STEM in

LESSON PLAN

Floating and Sinking

Students will predict and test whether objects float or sink, gaining an understanding of buoyancy and density. They will then design and build a small raft using straws and tape, testing its ability to float and hold weight, and discussing real-world applications like boats and submarines.

Recommended age for this game

6-9 years old

Duration

45 - 60 min

Learning Objectives

- Understand why some objects float while others sink based on buoyancy and density.
- Explore real-life applications of buoyancy, such as boats and submarines.

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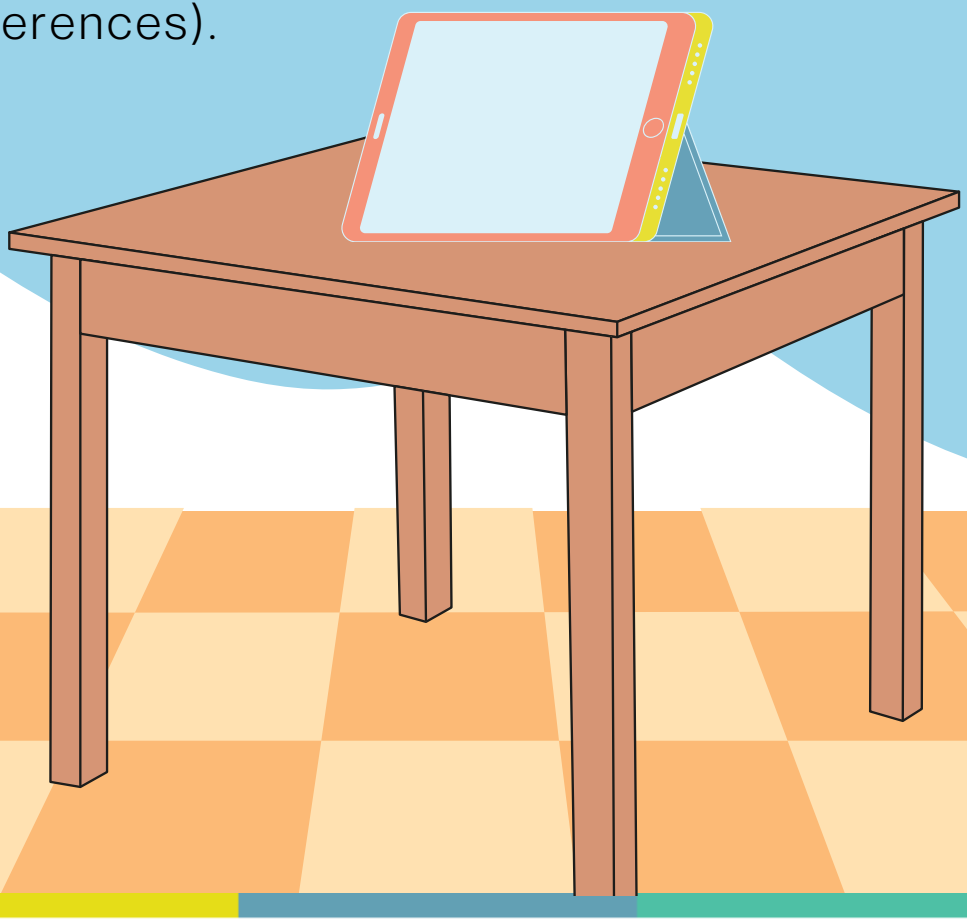
Materials and tools needed

- Large clear container filled with water
- A variety of objects (wood, metal, plastic, rubber, sponge, etc.)
- Straws and tape (for raft-building challenge)
- Coins or marbles (to test how much the raft can hold)
- Printable worksheet for predictions and observations (See references).
- Optional: Digital animations or online simulations on buoyancy (See references).



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Guidance for Teachers

Activity description

- Students will explore buoyancy by predicting and testing which objects float or sink. They will design and build a small raft using straws and tape to test how well it floats and supports weight. The activity encourages experimentation, problem-solving, and discussion on real-world applications like boats and submarines.
- Introduction & Demonstration: The teacher introduces buoyancy with a discussion and simple floating and sinking experiment.
- Hands-on Experimentation: Students test a variety of objects in water, record their observations, and analyze the results.
- Raft-Building Challenge: Students design and construct a floating raft using straws and tape, testing its buoyancy with small weights.
- Technology Integration: Students interact with an online buoyancy simulator to explore how shape, material, and mass affect floating and sinking.
- Discussion & Reflection: Students share their findings, discuss real-world applications, and consider how to improve their raft designs.

