Teacher's Guide

The Water Cycle

Editors:
Brian A. Jerome, Ph.D.
Stephanie Zak Jerome

Assistant Editor:
Anneliese Brown
Louise Marrier

Graphics:
Fred Thodal
Lyndsey Canfield
Dean Ladago
A Message from our Company . . .

Visual Learning is a Vermont-based, family-owned company specializing in the creation of science programs. As former classroom science teachers we have designed our programs to meet the needs and interests of both students and teachers. Our mission is to help educators and students meet educational goals while experiencing the thrill of science!

Viewing Clearances

The video and accompanying teacher’s guide are for instructional use only. In showing these programs, no admission charges are to be incurred. The programs are to be utilized in face-to-face classroom instructional settings, library settings, or similar instructional settings.

Duplication Rights are available, but must be negotiated with the Visual Learning Company.

Television, cable, or satellite rights are also available, but must be negotiated with the Visual Learning Company.

Closed circuit rights are available, and are defined as the use of the program beyond a single classroom but within a single campus. Institutions wishing to utilize the program in multiple campuses must purchase the multiple campus version of the program, available at a slightly higher fee.

Video streaming rights are available and must be negotiated with the Visual Learning Company.

Discounts may be granted to institutions interested in purchasing programs in large quantities. These discounts may be negotiated with the Visual Learning Company.

Use and Copyright:

The purchase of this video program entitles the user the right to reproduce or duplicate, in whole or in part, this teacher’s guide and the black line master handouts for the purpose of teaching in conjunction with this video, The Water Cycle. The right is restricted only for use with this video program. Any reproduction or duplication, in whole or in part, of this guide and student masters for any purpose other than for use with this video program is prohibited.

The video and this teacher’s guide are the exclusive property of the copyright holder. Copying, transmitting, or reproducing in any form, or by any means, without prior written permission from the copyright holder is prohibited (Title 17, U.S. Code Sections 501 and 506).

Copyright © 2007

ISBN 978-1-59234-190-0
Table of Contents

A Message from our Company  2
Viewing Clearances  2
Use and Copyright  2
National Standards Correlations  4
Student Learning Objectives  5
Assessment  6
Introducing the Program  7
Program Viewing Suggestions  7
Video Script  8
Answer Key to Student Assessments  12
Answer Key to Student Activities  13
Pre-Test  14
Post-Test  16
Video Review  18
Vocabulary  19
Writing Activity  20
The Life of a Water Droplet  21
Classroom Water Cycle  22
Save Earth’s Water!  24
Let It Rain  25
National Standards Correlations

Benchmarks for Science Literacy
(Project 2061 – AAAS) Grades 3–5

The Physical Setting - The Earth (4B)
By the end of the fifth grade, students should know that:

• When liquid water disappears, it turns into a gas (vapor) in the air and can reappear as a liquid when cooled, or as a solid if cooled below the freezing point of water. Clouds and fog are made of tiny droplets of water.

• The cycling of water in and out of the atmosphere plays an important role in determining climatic patterns. Water evaporates from the surface of the earth, rises and cools, condenses into rain or snow, and falls again to the surface. The water falling on land collects in rivers and lakes, soil, and porous layers of rock, and much of it flows back into the ocean.

National Science Education Standards
(Content Standards: K–4, National Academy of Sciences)

Physical Science - Content Standard B
As a result of their activities in grades K-4, all students should develop an understanding of:

Properties of Objects and Materials
• Materials can exist in different states - solid, liquid, and gas. Some common materials, such as water, can be changed from one state to another by heating or cooling.

Earth and Space Science - Content Standard D
As a result of their activities in grades 5-8, all students should develop an understanding of:

Structure of the Earth System
• Water, which covers the majority of the Earth’s surface, circulates through the crust, oceans, and atmosphere in what is known as the “water cycle.” Water evaporates from the Earth’s surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.
Student Learning Objectives

Upon viewing the video and completing the enclosed student activities, students will be able to do the following:

• Define the water cycle as the continual movement of water between earth and the air.

• Explain that the water cycle consists of three processes: evaporation, condensation, and precipitation.

• Identify transpiration as the process by which plants give off large amounts of water.

• Explain that water exists in three different forms - solid, liquid, and gas - and the process by which water changes from one form to another is referred to as a phase change.

• Define evaporation as the process by which liquid water becomes a gas, or water vapor.

• Explain that clouds are formed when warm, moisture-rich air cools, condensing into millions of tiny droplets.

• Understand that precipitation occurs when water droplets, ice, or snow become too numerous and heavy, causing them to fall from clouds to the earth.

