

Properties of Water

OBJECTIVES

In this activity, students investigate the properties of water by finding out how water feels, smells, sounds, looks, and behaves.

The students

- ▶ discuss rules for working with water
- ▶ use their senses to explore water
- ▶ describe some properties of water

SCHEDULE

About 40 minutes

VOCABULARY

properties

MATERIALS

For each student

- 1 Activity Sheet 1

For each team of four

- 2 cups, plastic, 9-oz
- 1 sponge
- 2 spoons, plastic
- 4 straws
- 2 tongue depressors
- 1 tub, plastic†

For the class

- 1 chart, Properties of Water
- 2 cups, plastic, 9-oz

- 1 marker, felt-tip*
- 1 pail†
- paper towels*
- water, tap*

*provided by the teacher

†in separate box

PREPARATION

- 1 Make a copy of Activity Sheet 1 for each student.
- 2 Use the pail to fill the tubs half-full of water. Place some paper towels next to each tub for wiping up spills.
- 3 Half-fill a plastic cup with water. You will need this cup of water and an empty cup for a class demonstration.
- 4 Hang the Properties of Water chart on the board.
- 5 Each team of students will need a tub of water and the following items: two tongue depressors, two plastic spoons, two plastic cups, four straws, and one sponge.

BACKGROUND INFORMATION

Water is the most common substance on Earth. Nearly three-quarters (about 70 percent) of the Earth's surface is covered with water. Water is unique because it is the only substance that occurs naturally on Earth in all three states—solid, liquid, and gas. About 2 percent of the world's water is solid, including snow, frost, glaciers, and the polar ice sheet. Less than one-thousandth of a percent of the world's water is gaseous, as water vapor. The rest of the world's water is liquid, and can be found in oceans, seas, lakes, rivers, streams, and groundwater.

Every living thing on Earth needs water to stay alive. In fact, living things can survive longer without food than without water. This is because water makes up most of the animal blood and plant sap that nourishes living tissues. For example, approximately 60 percent of the weight of the human body is due to water.

Human tissues require 2.35 L (2.5 qt) of water daily. Most people get about half the water they need from the fluids they drink daily. The water content of foods supply the remainder of the required water. For example, an egg is 74 percent water, and a piece of lean meat is 70 percent water.

The average person in the United States requires more than 375 L (100 gal) of water a day for personal and household uses, including drinking, washing, and preparing meals. For example, a bath in a tub consumes approximately 115 L (30 gal) of water. Large amounts of water are also used in watering lawns and gardens, in agriculture, and in operating air conditioning units and heating systems. For example, it takes 3,028,320 L (800,000 gal) of water to grow an acre of cotton.

A **property** is a quality or trait that is characteristic of a person or thing. A property can also be an effect that a material or substance has on another object (such as “water gets things wet”) or on one or more of the senses of the observer (such as taste, hearing, smell, and touch).

In this activity, students will touch, manipulate, smell, and observe water in an effort to list the properties of water.

▼ Activity Sheet 1

Properties of Water

1. Circle the sentences about water that are true.

Water has color.

Water is wet.

Water has no color.

Water is dry.

2. Circle the picture that shows what happens to water when you blow on it.



3. Circle the picture that shows how water looks when you pour it.



Guiding the Activity

- 1 Hold up a cup of water and an empty cup. Pour the water from one cup to the other. Ask, **What do you think I am pouring back and forth between these cups?**

Ask, **How do you know it is water?**

Ask, **Could it be a clear soft drink?**

Ask, **How could you tell for sure if this cup has water in it?**

Tell students that if they were to taste the liquid in this cup, they would find that it is indeed water. Lead students to conclude that you can identify water by the way it looks or tastes or behaves. Tell students that when they describe how something looks, feels, smells, and behaves, they are telling about the **properties** of that object. Write the word *properties* on the board, saying it aloud as you write it.