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Guidance for Teachers

Preparation

- Gather a variety of materials to test for floating and sinking.
- Fill a large container with water for class demonstrations.
- Prepare a digital animation or simulation explaining buoyancy.
- Provide students with worksheets to record predictions and results.

Implementation steps

1. Introduction & Prediction
   - Discuss the concept of buoyancy and why some objects float while others sink.
   - Show examples of floating and sinking objects and ask students to predict outcomes.

2. Experimenting with Objects
   - Distribute various objects to small groups.
   - Have students test each object in the water and record whether it floats or sinks.
   - Discuss results as a class and introduce the concept of density affecting buoyancy.

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3. Raft-Building Challenge

- Give each student a set of straws and tape and challenge them to design a floating raft.
- Have students test their rafts by placing them in water and adding small weights (coins, marbles, etc.).
- Encourage students to redesign and improve their rafts based on observations.

4. Discussion & Reflection

- Discuss which raft designs worked best and why.
- Ask students: How would you improve your raft design?
- Show a real-world example of how engineers design boats and submarines.
- Conduct a short quiz or class discussion to reinforce learning.

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Follow-up and reflection

- Expected Outcome:
  - Students will understand why objects float or sink based on buoyancy and density.
  - Students will apply their knowledge to design and improve floating structures.

- Student Activities:
  - Interactive quiz on floating and sinking concepts (See Annex 1 for the questions).
  - Draw and label their raft designs, explaining why they worked or failed.
  - Discuss real-world applications of buoyancy in transportation and safety.

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Student Activities

Activity description	Expected outcome	Technology integration
Predict Floating & Sinking	Students will use reasoning skills to guess which objects will float or sink.	Use an interactive buoyancy quiz to test predictions.
Testing Objects in Water	Students will observe and classify objects based on buoyancy.	Record observations and compare with an online simulator.
Raft-Building Challenge	Students will experiment with materials and structures to create a floating raft.	Explore an interactive buoyancy simulation.
Discussion & Reflection	Students will explain what they learned and apply it to real-world situations.	Use a virtual whiteboard for brainstorming improvements.

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Reflective questions for students

- What surprised you the most about which objects floated or sank?
- How does the shape of an object affect whether it floats or sinks?
- If you redesigned your raft, what changes would you make and why?
- Can you think of any real-life situations where understanding buoyancy is important?

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Differentiation ideas

- **For advanced students:** Challenge them to design a raft using different materials and test variations in weight distribution.
- **For students with special needs:** Provide step-by-step guidance and allow tactile exploration with objects before predictions.

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Tips

- Ask students to explain why they think an object will float or sink before testing.
- Show videos or diagrams of boats, submarines, and life vests to relate the concept to everyday life.
- Assign small groups for testing objects and designing rafts to foster collaboration.
- Let students experiment with different raft shapes and materials to discover what works best.
- Connect the concept to cargo ships, swimmers, and floating toys.
- Provide tactile experiences, visual media, and discussion opportunities for diverse learners.

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Additional materials and references

Floating or Sinking game
https://www.gynzy.com/en/library/items/floating-or-sinking

Video “How Do Boats Float?”
https://www.youtube.com/watch?v=VnLccU8mihQ

Example of the Worksheet for “Sink or Float?”
https://preschool365.com/l3/experiment-float-or-sink/preschool-float-or-sink-science-experiment-06.pdf

Kahoot https://create.kahoot.it/auth/register

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ANNEX 1

Questions for the quizzes

- 1. Why do some objects float while others sink?

A) Because of their color
B) Because of their weight
C) Because of buoyancy and density
D) Because of the shape of the container

- 2. Which of the following materials is most likely to sink in water?

A) Wood
B) Plastic
C) Metal
D) Sponge

- 3. What happens if an object is less dense than water?

A) It sinks to the bottom
B) It floats on the surface
C) It disappears in the water
D) It dissolves in the water

- 4. What is an example of a real-world application of buoyancy?

A) A car driving on the road
B) A boat floating on a river
C) A bird flying in the sky
D) A tree growing in a forest

- 5. How can you increase the buoyancy of an object?

A) Make it heavier
B) Make it smaller
C) Increase its surface area and trap air inside
D) Push it to the bottom of the water

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