MOHAI
MUSEUM OF HISTORY & INDUSTRY

Idea Lab at Home

Exterior of *Wawona* by John Grade

Wawona and tug Gail S on Lake Union, June 23, 1993. MOHAI, Seattle Post-Intelligencer Collection, 2000.107.19930623.6.14

The Wawona

The massive wooden sculpture standing in the MOHAI atrium is *Wawona*, a work of art by John Grade, built from the dismantled pieces of the three-masted schooner of the same name. As a ship, the Wawona hauled lumber and was later used for fishing across the Pacific coast from Seattle to California from 1897-1947.

A schooner is an aquatic vessel that has two or more masts for sailing, but boats and ships come in many sizes (think of the difference between tugboats, barges, and canoes). Watercrafts also have different features depending on how they are powered, such as masts and sails for wind travel, and come in many different shapes that affect their ability to move forward through water and stay afloat.

What floats your boat?

A **hull** is the watertight body of a ship or boat, including its bottom, sides, and fittings. Hulls may be open or covered with a deck. They come in a variety of shapes, depending on the purpose a boat or ship is designed for, such as moving people, cargo, or for rapid travel. Hulls help boats to remain buoyant.

Buoyancy is caused by the upward force exerted by water or other fluid against an immersed or submerged object, allowing it to float above or within the liquid rather than sink. Whether an object is buoyant depends on how much water it displaces or moves, and the **density** of the object (its **mass** relative to its **volume**).

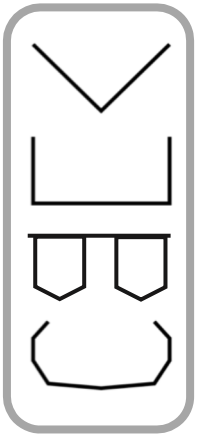
TYPES OF HULLS

There are two main ways a hull can be designed to help a boat move through water:

- **Displacement** – pushes water away while the boat/ship is in motion
- **Planing** – the boat/ship lies atop the water and generally relies on lift to glide

Semi-displacement hulls are a mix of the two, able to generate some lift

What boat shapes hold the most amount of weight? Find out with an at-home challenge!



DEEP VEE (planing) – ex: powerboats

FLAT (planing) – ex: barges

MULTI-HULL (displacement) – ex: catamarans

ROUND (displacement) – ex: canoes

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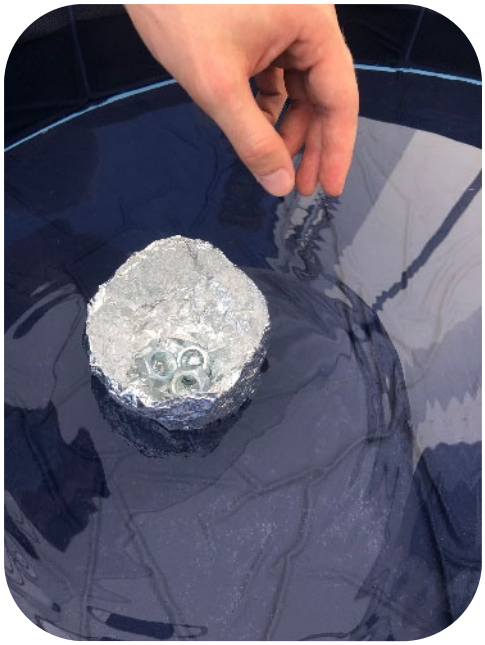
Buoyancy Challenge



Watch the video introduction on the MOHAI YouTube Channel (@mohaiprograms) to learn more about buoyancy and for a demonstration of the activity.

What you'll need:

- Equally sized sheets of aluminum foil
- An open container for water such as a kiddy pool, bathtub, sink, or plastic tub
- Small objects of equal size and weight such as pennies or washers
- Optional: a scale

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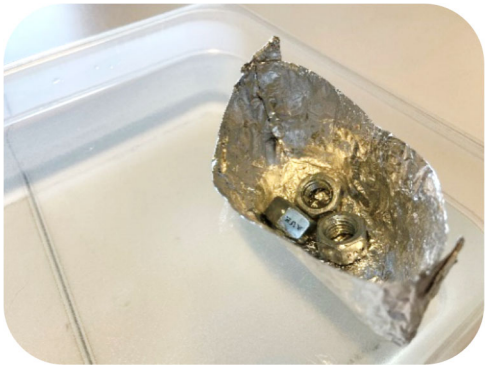
What you'll do:

1. Fill your container with water

- About 1/3 to 1/3 of the volume should be enough – you want your boat to be fully submerged when it sinks.

2. Design and build your boat using only TWO sheets of aluminum foil.

- What boat shapes are you familiar with? What's a boat shape you've *never* seen before?
- If it helps, draw or sketch your idea first!
- Assemble your boat – you can roll, tear, layer, or fold your sheets together but no extra fasteners like tape or paperclips allowed!
- Put it in the water – does it float? Is it watertight? How balanced is it?



3. Test your boat – How much weight can it hold?

- Place weights in your boat one at a time until it sinks.
- How much weight could it hold? Measure by counting your weights or using a scale.

4. Reflect and experiment!

- What were your boat's strengths and weaknesses?
- Test your boat again – does where you place the weights affect its ability to stay afloat?
- Build more boats with different hull shapes – which ones hold the most amount of weight?

Share your boat(s) on social media with us!

@mohaiseattle @mohai @seattlehistory