

Objectives

The student will be able to do the following:

- Explain why water is important
- List the many uses of water
- List the many locations of water on the earth
- Describe water as a solid, liquid, and gas

Materials

A cup of water and/or ice (if desired for demonstration)

Copies of the reading material for students to read aloud

Copies of desired activity sheets or homework sheets

A globe or map (if desired)

Teachers may want to refer to items in the classroom during this unit (e.g. point to sink)

Background

This unit lays the foundation for future lessons on watersheds and water quality. This unit highlights the basic element in a watershed: water. It reminds students about the importance of water and introduces water forms and locations. The unit introduces the elements of Hydrogen and Oxygen, which may be left out at the teacher's discretion.

Advance Preparation

This is an introductory unit and can be done with little advance preparation.

Procedure

1. Introduce the topic of water. Teachers may use the cup of water or ice as a prop.
2. Ask students to describe water. What is it?
 - a. Water is a molecule made up of two elements called hydrogen and oxygen
 - i. Hydrogen and oxygen are present in the air all around us.
 - ii. What is another reason that oxygen is important?
 - iii. It may be helpful to draw the water molecule as “Mickey Mouse” – with a head of oxygen and two ears of hydrogen
 - b. Water comes in three forms:
 - i. Liquid
 - ii. Solid
 - iii. Gas
3. A paragraph of text is also provided, in case the teacher wants students to read about water out loud. Questions are provided in the text as places for pause and discussion.
4. Ask students for ways in which they personally use water.
 - a. Bathing, washing, cleaning, cooking, flushing, recreation, etc.
 - b. Drinking – Human bodies are 75% water, so water is necessary for life
5. Ask students about other ways water is important.

- a. Grow and produce food, provide energy, manufacture and transport goods, mining, used to put out fires, inside all living organisms, etc.
6. Ask students where water is located. A globe or map may be useful.
 - a. Air, atmosphere, lakes, streams, rivers, oceans, rain, oceans, inside living things, underground, in the ground (soil), frozen as ice in the ground or on the ground (ice caps on mountains), ice caps, glaciers; All around
 - i. 75% of the earth's surface is covered with water
7. Depending on time, have students apply this learning through any of the activities or homework activities.

Activities

1. Have students fill out the worksheet in class or as homework

Other interesting facts

Of freshwater in the continental USA:

- 11% used in homes
- 8% used in mining
- 39% used to produce electricity
- 42% used in agriculture

97% of the earth's water is salt water

3% is freshwater

2% of the total is trapped in glaciers, ice caps, or as snow on mountains

- Only 1% of the earth's water moves through the short-term water cycle. (Source: EPA website)

One estimate of the total volume of water on earth: 326,000,000,000,000,000,000 gallons (326 million trillion gallons) (Source: howstuffworks.com)

Objectives

The student will be able to do the following:

- Explain that water does not disappear but rather moves through the water cycle
- Explain that water is stored in various forms, including clouds, the ocean, air, streams, and lakes.
- Define precipitation, evaporation, condensation, and streamflow
- Diagram the water cycle

Materials

A cup of cold water and/or a cup of boiling water (if desired for demonstration)

Copies of the reading material for students to read aloud

Copies of homework sheets

A globe or map (if desired)

The activity sheets, cut to size and packaged for the appropriate group size

Background

This unit builds on the previous unit on water, particularly by building on the concept of the three phases of water. Students should understand that water can move between these three phases. Students should also understand that water can be found and stored in many locations, and that water moves around among these storage reservoirs.

Advance Preparation

Teachers should prepare the activity by printing and cutting out activity sheets, enough for the number of groups. Each group should receive a packet that includes blank drawing cards and a sheet with a hypothetical path for a water droplet.

If available, teachers may want to freeze or chill a cup of liquid, so as to demonstrate condensation. If available, teachers may want to microwave or boil water to demonstrate the conversion of liquid water to a gas.