- 2 Point to the Properties of Water chart. Using the marker, write *clear, can see through it* on the chart, saying the phrase aloud as you write it. Remind students that one property of water is that it is clear. Tell students that they are going to be given a tub of water and some utensils, and you want them to find other properties of water, including how it feels, smells, sounds, looks, and behaves (see Figure 1-1).

Guide students to understand that you want them to come up with enough properties of water so that if you read just their list of properties to someone, he or she would be able to guess that you were describing water. Tell students that, although taste is also a property of an object, they will not be tasting water in this activity.

Additional Information

The students will probably say that you are pouring water from one cup to the other.

Students will probably say they know it is water because it is clear or because it looks like water.

Some students may say it could be. Others may say that is not possible, because if it were a clear soft drink it would fizz when you poured it from one cup into another.

Students will probably say that you could taste it.

Caution: Warn students that they should never taste anything in science class unless told to do so by their teacher.



▲ Figure 1-1. Students investigate the properties of water.

Guiding the Activity

Additional Information

3 Discuss rules the students should follow when they work with water, especially when they work at the tubs. As students discuss the rules, write them on the board. Be sure the students list the following: 1) Wipe up spills with the sponge as soon as they happen. 2) Do not drink the water. 3) Share equipment, except for the straws.

Distribute a tub of water, two tongue depressors, two plastic spoons, two plastic cups, four straws, and one sponge to each team. Challenge the students to use the materials to learn how water feels, smells, sounds, and looks. Allow students about 15 minutes to experiment with and manipulate the water.

Remind students not to use their straws for drinking the water in their tubs. Use them only for stirring the water or blowing air under the water or over the water's surface. Also remind students not to exchange their straws.

4 After students have had time to examine the water in their tubs, hold a group discussion. Ask, **Does water have a color?**

Write *has no color* on the Properties of Water chart, saying it aloud as you write it. Ask, **Does water have a smell?**

Write *does not smell* on the Properties of Water chart, saying it aloud as you write it. Ask, **What does water feel like?**

Write *feels wet and slippery* on the chart, saying it aloud as you write it. Ask, **Does water make a sound when you pour it?**

Write *makes a noise when you pour it* on the Properties of Water chart, saying it aloud as you write it.

Students should say that it has no color.

Students should say that water does not have a smell.

Students may say that water feels wet and slippery.

Students should say that water makes a noise when you pour it.

5 Ask, **What happens when you stir the water with the spoon or the tongue depressor?**

Write *water moves when stirred* on the chart, saying it aloud as you write it. Ask, **Can you scoop up water with a tongue depressor?**

Students should say that the water moves when it is stirred.

Students should say that the water slips off the tongue depressor and back into the tub.

Guiding the Activity

Ask, **What can you use to pick up water?**

Write *can scoop it up in a cup or a spoon* on the Properties of Water chart, saying it aloud as you write it.

6 Ask, **What happens when you put a straw in the water and blow through it?**

Write *bubbles form and then pop when you blow air into it* on the Properties of Water chart, saying the sentence aloud as you write it.

Ask, **What happens when you use the straw to blow air across the water's surface?**

Write *its surface moves and wrinkles when air blows across it* on the chart, saying the sentence aloud as you write it.

Ask, **Are there any other properties of water you would like to add to our list?**

Additional Information

Students should say they can use the spoon and the cups to pick up water. Some students may find that they can also use the straw to move water. (They can put one end of the straw in the water and then cover the other end of the straw with a thumb and lift the straw out of the water, as shown in Figure 1-2. They will find that water drops back into the tub when they lift a thumb off the other end of the straw.)



▲ Figure 1-2. A student moves water with a straw.

Students should say that bubbles form, but quickly rise to the top and pop.

Students may say that the water moves and/or that wrinkles form on its surface.

Add any other properties that all the students agree on. For example, students may say that you can pour water from one container to another. In that case, add *pours easily* to the Properties of Water chart, saying it aloud as you write it.

Guiding the Activity

7 Read the list of properties of water you have recorded on the chart. Guide students to understand that when they describe water in these ways they are telling about the properties of water.

