



OVERVIEW

WATER



GOALS

Water is the most important substance on Earth. Water dominates the surface of our planet, changes the face of the land, and defines life. These powerful, pervasive ideas are introduced here. The **Water Module** consists of four investigations in which students explore properties of water, changes in water, interactions between water and other earth materials, and how humans use water.

FOSS EXPECTS STUDENTS TO

- Observe and explore properties of water in liquid, solid, and gaseous states.
- Observe the expansion and contraction of water as it warms and cools.
- Investigate factors that influence evaporation and condensation of water.
- Consider components of the water cycle.
- Observe and compare how water moves through different types of earth materials, including soil and gravel.
- Consider the water quality of local water sources.
- Investigate how water can be used to do work.
- Acquire vocabulary associated with water.
- Record observations in writing and pictures.
- Exercise language, social studies, and math skills in the context of science.
- Become aware of the importance of water in their lives.
- Use scientific thinking processes to conduct investigations and build explanations: observing, communicating, comparing, and organizing.

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WATER MODULE MATRIX

SYNOPSIS

SCIENCE CONTENT

THINKING PROCESSES

1. WATER OBSERVATIONS

Students investigate properties of water. They compare the way water interacts with four different surfaces, observe the property of surface tension, and investigate how to change this property. They compare the rates of different amounts of water flowing downhill.

- Water has several observable properties, including transparency, shapelessness, and movement or flow.
- Water beads up on some materials and is absorbed by other materials.
- Surface tension is the skinlike surface of water that pulls it together into the smallest possible volume.
- Water flows downhill.

- Observe and compare water on a variety of surfaces.
- Observe and compare rates of water flow.
- Describe and communicate observations.

2. HOT WATER, COLD WATER

Students observe the properties of water as it is heated, cooled, and frozen. They make a water thermometer and find that water expands as it is heated. Students compare the density of water at different temperatures and find that warm water is less dense than cool water, and ice is less dense than liquid water.

- Water expands when heat is added.
- Water contracts when heat is taken away.
- Cold water is denser than warm water.
- Water is densest at 4°C.
- Ice is less dense than liquid water.
- A solid has a definite volume and shape; a liquid has only definite volume.

- Observe and compare the interaction of water at different temperatures.
- Observe and describe the properties of water in two states, solid and liquid.
- Communicate observations about water.

3. WATER VAPOR

Students are introduced to water vapor and evaporation. They explore the effects of environmental conditions and surface area on rates of evaporation. They set up condensation chambers and consider how evaporation and condensation contribute to the water cycle.

- Evaporation is the process by which liquid water changes into water vapor, a gas.
- Temperature affects the rate of evaporation.
- The surface area of a liquid affects the rate of evaporation.
- Condensation occurs when water vapor touches a cool surface and changes into liquid.
- Evaporation and condensation contribute to the movement of water through the water cycle.

- Observe evaporation and condensation.
- Compare rates of evaporation under different conditions.
- Organize results from evaporation investigations.
- Describe and communicate observations.

4. WATERWORKS

Students compare what happens when water is poured through two different earth materials, soil and gravel. Students construct a waterwheel and use it to lift objects, learning about the power of water. They collect water from local sources, examine its properties, and are introduced to the concept of water quality.

- Some earth materials absorb more water than other earth materials do.
- Water flows more easily through some earth materials than through others.
- Flowing water can be used to do work.
- Water contains different materials that affect its quality.
- Evaporation can be used to detect materials dissolved in water.

- Observe and compare movement of water through different materials.
- Observe water power.
- Organize results of investigation of water samples.

Language Extensions

- What are raincoats?
- Discuss water uses.

Math Extensions

- Problem of the week.
- Weigh water.
- Measure water drops.

Music and Science Extensions

- Listen to water music.
- Study movement of water through earth.
- Run water through a maze.
- Capture raindrops.

Language Extension

- Describe icy worlds.

Math Extension

- Problem of the week.

Social Studies and Science Extensions

- Calibrate a thermometer.
- Research ice in warm and cold climates.
- Freeze salt water.
- Compare density of salt and plain water.

Language Extension

- Research recycling water.

Math Extensions

- Problem of the week.
- Measure and graph surface area.

Social Studies and Science Extensions

- Research water storage and delivery systems.
- Investigate how humidity affects evaporation.

Language Extensions

- Investigate local water.
- Write raindrop stories.

Math Extensions

- Problem of the week.
- Graph water use.

Science Extensions

- Get the salt out.
- Test aquarium water.

See the Science Stories folio.

- *A Report from the Blue Planet*
- *Surface Tension*
- *Which Way Does It Go?*

See the Science Stories folio.

- *The Pond*
- *Ice Is Everywhere*
- *Ice History*

See the Science Stories folio.

- *Wet and Dry Places*
- *Evaporation and Condensation*
- *The Water Cycle*

See the Science Stories folio.

- *Water: A Vital Resource*
- *The Power of Water*
- *Ellen Swallow Richards: An Early Ecologist*
- *Moon Dreams*

www.fossweb.com

Check the FOSS website for interactive simulations, to write questions to a scientist, for teaching tips, and to talk with other classes using FOSS.

Home/School Connection: Students investigate surface tension. They make a paper water strider move across water, find out how many paper clips they can fit in a full glass of water, and float a berry basket.

Home/School Connection: Students find out how much water food preparation requires.

Home/School Connection: Students consider how evaporation keeps their bodies cool. They find out about humidity and the effect it has on evaporation and the weather.

Home/School Connection: Students will need extra time at home to work on presenting their project to the class.

FOSS AND NATIONAL STANDARDS

The Water Module emphasizes the development of observation and description skills and building explanations based on experience. This module supports the following National Science Education Standards.

SCIENCE AS INQUIRY

Develop students' abilities to do and understand scientific inquiry.

- Ask and answer questions.
- Plan and conduct simple investigations.
- Employ tools to gather data.
- Use data to construct reasonable explanations.
- Communicate investigations and explanations.
- Understand that scientists use different kinds of investigations and tools to develop explanations using evidence and knowledge.

CONTENT: EARTH SCIENCE

Develop students' understanding of properties of earth materials.

- Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways. Earth materials provide many of the resources that humans use.
- Soils have properties of color and texture and the capacity to retain water.
- Clouds, formed by the condensation of water vapor, affect weather and climate.
- Water, which covers most of Earth's surface, moves through the earth, oceans, and atmosphere in the water cycle.

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

Develop students' understandings about types of resources.

- Some resources are basic materials, such as water, air, and soil.
- Resources can be extended through recycling and decreased use.