

Photo Description



A big ship floats on water. The ship has a red bottom and black top. It carries heavy things from one place to another place.

Scientific Phenomena

This image represents the Anchoring Phenomenon of buoyancy - how heavy objects can float on water. The massive cargo ship floats because it displaces (pushes away) a volume of water that weighs more than the ship itself. The ship's hull is designed with a hollow shape that traps air, making the overall density of the ship less than water, allowing it to stay afloat despite carrying heavy cargo.

Core Science Concepts

1. Buoyancy and Floating: Objects float when they are less dense than the liquid they are in
2. Displacement: When an object enters water, it pushes the water out of the way
3. Materials and Properties: Different materials have different weights and can sink or float
4. Forces: Water pushes up on objects (upward force) while gravity pulls down (downward force)

Pedagogical Tip:

Use a clear container filled with water and various objects (cork, coin, toy boat, clay) to let students predict and test what will sink or float before explaining why.

UDL Suggestions:

Provide multiple ways for students to demonstrate understanding: drawing pictures, using hand gestures to show forces, or building with clay to test floating versus sinking shapes.

Zoom In / Zoom Out

1. Zoom In: At the molecular level, water molecules are constantly moving and pushing against each other and any object placed in the water, creating the upward force we call buoyancy.
2. Zoom Out: This ship is part of a global transportation system that moves goods across oceans, connecting continents and allowing people worldwide to share resources and products.

Discussion Questions

1. What do you think would happen if we filled the ship with water instead of air? (Bloom's: Predict | DOK: 2)
2. Why might the ship have a red bottom and black top - what purposes might these colors serve? (Bloom's: Analyze | DOK: 2)
3. How is this big ship similar to a toy boat in your bathtub? (Bloom's: Compare | DOK: 2)
4. What other things have you seen that float even though they seem heavy? (Bloom's: Apply | DOK: 1)

Potential Student Misconceptions

1. Misconception: Heavy things always sink

Clarification: Weight alone doesn't determine floating - it's about density (how much space something takes up compared to its weight)

2. Misconception: Only small things can float

Clarification: Very large ships can float because of their shape and the air trapped inside them

3. Misconception: Metal cannot float

Clarification: Metal objects can float if they are shaped to trap air and displace enough water

NGSS Connections

- Performance Expectation: 2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties
- Disciplinary Core Ideas: 2-PS1.A - Different kinds of matter exist and many of them can be either solid or liquid
- Crosscutting Concepts: Patterns - Patterns in the natural world can be observed and used as evidence

Science Vocabulary

- * Float: When something stays on top of water instead of sinking down
- * Sink: When something falls down through water to the bottom
- * Dense: How tightly packed the tiny pieces of something are together
- * Displace: To push something out of the way and take its place
- * Cargo: The things that ships, trucks, or planes carry from place to place

External Resources

Children's Books:

- Who Sank the Boat? by Pamela Allen
- Floating and Sinking by Karen Bryant-Mole
- Ships and Boats by Ian Graham

YouTube Videos:

- "Why Do Ships Float?" by SciShow Kids - Simple explanation of buoyancy for young learners: <https://www.youtube.com/watch?v=f49ELSi-Dal>
- "Sink or Float Experiment" by Steve Spangler Science - Hands-on experiments kids can try: <https://www.youtube.com/watch?v=OuLPhNOTpwg>