



# Lesson Plan

<b>Content Area(s)</b>	<b>Science, Math, Engineering</b>
<b>Topic</b>	<b>Build a Boat</b>
<b>Grade Level (s)</b>	<b>2 - 7</b>
<b>Seashore Center Resources</b>	<b>Boating Station: real boat, reusable build-a-boat models, knot tying station, boat navigation app</b>
<b>Standards</b>	<b>MS-ETS1 Engineering Design 3-5-ETS1 Engineering Design</b>
<b>Learning Target(s)</b>	<p><b>Students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Understand the concepts of buoyancy and water displacement</li> <li>• Design a watercraft that will support a given amount of weight</li> <li>• Incorporate the scientific principles of force and motion with engineering design and mathematics</li> </ul>
<b>Accommodations &amp; Modifications</b>	<ul style="list-style-type: none"> <li>• For younger students, challenge them to build a boat without the included budget</li> <li>• For a challenge, ask students to design as many different boats as possible</li> <li>• For ELLs, preteach the vocabulary</li> </ul>
<b>Assessment Plan</b>	<p><b>Assess:</b></p> <ul style="list-style-type: none"> <li>• The quality of students' rationales for their boat designs.</li> <li>• The creativity of students' boat designs.</li> <li>• The accuracy of students' recorded weight and cost data.</li> </ul>
<b>Keywords</b>	<b>Boat, buoyancy, float, science, experiment, motion, math, engineering</b>
<b>Instructional Materials</b>	<ul style="list-style-type: none"> <li>• Boat design printable</li> <li>• Clear aquarium or tub filled with water</li> <li>• Aluminum foil</li> <li>• Small group boat building kits: popsicle sticks, aluminum foil, glue, plastic straws, corks, masking tape, What Floats? What Sinks? by J. Boothroyd</li> </ul>

## **Procedures**

- 1. Begin with a simple demonstration. Show the students two sheets of aluminum foil that are exactly the same size. Ask them if they think the aluminum foil will sink or float if you place it in the water. Give students an opportunity to explain their guesses.**
- 2. Place one piece of aluminum foil on the top of the water. Ask them if they can think of any way to change the second sheet of aluminum foil so that it sinks rather than floats.**
- 3. Crumple the second piece of aluminum foil into a ball and place it in the water. Ask students why they think the ball of foil sank when the sheet of paper floats. Explain the concept of water displacement and discuss.**
- 4. Next, read the book *What Floats? What Sinks?* by J. Boothroyd aloud to students. Take time to reinforce the scientific principles of buoyance, gravity, water displacement and force. Stop periodically to discuss the illustrations and content. It is a great idea to make additional literature resources available in the room for students to explore on their own.**
- 5. Explain to students that they will participate in a boat-building challenge. Provide each with a copy of the Boat Design Challenge and group them into teams of 3-4 for the challenge. Distribute the Boat Design Challenge kit to each group and allow enough time for them to brainstorm, design, build and test their models.**
- 6. When students have had time to test and improve their models, host a Classroom Boat Design Competition. Each group should be prepared to explain the rationale for its boat design before testing the weight it will support. Encourage students to record the weight and cost for each model on the data collection form so that all students will be involved in identifying the winner.**