Procedure

1. Ask students to think about where water is stored. If not already on the board, have students draw storage reservoirs on the board. Include at least a cloud, ocean, air, stream, lake, and the ground.
2. Ask students what happens to water. Remind students that a cloud consists of water. Present a hypothetical situation – say that in the morning there was a cloud in the air, and in the afternoon that cloud is gone. Ask whether the water in the cloud disappeared. Stress that water can't just disappear – that instead it must go somewhere. Ask them where the water went (they should identify either rain, or possibly, evaporation back to the air).

3. You may want to have students read along on the sheet as you work through the process of the water cycle.
4. Explain that as water moves around from various storage reservoirs, it changes phase or location. Work through each process in the water cycle. Pause to diagram each process on the board. Teachers may choose to leave out seepage, transpiration, and uptake.
 - a. Precipitation
 - b. Evaporation
 - c. Condensation
 - d. Seepage
 - e. Streamflow
 - f. Transpiration/Sweating
 - g. Uptake/Drinking
5. If possible, show condensation by putting out a cold cup and watching water form on it.
6. If possible, show “evaporation” by boiling water
7. Have students form groups, give each group a packet
 - a. Each student in each group should have one storage reservoir to draw
 - b. Students should put their individual drawings together to form a realistic landscape (e.g. cloud is above the land, ocean is next to land rather than under it)
 - c. In each packet, include a question about a hypothetical path of water (e.g. What happens when a water droplet moves from a cloud to the air)
 - d. Ask students to diagram the pathway of the water droplet, explaining the processes along the way. In each packet will be a number of blank arrows which they can use to diagram the pathway. Students should fill in each arrow with the appropriate words (e.g. to diagram the path from cloud to air, they should have arrows for precipitation and evaporation, at least).
 - e. Each team should be given a different hypothetical question.
 - f. When teams are finished, they should present their diagram, explaining their water droplet’s path
8. If time permits, have students begin working on worksheet in class or assign it as homework.

Activities

1. Students will diagram the water cycle by drawing and putting together various water storage reservoirs. They will then be assigned a question about the path of water, which they must then diagram. This should be done in teams.
2. Students can fill out the worksheet as homework or in class.

Water droplet cartoon from - <http://www.cartoonstock.com/lowres/thl0022l.jpg>



Water for Life!

Water is one of the most valuable things on earth. Without water, there would be no life.

What is water?

Did you know that water is actually made up of tiny molecules? Water is made up of two elements called Hydrogen and Oxygen.

Where else can you find Hydrogen and Oxygen?

You might think of these elements as gasses. Hydrogen is the lightest gas. Oxygen is important when you breathe. When Oxygen and Hydrogen combine, they form water.

What does water look like?

You might recognize water as a liquid. But water is also found as a solid and gas. Think about ice. Ice is made out of frozen water. Have you ever seen steam from a pot of boiling water? Steam is water that has become a gas.

Why is water so important?

Water is tremendously important to living things. Human bodies are made up almost all of water. So are trees and all other living things. A human body is almost 3/4 water!

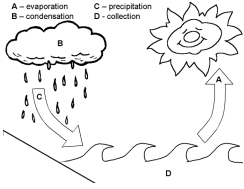
Is water important to you? How do you use water?

You use water everyday. You drink it, and you use it to wash, clean, cook, and flush. Occasionally you use water for fun – like for swimming! People also use water to grow and make food and to provide electricity. Ships travel on water. Water is used in factories making all sorts of things. Even firemen use water to put out fires.

Where can we find water?

Water is everywhere. Water is in the air and in lakes, streams, and oceans. Water is in clouds and underground. Water is also in the ground in soil. Water is frozen at the North and South Pole and in glaciers or snow on mountains. Water is inside all living things.

There is a lot of water on earth, but did you know that only a little bit of the total water on earth is freshwater? Most of the water on earth is saltwater. In fact, 3/4 of the earth's surface is covered with water, most of it in the oceans. Humans can only drink freshwater.



The Water Cycle

All of the water on earth now is the same water that has always been on earth. The amount of water on earth always stays the same. It has nowhere to go! Water does not disappear, it just moves to different places. This is called the WATER CYCLE.

