



COIN CARGO EXPERIMENT!

Ferry boats can carry a lot of things—people, cargo, even cars!—over long distances on the water. But how can boat carry so many objects without sinking? In this activity, you will discover how a ferry like the SS VIRGINIA can sail with a large amount of cargo using **weight distribution** and **buoyancy**.

You will need:

- Tin foil
- A large bowl or tub
- Scissors
- Coins
- Water
- Towel

Directions:

1. Cut or tear a square piece of tin foil.
2. Fold up the sides of the tin foil to form a “boat” that can hold coins in the center (see photo for example).
3. Fill your bowl or tub with water. Place your boat in the water, making sure it is floating without any cargo added.
4. Begin adding coins to your boat in a pile. Count how many it can carry before it sinks!
5. Once your boat has sunk, remove the boat and coins from the water and dry them with the towel.
6. Try the experiment again, this time making sure to spread the coins evenly around the boat as you add them. Count how many coins the boat can carry with this new strategy before it sinks!
7. For more fun, challenge your friends and family to make boats too and see whose can hold the most cargo!



Source:
<https://shiphistory.org/2017/09/19/aluminum-boats-cs-problem-solving/>
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Now discuss the following questions:

- Did your boat hold more coins when they were added in a pile, or distributed evenly around the boat?
- Tin foil is a very thin, light material, but as you’ve seen, it can carry a lot of weight when it floats. Why do you think that is possible?
- What do you think would happen if you added more coins to one side of your boat than the other?

The science behind it:

When you add cargo to your tin foil boat, two forces are acting on it. **Gravity** is the force trying to pull the tin foil and pennies downward and sink them. **Buoyancy** is pushing the boat toward the surface.

The gravitational force is determined by the combined weight of the tin foil and the coins in the boat. The force of buoyancy is determined by the weight of the water that is displaced by the boat as it floats.

So long as the force of buoyancy is greater than the force of gravity, your tin foil boat will keep floating!