• Define condensation as the process by which water vapor changes from a gas to a liquid.

• Understand the role that humans, plants, and animals play in the water cycle.

• Explain that while some regions of the world receive more precipitation than others, the total amount of evaporation and precipitation is balanced worldwide.

• Given a diagram of the water cycle, label the processes of evaporation, condensation, and precipitation.

• Provide examples of the water cycle at work around their home, school, and community.
Assessment

Preliminary Test (p. 14–15):

The Preliminary Test is an assessment tool designed to gain an understanding of students’ preexisting knowledge. It can also be used as a benchmark upon which to assess student progress based on the objectives stated on the previous pages.

Post-Test (p. 16–17):

The Post-Test can be utilized as an assessment tool following student completion of the program and student activities. The results of the Post-Test can be compared against the results of the Preliminary Test to assess student progress.

Video Review (p. 18):

The Video Review can be used as an assessment tool or as a student activity. There are two sections. The first part contains questions displayed during the program. The second part consists of a five-question video quiz to be answered at the end of the video.
Introducing the Program

Before showing the video program, ask students to discuss the many ways they use water everyday. Record their responses on the board. Next, ask them how animals and plants use water. Explain to students that water exists in three forms - solid, liquid, and gas. Referring to the list of water uses on the board, have students identify whether each item listed is an example of a solid, liquid, or gas. Encourage the students to continue to brainstorm until there are at least two examples of each form of water.

Next, ask students where water comes from. Explain that water changes from one form to another as part of the water cycle. Tell students that the total amount of water on Earth remains constant and is merely changing forms. Next, ask students if they know how water changes from one form to another. For example, where does rain come from? What happens to rain once it reaches the earth? How do clouds form? Tell students to pay close attention to the video to learn more about the water cycle.

Program Viewing Suggestions

The student master “Video Review” is provided (p. 18) for distribution to students. You may choose to have your students complete this Master while viewing the program or do so upon its conclusion.

The program is approximately 14 minutes in length and includes a five-question video quiz. Answers are not provided to the Video Quiz in the video, but are included in this guide on page 12. You may choose to grade student quizzes as an assessment tool or to review the answers in class.

The video is content-rich with numerous vocabulary words. For this reason you may want to periodically stop the video to review and discuss new terminology and concepts.
Video Script

1. Have you ever jumped into a lake on a hot summer afternoon?
2. Or maybe you have gulped down a glass of ice water when you were thirsty.
3. This morning, perhaps you took a shower before coming to school.
4. And, you probably wet your toothbrush before brushing your teeth.
5. If you have done any of these things, you’ve used water.
6. Water is vital to the survival of living things.
7. We need to drink water to live.
8. And, most everything we eat depends on water.
9. In fact, about 60% of our body is made up of water.
10. Where does water come from?
11. What forms does it take, and how does it change form?
12. During the next few minutes we are going to explore these questions and others…
13. …as we discuss the water cycle.
14. Graphic Transition - The Many Uses of Water
15. It is hard to imagine a world without water.
16. There wouldn’t be any oceans,…
17. …no rain, no snow,…
18. …and no clouds.
19. And, there wouldn’t be any lakes, rivers, or streams.
20. In fact, life as we know it wouldn’t exist without water.
21. We use water to wash, cook, drink, and even to flush the toilet!
22. Beyond using water in our homes, water is used in industries to make products.
23. It is used in agriculture to wash animals and to provide them with drinking water.
24. You Observe!
   How is water being used in this field?
25. In this case, water is being used to irrigate crops.
26. Water also plays a key role in keeping cities and neighborhoods clean.
27. And think of all the recreational opportunities that water provides, like swimming,
   boating, fishing, and skating.
28. So as you can see, water is a very important substance that we really couldn’t live
   without.
29. Graphic Transition - A Drop of Water
30. This single drop of water might be thousands of years old.
31. It may have been pumped from deep underground where it has been trapped for the past
   five thousand years.
32. Before that it may have once been a drop in an ancient sea.
33. Later it may have existed as an ice crystal in a glacier...
34. …or been part of a cloud high in the sky!
35. How does water change from one form to another?
Video Script

36. The answer lies in something called the water cycle.
37. The water cycle is the continual movement of water from sources of liquid water,…
38. … to the air,…
39. … and then back to earth.
40. The water cycle is going on constantly all around us even though we may not realize it.
41. There are three very important processes at work in the water cycle: evaporation, condensation, and precipitation.
42. Let’s take a closer look at the water cycle and see just how water changes from one form to another.