Where does water go?

Water moves around from the places where it is stored. Water is stored as:
Clouds, Ocean, Air, Plants and animals, Streams and rivers, Lakes, Aquifer (under the ground), Soil (in the ground), Snow and glaciers

What happens to water?

Water goes through its three phases and through many processes as it moves around:

1. Precipitation

Precipitation is when liquid water is released from a cloud. When a cloud is full, it lets some of its water fall back to the ground as rain or snow.

2. Evaporation

Evaporation is when liquid water becomes a gas. You've seen this when a puddle dries up after a rain. When water boils, the liquid is also becoming a gas.

3. Condensation

Condensation is when water in the air (a gas) comes out of the air to form a liquid. You've seen this on the side of cold soda containers that have been left out in the heat, and the outside gets wet.

4. Seepage

Seepage is when liquid water moves through the soil or under the ground to an aquifer.

5. Streamflow

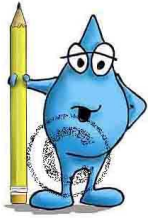
Streamflow is when liquid water flows down a stream.

6. Transpiration or Sweating.

Transpiration is when plants release some of the water that is inside the leaves to the outside as a gas. Sweating is when animals release some of the water that is inside their bodies as a liquid.

7. Uptake or Drinking

Uptake is when plant roots take liquid water out of the soil and bring it up into the plant. Drinking is when animals take liquid water into their bodies.



Name _____

Water for Life!

1. Make three drawings showing water as a solid, a liquid, and a gas.

2. Water is made up of Hydrogen and _____

3. How much of the human body is made up of water?

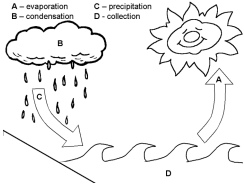
One-half ($1/2$)

Two-eighths ($2/8$)

Three-fourths ($3/4$)

4. What are some ways that water is used in school?

5. Where are some places we can find water?



The Water Cycle

1. What is it called when it rains?

Evaporation Precipitation Condensation

2. Does water ever disappear?

Yes No What happens? _____

3. What is it called when water from the ocean becomes water in the air? _____

4. What is an example of condensation?

- a) When water in the air forms a cloud
- b) When it rains
- c) When water flows in a stream to the ocean

5. Draw a simple water cycle. Include a cloud, air, ocean, stream, and land. Draw and label arrows to show precipitation, evaporation, condensation, and streamflow.

1) What happens to water when it goes from a cloud to the air?

Directions:

- Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.
- Work as a team to put each of the drawings together to form a picture of a realistic place.
- Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.
- Present your question and your diagram to the rest of the class.

2) What happens to water when it goes from a cloud to the ocean?

Directions:

- **Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.**
- **Work as a team to put each of the drawings together to form a picture of a realistic place.**
- **Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.**
- **Present your question and your diagram to the rest of the class.**

3) What happens to water when it goes from the ocean to a cloud?

Directions:

- Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.
- Work as a team to put each of the drawings together to form a picture of a realistic place.
- Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.
- Present your question and your diagram to the rest of the class.

4) What happens to water when it goes from a stream to the air?

Directions:

- **Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.**
- **Work as a team to put each of the drawings together to form a picture of a realistic place.**
- **Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.**
- **Present your question and your diagram to the rest of the class.**

5) What happens to water when it goes from the air to a stream?

Directions:

- **Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.**
- **Work as a team to put each of the drawings together to form a picture of a realistic place.**
- **Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.**
- **Present your question and your diagram to the rest of the class.**

6) What happens to water when it goes from the air to the ocean?

Directions:

- **Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.**
- **Work as a team to put each of the drawings together to form a picture of a realistic place.**
- **Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.**
- **Present your question and your diagram to the rest of the class.**

7) What happens to water when it goes from the ocean to a stream?

Directions:

- **Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.**
- **Work as a team to put each of the drawings together to form a picture of a realistic place.**
- **Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.**
- **Present your question and your diagram to the rest of the class.**

8) What happens to water when it goes from a lake to the ocean?

