# States Of Matter

Physical Science | Lesson Guide

3rd Grade

## Photo Description

This image shows a blue water valve or meter located near a sidewalk and grassy area, with an orange and white traffic cone beside it next to a small body of water. The valve has a warning sign on top and appears to be part of a water management or drainage system in a residential area.

## Scientific Phenomena

Anchoring Phenomenon: Water management and flow in community infrastructure.

The cone and valve placement demonstrate how engineers control and direct the movement of water through pipes and systems. Water naturally flows downward due to gravity, but humans design valves, meters, and pipes to control where and how fast water moves. In this case, the system likely manages stormwater runoff (water from rain and irrigation) that flows from the sidewalk and grass toward the retention pond or drainage system visible in the image. The valve allows operators to open, close, or regulate water flow, while the cone warns people about the work site.

## Core Science Concepts

* Gravity and Water Flow: Water moves downward and seeks the lowest point. Gravity pulls water from higher areas (sidewalk, grass) toward lower areas (the pond), and pipes and valves help guide this natural movement.

* States of Water: The image shows water in its liquid state in the pond. Water can exist as a solid (ice), liquid (water), or gas (water vapor). The water in this system is liquid but may evaporate into gas or freeze into ice depending on temperature.

* Engineering and Human Systems: People design valves, pipes, and drainage systems to control water movement in communities. These tools help prevent flooding, protect property, and manage water resources.

* Observable Properties of Water: Water is transparent (you can see through it), it reflects light, and it takes the shape of its container (the pond or pipes).

**Pedagogical Tip:**

Use this image as a "mystery" prompt: "Why do you think someone put this valve and cone here?" This activates prior knowledge and creates curiosity before teaching formal concepts. Third graders benefit from concrete, visible systems before abstract explanations.

**UDL Suggestions:**

Multiple Means of Engagement: Some students may connect better to this image through tactile exploration. Consider providing students with a simple valve model or allowing them to manipulate a toy water system. Additionally, connect the image to students' own experiences: "Have you seen water drains near your home or school?" This personalizes the learning and increases relevance for diverse learners.

## Discussion Questions

1. Why do you think engineers built a pipe and valve system in this neighborhood? (Bloom's: Understand | DOK: 2)

2. What would happen to the water without this drainage system during a heavy rainstorm? (Bloom's: Analyze | DOK: 3)

3. How is a water valve similar to a faucet in your kitchen or bathroom? (Bloom's: Compare | DOK: 2)

4. What do you think the orange cone is warning people about, and why is safety important around water systems? (Bloom's: Evaluate | DOK: 3)

## Extension Activities

1. DIY Water Flow Experiment: Provide students with clear plastic tubes, funnels, and water. Have them design their own simple drainage system using blocks and cups to show how water flows downhill. Ask them to predict and test different angles and obstacles. This directly models the real system in the photo.

2. Community Water Walk: Take students on a short, supervised walk around the school or neighborhood to identify other water management features (storm drains, gutters, downspouts, retention ponds). Create a class map marking these locations and discussing what each does.

3. Gravity and Flow Investigation: Fill clear containers with water and provide various materials (straws, funnels, small tubes). Have students explore how gravity affects water movement and how tools can redirect its flow. Connect observations back to the valve system in the photo.

## NGSS Connections

Performance Expectation:
3-PS2-1: Plan and conduct an investigation to provide evidence that balanced and unbalanced forces on an object change its shape, motion, or direction.

Disciplinary Core Ideas:
* 3-PS2.A - Forces and Motion: The location of an object can change, and that change in position is called motion. (Water moves through pipes due to gravitational force.)
* 3-ETS1.A - Engineering Design: People design solutions to solve problems caused by natural events and processes. (Valves and drainage systems solve water management problems.)

Crosscutting Concepts:
* Systems and System Models - Water systems have parts (valves, pipes, reservoirs) that work together.
* Cause and Effect - Gravity causes water to flow; valves cause water flow to stop or slow.

## Science Vocabulary

* Valve: A device that opens, closes, or controls the flow of water through a pipe (like a switch for water).

* Drainage System: Pipes and structures designed to collect and move water away from areas where people live.

* Gravity: The force that pulls objects and water downward toward Earth.

* Liquid: A state of matter that has a definite volume but no definite shape—it takes the shape of its container (like water).

* Meter: A device that measures or counts something, such as how much water flows through a pipe.

## External Resources

Children's Books:
Water* by Manya Stojic (explores water in nature and human communities)
Where Does the Garbage Go?* by Paul Showers (similar infrastructure exploration theme)
Drip, Drop: How Water Moves* by Sarah L. Thomson (grade-appropriate water cycle and flow)

YouTube Videos:
* "How Water Treatment Works" by National Geographic Kids (2:45) – Explains how water systems serve communities. https://www.youtube.com/watch?v=Y_UD5L7RJIM

* "Gravity and Water Flow Experiment" by ScienceKids (3:20) – Demonstrates how gravity moves water downward, directly applicable to valve systems. https://www.youtube.com/watch?v=AwDhfLm-5i8

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Teacher Notes: This image is an excellent real-world anchor to introduce water systems, gravity, and engineering design. Third graders are naturally curious about their physical world and community infrastructure. By connecting abstract concepts (gravity, states of matter) to a concrete, visible system, you help students develop systems thinking—a key NGSS practice. Encourage students to notice water management systems in their own lives and share observations.