43. Graphic Transition - Evaporation
44. You Predict!
   What would happen if we left this glass of water on this windowsill for ten days?
45. As you can see, over time the water gradually disappeared.
46. Where did the water go? It went into the air, changing from a liquid to a gas. This is an example of a phase change.
47. Water can exist in three different phases: a solid, a liquid, or a gas.
48. A phase change involves matter changing from one phase to another.
49. Ice melting into liquid water is an example of a phase change.
50. In the case of the glass of water left on the window sill, liquid water changed into a gas, referred to as water vapor, via a process called evaporation.
51. Evaporation is occurring all the time off the surface of lakes, streams, oceans, rivers,…
52. … swimming pools, and mud puddles.
53. Evaporation even occurs off the surface of your skin when you sweat or come out of the water after swimming.
54. Evaporation from bodies of water is one of the main ways water vapor gets into the air.
55. Plants also give off large amounts of water vapor in a process called transpiration.
56. A single large tree, for example, can consume about 1800 liters of water a day, and a large amount of this is emitted into the air as water vapor.
57. Animals also emit water vapor when they breathe out.
58. The boiling of water is another way water vapor enters the air.
59. This occurs in our homes when we cook…
60. …and also in nature in areas of geothermal activity.
61. So, as you can see, there are many ways water vapor enters the air.

62. Graphic Transition - Condensation
63. Perhaps you’ve grabbed a cold can of soda and noticed moisture on the surface of the can.
64. You Decide!
   Where did the moisture come from?
65. That’s right. The moisture came from water vapor in the surrounding air.
Video Script

66. As water vapor cools, water molecules slow down. In this process, called condensation, water vapor changes phase from a gas to a liquid.
67. Condensation is the process by which clouds form in the sky!
68. As warm moisture-rich air containing water vapor rises, it cools.
69. When air cools it condenses into millions of tiny water droplets which make up clouds.
70. In some cases, when the temperature in the atmosphere is cold enough, ice crystals form to make up clouds.

71. Graphic Transition - Precipitation
72. You have probably taken a walk in the rain,…
73. … or, if you live in a northern climate, you’ve most likely experienced a snowstorm.
74. Rain and snow are examples of precipitation.
75. In the process of precipitation, water is returned to earth in the form of rain, snow,…
76. … sleet, or hail.
77. Precipitation occurs when water droplets or frozen water in the form of ice or snow become too numerous and heavy in a cloud and they fall to earth.
78. Precipitation is very important because it is the process by which water is returned to earth.
79. As you probably already know, not all places on Earth receive the same amount or type of precipitation.
80. Deserts, for example, receive much less precipitation than other places, such as forests in eastern North America
81. But, worldwide, the total amount of evaporation and precipitation are balanced.

82. Graphic Transition - The Water Cycle
83. We’ve just discussed the three main processes in the water cycle: evaporation, condensation, and precipitation.
84. Let’s see how these work together to create a cycle around this forested lake.
85. Water evaporates off the surface of the lake when liquid water changes to water vapor.
86. The plants and animals surrounding the lake also give off water vapor.
87. As air containing water vapor rises, it cools. Water vapor condenses into tiny liquid water droplets or tiny ice crystals.
88. When enough of these gather, clouds form.

89. You Predict!
What will happen when the water droplets or ice crystals become heavy and numerous?
90. The water droplets or frozen water eventually fall to earth in the form of precipitation.
91. Some precipitation falls directly into lakes or other bodies of water,…
92. …or it falls onto the land. Snow, for example, may accumulate on the forest floor where it stays until it melts in the spring.
93. Rainwater, on the other hand, is absorbed by forest soils…
94. … or it flows over the surface as runoff.
95. Water runoff in streams is carried into the lake. Eventually a river carries water from the lake to the ocean.
96. Notice when arrows are placed on this diagram the different stages form a circle. This graphic illustrates the water cycle.

97. Graphic Transition - Summing Up
98. During the past few minutes we have discussed some of the important ways we use water.
99. We saw that the water cycle involves the continual movement of water from sources of liquid water, to the air, and back to earth.
100. The specific parts of the water cycle were explored, including evaporation, condensation, and precipitation.
101. So the next time you take a drink of water,…
102. …go swimming,…
103. …or take a walk in a snowstorm,
104. …think about some of the things we just discussed.
105. You just might think about the water cycle a little differently.

106. Graphic Transition - Video Assessment
107. Fill in the correct word to complete the sentence. Good luck and let’s get started!

1. The water ______ is the continual movement of water between earth and the air.
2. ________ involves liquid water changing into water vapor.
3. Plants give of large amounts of water ______.
4. Clouds form via the process of ____________.
5. Rain and snow are examples of ____________.