Distribute a copy of **Activity Sheet 1** to each student and help them complete it. Depending on the reading level of your students, you may need to read the activity sheet aloud.

Keep the Properties of Water chart on display in the classroom.

Additional Information

After students have completed all the activities, your Properties of Water chart may look like this:

Properties of Water

*Has no color
Does not smell
Feels wet and slippery
Makes a noise when you pour it
Water moves when stirred
Can scoop it in a cup or a spoon
Surface moves and wrinkles when air blows across it
Bubbles form and then pop when you blow air into it
Water drops are round, smooth, and small
Water sticks to water
Water can pull itself up some materials
Flows downhill
Pours easily
Takes the shape of its container
Pushes against objects placed in it
Soapy water feels slippery
Soapy water makes bubbles
Freezes and becomes ice when cooled enough
Expands when it freezes
Evaporates into the air
Condenses out of the air
Can be cleaned by a filter*

REINFORCEMENT

Provide students with other instruments they can use to manipulate the water in their tubs. Record on the class chart any new properties of water they may discover during their experiments.

SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

CLEANUP

Empty the tubs of water and enlist all the students' help in using the paper towels to dry the materials. Return the tubs, tongue depressors, cups, spoons, and the pail to the kit. Leave the sponges to air dry, and discard the straws. Leave the Properties of Water chart on display.

SCIENCE AT HOME

Tell students to turn on a faucet at home so that water flows in a very small stream. Encourage students to experiment with the stream of water and answer the following questions: What happens when you hold a fork under the stream? What happens when you hold a spoon under? What happens when you hold a spatula or a butter knife under the stream?

Connections

Science Challenge

Repeat the basic activity, this time using sand instead of water. Encourage students to pour sand from one container to another, stir it, blow on it with a straw, and so forth. Ask students to identify the properties of sand as you list their suggestions on the board. Ask students whether they think sand is a liquid. Guide them to recognize that although a quantity of sand acts like a liquid, it is actually made up of many tiny solid pieces of material. Let students use a magnifier to closely examine a spoonful of sand on black paper. (Also see the Science Challenge for Activity 4.)

Science Extension

- ▶ Give each team two small bowls, one containing water and the other milk. Challenge students to examine the two liquids, describe the properties of each, and compare their properties. How are the two liquids alike? How are they different? You might want to repeat this activity with other common, safe liquids such as juice, soda water, and vinegar.
- ▶ To give students additional practice describing the properties of objects, play a game of “I Spy.” Model the procedure for the class by choosing an object in the classroom without telling students what it is and describing its properties: “I spy something long, thin, hard, yellow, and pointed on one end,” for a pencil, for example. Let students take turns guessing the identity of the object. Once students have the idea, let volunteers choose and describe objects for the rest of the class to identify.

Science and Math

Give each student a paper circle 25–30 cm (10–12 in.) in diameter. Tell students to fold the circle in half once and then once again

(into quarters), then open it up and lay it flat. Tell them to color one quarter-section brown and the other three sections blue. When they have finished, explain that the brown section shows how much of Earth is bare land and the blue section shows how much is covered by water.

Science and Health

Tell students that their own bodies are made up mostly of water. When your body does not get enough water, you can become very sick. To be healthy, you should drink plenty of water and other liquids every day, especially when you are exercising or when the weather is very hot. Ask students to count how many glasses of water and other liquids they drink each day for a week, and keep a class chart of the amounts that students report. (The recommended amount for adults is six to eight glasses per day.)

Science and Language Arts

Obtain an easy-to-read children’s book describing and illustrating facts about water. See the References and Resources section of this guide for suggestions. Read the book aloud to small groups or make it available for students to read on their own if they are capable. You may want to return to the book at various times in the module as students learn more about the ideas presented in it.

Science and Social Studies

Post a full-color map of your town, county, or state in the classroom. Explain (or ask students to recall) the meaning of the various colors used on the map—red, green, and black for roads, white for land, and blue for water. Let students examine the map to find lakes, ponds, rivers, and streams in your area.