Directions:

- **Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.**
- **Work as a team to put each of the drawings together to form a picture of a realistic place.**
- **Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.**
- **Present your question and your diagram to the rest of the class.**

9) What happens to water when it goes from a lake to a cloud?

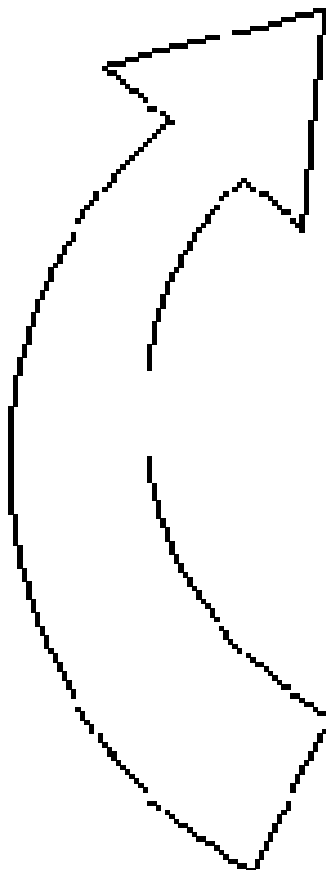
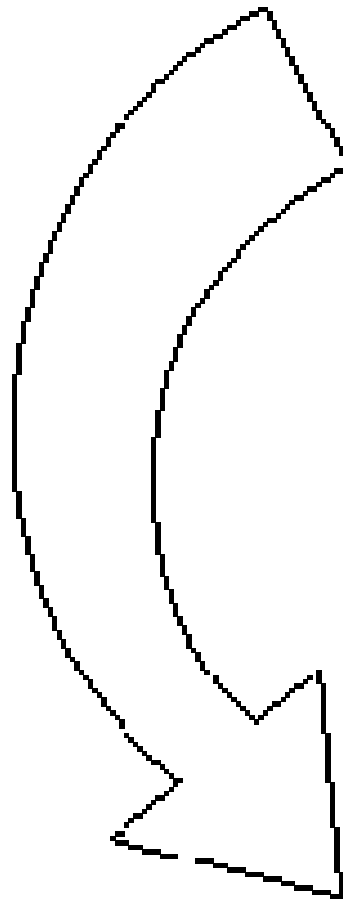
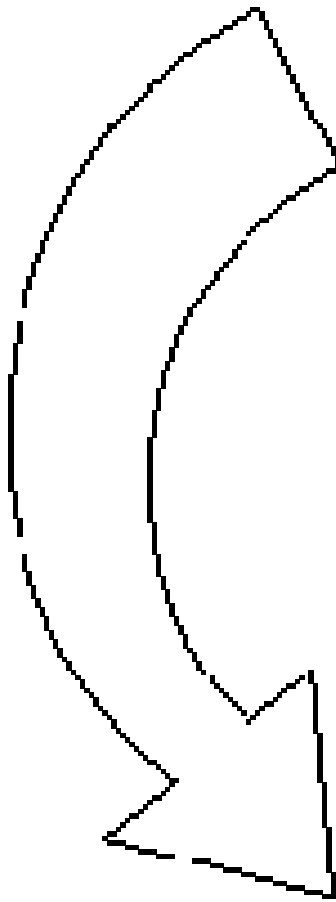
Directions:

- Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.
- Work as a team to put each of the drawings together to form a picture of a realistic place.
- Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.
- Present your question and your diagram to the rest of the class.

10) What happens to water when it goes from the ocean to a cloud?

Directions:

- Each member of the team should have one little piece of paper with a word on it. That piece of paper tells you a location of water. Make a drawing to symbolize that location of water.
- Work as a team to put each of the drawings together to form a picture of a realistic place.
- Answer the question above by making a diagram showing the path of water between the locations of water. Use the arrows to show the path of the water and write in the name of the process that occurs along the path.
- Present your question and your diagram to the rest of the class.



Cloud

Ocean

Air

Stream

Aquifer/Soil

Lake