Answers can be found on page 12.
Answer Key to Student Assessments

Pre-Test (p. 14-15)
1. b - water cycle
2. c - condensation
3. d - transpiration
4. a - water vapor
5. c - three
6. a - evaporation
7. d - irrigate
8. c - clouds
9. b - phase change
10. a - precipitation
11. True
12. False
13. True
14. False
15. False
16. Water vapor is created when animals breath out, plants transpire, liquid water evaporates, and via geothermal activity.
17. This is called evaporation - the process by which liquid water changes into gas (water vapor).
18. Water exists as a gas, liquid, and solid.
19. When warm, moisture-rich air rises, the water vapor within it cools and condenses into millions of tiny water droplets.
20. Precipitation is the process by which water returns to the earth. It can occur in the following forms: snow, sleet, rain, and hail.

Post-Test (p. 16-17)
1. a - evaporation
2. b - phase change
3. c - three
4. b - water cycle
5. d - transpiration
6. c - condensation
7. a - precipitation
8. a - water vapor
9. c - clouds
10. d - irrigate
11. False
12. True
13. False
14. True
15. False
16. When warm, moisture-rich air rises, the water vapor within it cools and condenses into millions of tiny water droplets.
17. Water exists as a gas, liquid, and solid.
18. Water vapor is created when animals breath out, plants transpire, liquid water evaporates, and via geothermal activity.
19. Precipitation is the process by which water returns to the earth. It can occur in the following forms: snow, sleet, rain, and hail.
20. This is called evaporation - the process by which liquid water changes into gas (water vapor).

Video Review (p. 18)
1. Water is being used to irrigate the fields.
2. The water gradually disappeared.
3. The moisture came from water vapor in the surrounding air.
4. The water droplets or ice crystals eventually fall to the earth in the form of precipitation.
   1. The water cycle is the continual movement of water between earth and the air.
   2. Evaporation involves liquid water changing into water vapor.
   3. Plants give off large amounts of water vapor.
   4. Clouds form via the process of condensation.
   5. Rain and snow are examples of precipitation.

Vocabulary (p. 19)
1. water cycle
2. phase change
3. clouds
4. evaporation
5. gas
6. transpiration
7. sleet
8. condensation
9. vapor
10. precipitation
Answer Key to Student Activities

**Writing Activity (p. 20)**
The *water cycle* is the continual movement of water between earth and the *air*. On a lake surrounded by trees, lake water turns into water vapor through the process of *evaporation*. The plants and animals that live around the lake also give off *water vapor*. As the water vapor rises, it cools and *condenses* into tiny drops of liquid water or ice crystals. When enough of these gather, a *cloud* forms. When the water droplets and/or ice crystals become too heavy, they fall to the earth via the process of *precipitation*. Precipitation may fall in the form of rain, sleet, *snow*, or hail. Some precipitation falls directly into the lake or other bodies of water, while other precipitation falls onto the land. Rain can be absorbed by the soil or run over the earth as surface runoff. Water runoff flows into lakes, streams, and rivers, and eventually to the *ocean*.

**In Your Own Words (p. 20)**
1. Precipitation occurs when water droplets or frozen water in the form of ice or snow become too numerous and heavy in a cloud and eventually fall to the earth.
2. The three main processes are evaporation, condensation, and precipitation. Evaporation is the process by which liquid water turns to gas, or water vapor. Condensation is the process through which water vapor changes from a gas to liquid water. Precipitation is the process by which water is returned to the earth in the form of rain, sleet, snow, or hail.
3. A phase change is when water changes from one form to another. The three phases of water are liquid, gas, and solid.

**Classroom Water Cycle (p. 23)**
1. The glass plate became foggy and water began dripping off. The plate is similar to a cloud.
2. Most of the water condenses on the glass plate and returns to the beaker. However, there will be slightly less water because some vapor will have escaped.
3. Evaporation, precipitation, and condensation.
4. Heating the water to the boiling point caused it to evaporate quickly.
5. The fog and water droplets on the glass plate are evidence of condensation.
6. Drawings should include an arrow indicating water moving from the beaker to the glass plate as evaporation, an arrow indicating condensation occurring on the glass plate, and an arrow indicating water falling back into the beaker as precipitation.

**Save Earth’s Water! (p. 24)**
1. Humans need water to survive. Because of the increase in population, there is a higher demand for water and Earth cannot replenish the water supply fast enough.
2. Only 3% of Earth’s water supply is safe for humans to drink, and 75% of that is frozen in ice caps.
3-5. Answers will vary.
6. Turning the faucet off while brushing your teeth can save 4 to 10 gallons of water each day.
7. On average, dishwashers use 15 gallons of water per load.

