

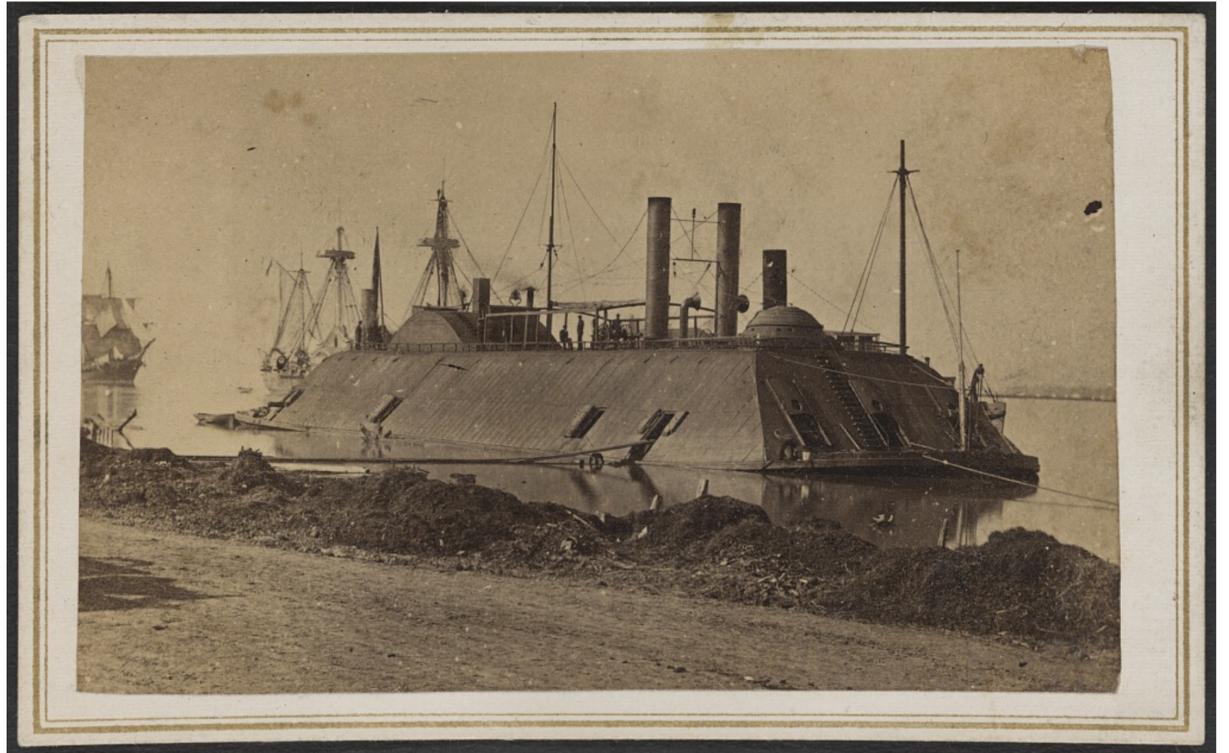
Build Your Own Ironclad

Materials

- aluminum foil
- small weights (pennies, pebbles, etc.)
- sink or container of water
- paper
- pencil



15-20 minutes



Civil War ships and boats came in all shapes and sizes. There were all kinds of new designs and ideas used by the Navy. Some of these new ships were called **ironclads**. An ironclad was a steam-propelled warship protected by iron or steel armor plates. The plates protected the sides of the ship from cannonballs and explosive shells. Design and build your own ironclad. Then, place your ship in water, see if it floats, and see how much cargo it can hold!

Instructions

- 1.** Get a few pieces of aluminum foil. You will use this to make your ironclad boat. Use your paper and pencil to sketch a few ideas of what your boat might look like.
- 2.** Fold the aluminum foil into a boat shape.
- 3.** Fill a sink or container with water. Test to see if your boat floats without adding any weights to it. If your boat won't float right now, go back and see if you can make any changes!

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4. Slowly add weights, one at a time, to see how much weight your boat can hold. Make a record of this. Do different boat shapes hold more weight than others?

For an extra challenge: See how much weight a boat built with just a single 12" x 12" piece of foil can hold.

What's Happening? So why do some of our boats float, while others sink? Why can some hold more weight than others? Let's examine the science behind this activity! Weight is a measurement of the force of gravity pulling down on an object, and in your boat, that is counteracted by a buoyant force which pushes up. Whichever force is greater determines whether your boat sinks or floats. Look at the picture below of two objects. On the left, the object's weight is less than the buoyant force acting on it, so the object floats. On the right, the object's weight is greater than the buoyant force acting on it, so the object sinks. But density, or the amount of mass in a given volume, is also responsible for your boat's ability to float. That's because density affects an object's weight. A given volume of a denser substance is heavier than the same volume of a less dense substance. For example, ice is not as dense as water, so it floats.

