick, from 12 inches above the water line.
- Drop the tennis ball/bouncy ball/rock at the yardstick, from 20 inches above the water line.

Did your boat tip? What happened?

TRIAL #5: MISSION CAPACITY SURGE TEST

- Guess how many more pennies your ship will hold (in calm waters): _____
- Add more pennies, one at a time, until you run out of pennies, or your ship sinks. How many pennies total did your ship hold? (Hint: you should have started out with 50) _____

GO DEEPER: Discussion Questions For Further Exploration

If you had more time or materials, what changes would you make to your ship?
