

Boat Building Session 1: Understanding Key Concepts - activity determine area of boat

Materials Needed:

Markers, large poster or chart paper, computers or tablets (for research)

Objective:

Students will be able to define and illustrate the concepts of volume, weight, displacement, density, area, perimeter, mass, and buoyancy, and explain their relevance to boat building.

Assessment:

Students will create a visual presentation demonstrating their understanding of their assigned terms (volume and weight, displacement and density, area and perimeter, mass and buoyancy) and teach these concepts to their peers. The presentations will be assessed based on clarity, accuracy, and engagement.

Key Points:

- **Volume and Weight:** Volume refers to the amount of space an object occupies, while weight measures the force of gravity on that object.
- **Displacement and Density:** Displacement is the volume of fluid that an object displaces when submerged, and density is mass per unit volume.
- **Area and Perimeter:** Area is the measure of space within a shape, while perimeter is the distance around that shape.
- **Mass and Buoyancy:** Mass is the amount of matter in an object, and buoyancy is the upward force exerted by a fluid that opposes the weight of an object submerged in it.

Opening:

- Start with a question: "What do you think makes a boat float?"
- Display a short video clip of various boats on water to capture interest.
- Explain that today, they will learn key concepts that help understand how boats are built and why they float.

Introduction to New Material:

- Divide students into four groups, assigning each group one of the key terms (volume and weight, displacement and density, area and perimeter, mass and buoyancy).
- Instruct groups to research their terms using computers, define them, and create illustrations.
- Anticipate the misconception that "weight" and "mass" are the same; clarify that weight is the force due to gravity, while mass is the amount of matter and does not change regardless of location.

Guided Practice:

- Set behavioral expectations: Listen, collaborate, and respect each other's ideas.
- Guide groups to find examples of their terms in real-life applications related to boats, such as how the shape of a boat affects its volume and buoyancy.
- Ask scaffolded questions:
 - Easy: "What is the definition of volume?"
 - Medium: "How does the shape of a boat affect its buoyancy?"
 - Hard: "Can you explain why density is important for a boat's design?"
- Monitor student performance by circulating among groups and providing feedback.

Independent Practice:

- Each group will finalize their visual presentation and practice teaching their terms to the class.
- Set expectations for presenting: Speak clearly, engage the audience, and be ready to answer questions.
- Each group will present for 5 minutes, followed by a Q&A session.

Closing:

- Conduct a quick review by asking each group to summarize their term in one sentence.
- Have students share one interesting fact they learned from another group.

Extension Activity:

- Students who finish early can create a simple boat model using everyday materials (e.g., paper, straws) to test buoyancy in a water container.

Homework:

- Research a famous boat or ship and write a short paragraph explaining how the concepts learned in class apply to its design and functionality.

Standards Addressed:

- **Next Generation Science Standards (NGSS) MS-PS2-3:** "Ask questions about data to determine the factors that affect the strength of electric and magnetic forces."
- **Common Core State Standards (CCSS) for Mathematics 6.G.1:** "Find the area of right triangles, other triangles, special quadrilaterals, and polygons by decomposing them into known shapes."