

## 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-DaI>
- "Sink or Float Experiment" by Steve Spangler Science - Hands-on experiments kids can try: <https://www.youtube.com/watch?v=OuLPhNOTpwg>