States Of Matter

Physical Science | Lesson Guide

4th Grade

Photo Description

This image shows a blue fire hydrant and orange traffic cone positioned near a sidewalk, grass, and a canal or waterway. The hydrant appears to be releasing water, and there is visible water on the ground and in the nearby canal. This real-world scene demonstrates how water exists in different places in our environment and how it moves through systems.

Scientific Phenomena

Anchoring Phenomenon: Water in motion and water management in urban environments.

Why This Happens (Scientific Explanation): Fire hydrants are connected to underground water pipes that deliver pressurized water throughout a community. When a hydrant is opened or leaks, water flows out due to pressure in the system. The water visible on the ground and in the canal demonstrates how water moves through human-made and natural systems. Additionally, this image shows water in its liquid state—the form water takes when it flows freely. Some of this water may also evaporate into water vapor (gas state) due to sunlight and heat, completing part of the water cycle that Fourth Graders are beginning to understand.

Core Science Concepts

* States of Matter: Water can exist as a solid (ice), liquid (flowing water), or gas (water vapor). In this image, we primarily observe water in its liquid state, but we can discuss how some of this water will eventually evaporate.

* The Water Cycle: Water moves from place to place through evaporation, condensation, and precipitation. The water in this hydrant came from a water source (like a reservoir or treatment plant), and eventually it will cycle back through evaporation or drainage systems.

* Properties of Liquids: Liquids take the shape of their container and flow downward due to gravity. The water spreading across the ground and flowing into the canal shows these properties in action.

* Human Systems & Water Management: Communities use infrastructure (pipes, hydrants, drainage systems) to manage and distribute water safely.

Pedagogical Tip:

When teaching states of matter to Fourth Graders, use this real-world hydrant image as a concrete anchor before moving to abstract diagrams. Ask students to predict what will happen to the water on the ground—will it stay there forever, or will it disappear? This naturally introduces evaporation without requiring memorization. Allow students to observe and touch (safely) different states of water during hands-on exploration to build deeper understanding.

UDL Suggestions:

To support diverse learners: (1) Provide a labeled diagram of the image with vocabulary words pre-highlighted for students who need visual support; (2) Create a water cycle illustration with arrows and simple captions so visual learners can track water movement; (3) Allow students to act out the water cycle (one student is liquid water, another becomes water vapor, etc.) for kinesthetic learners; (4) Offer sentence frames for discussion: "The water is _____ because _____."

Discussion Questions

1. "What do you think will happen to the water on the ground and in the canal over the next few hours or days?" (Bloom's: Predict | DOK: 2)
   - This prompts students to think about evaporation and the water cycle.

2. "Why do you think communities need fire hydrants and water pipes underground?" (Bloom's: Understand | DOK: 2)
   - This connects to water management and community systems.

3. "How is the water in this hydrant different from ice cubes or water vapor?" (Bloom's: Compare | DOK: 2)
   - This reinforces understanding of states of matter.

4. "If we collected all the water from this hydrant in a closed container where it couldn't escape, what changes might occur to the water over time, and why?" (Bloom's: Analyze | DOK: 3)
   - This pushes students to think about evaporation, condensation, and energy.

Extension Activities

Activity 1: "Evaporation Investigation"
Provide students with three cups of water placed in different locations: one in sunlight, one in shade, and one in a warm (but safe) area. Over 2-3 days, have students measure and record the water level daily using a ruler. Create a line graph showing which water evaporated fastest. Discuss why the sunny location had more evaporation (heat energy).

Activity 2: "Design a Water Management System"
Give students building materials (cups, straws, tape, funnels, string) and challenge them to design a system that moves water from one container to another, similar to how pipes move water through a community. Ask: "How can you move water uphill? What happens if your system has a leak?" This integrates engineering and systems thinking.

Activity 3: "States of Water Exploration Station"
Set up a station with ice (solid), liquid water, and a warm (not boiling) mirror held above warm water to show condensation (gas becoming liquid again). Students rotate through, observe each state, and record their observations on a worksheet with drawings. Include the guiding question: "What do you notice about how each state of water looks and behaves?"

NGSS Connections

Performance Expectation:
4-PS3-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. (Note: Evaporation involves heat energy changing water to vapor)

Disciplinary Core Ideas:
- 2-PS1.A Properties of Matter (states of matter and their observable characteristics)
- 2-ESS2.B Water on Earth (water cycle and its importance)

Crosscutting Concepts:
- Systems and System Models (Water systems within communities)
- Energy and Matter (Water changing states through heat energy)

Science Vocabulary

* Liquid: A state of matter that flows freely and takes the shape of its container (like water in a cup).

* Evaporation: The process where a liquid changes into a gas or vapor, usually due to heat from the sun.

* Water Cycle: The continuous movement of water from Earth's surface to the atmosphere and back again through evaporation, condensation, and precipitation.

* Hydrant: A metal pipe connected to underground water lines that firefighters and water workers use to access water.

* Pressure: A force that pushes on something; water pressure in pipes pushes water through the system.

* States of Matter: The three main forms that substances can take: solid, liquid, and gas.

External Resources

Children's Books:
- Water by Manya Stojic (explores water's journey through the water cycle with beautiful illustrations)
- The Water Cycle by Rebecca Olien (simple, age-appropriate explanation with diagrams)
- Come On, Rain! by Karen Hesse (narrative picture book that celebrates water in the community)

YouTube Videos:
- "The Water Cycle for Kids" by National Geographic Kids
  - Clear animation showing evaporation, condensation, and precipitation at Fourth Grade level
  - URL: https://www.youtube.com/watch?v=UswiVR3HTW0

- "States of Matter: Solid, Liquid, and Gas" by Crash Course Kids
  - Engaging explanation with real-world examples and relatable demonstrations
  - URL: https://www.youtube.com/watch?v=wDYy4-6FHCQ

Teacher Tip: Use this hydrant photo as a "phenomenon card" on your bulletin board throughout the water cycle and states of matter unit. As students learn new concepts, encourage them to return to this image and add sticky notes with new observations: "I notice the water is a liquid because..." or "I predict this water will evaporate because..." This builds metacognitive awareness and shows how science applies to their community.