**Let It Rain (p. 25)**
1. The water in the jar evaporates.
2. Condensation occurs on the bottom of the cold plate.
3. Evaporation occurs when the warm liquid water changes to water vapor.
4. Condensation occurs when the water vapor cools on the cold plate and changes to liquid water.
5. Cold tap water would evaporate more slowly.
Circle the best answer for each of the following questions.

1. The continual movement of water between earth and the air is called (the):
   a. nitrogen cycle   b. water cycle   c. carbon cycle   d. atmospheric degradation

2. Clouds form through the process of:
   a. precipitation   b. sublimation   c. condensation   d. thawing

3. The process by which plants give off water is called:
   a. osmosis   b. growth   c. pollination   d. transpiration

4. What do animals produce when they breathe out?
   a. water vapor   b. ice   c. liquid water   d. oxygen

5. In how many forms does water exist on Earth?
   a. two   b. ten   c. three   d. five

6. The process of water changing from liquid into gas is called:
   a. evaporation   b. sublimation   c. precipitation   d. condensation

7. Farmers use water to _________ their crops.
   a. fertilize   b. irritate   c. harvest   d. irrigate

8. What structures are formed when warm air rises and the water vapor within it condenses?
   a. icicles   b. stalactites   c. clouds   d. tornados

9. Ice melting into liquid water is an example of this process:
   a. freezing   b. phase change   c. condensation   d. precipitation

10. Rain and snow are examples of this process:
    a. precipitation   b. sublimation   c. evaporation   d. condensation
Pre-Test

Write true or false next to each statement.

11. ________________ Approximately 60% of the human body is made up of water.

12. ________________ The water cycle only occurs at certain times during the year.

13. ________________ A great deal of water vapor evaporates from the oceans.

14. ________________ Snow and rain are forms of condensation.

15. ________________ Clouds form via the process of sublimation.

Write a short answer for each of the following.

16. Describe three ways water vapor can be created.

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

17. Name and define the process that occurs when the water in a mud puddle disappears.

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

18. List the three forms, or phases, in which water exists.

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

19. How is a cloud formed?

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________

20. Define precipitation and list the forms that it can take.

__________________________________________________________________________________

__________________________________________________________________________________

__________________________________________________________________________________
Circle the best answer for each of the following questions.

1. The process of water changing from liquid into gas is called:
   a. evaporation  
   b. sublimation  
   c. precipitation  
   d. condensation

2. Ice melting into liquid water is an example of this process:
   a. freezing  
   b. phase change  
   c. condensation  
   d. precipitation

3. In how many forms does water exist on Earth?
   a. two  
   b. ten  
   c. three  
   d. five

4. The continual movement of water between earth and the air is called (the):
   a. nitrogen cycle  
   b. water cycle  
   c. carbon cycle  
   d. atmospheric degradation

5. The process by which plants give off water is called:
   a. osmosis  
   b. growth  
   c. pollination  
   d. transpiration

6. Clouds form through the process of:
   a. precipitation  
   b. sublimation  
   c. condensation  
   d. thawing

7. Rain and snow are examples of this process:
   a. precipitation  
   b. sublimation  
   c. evaporation  
   d. condensation

8. What do animals produce when they breathe out?
   a. water vapor  
   b. ice  
   c. liquid water  
   d. oxygen

9. What structures are formed when warm air rises and the water vapor within it condenses?
   a. icicles  
   b. stalactites  
   c. clouds  
   d. tornados

10. Farmers use water to _________ their crops.
    a. fertilize  
    b. irritate  
    c. harvest  
    d. irrigate
Write true or false next to each statement.

11. ___________________ Snow and rain are forms of condensation.
12. ___________________ Approximately 60% of the human body is made up of water.
13. ___________________ Clouds form via the process of sublimation.
14. ___________________ A great deal of water vapor evaporates from the oceans.
15. ___________________ The water cycle only occurs at certain times during the year.

Write a short answer for each of the following.

16. How is a cloud formed?

__________________________________________________________________________

17. List the three forms, or phases, in which water exists.

__________________________________________________________________________

18. Describe three ways water vapor can be created.

__________________________________________________________________________

19. Define precipitation and list the forms that it can take.

__________________________________________________________________________

20. Name and define the process that occurs when the water in a mud puddle disappears.

__________________________________________________________________________
While you watch the video, answer these questions:

1. **You Observe!** How is water being used in this field?
   ____________________________________________________________

2. **You Predict!** What would happen if we left this glass of water on this windowsill for ten days?
   ____________________________________________________________

3. **You Decide!** Where did the moisture come from?
   ____________________________________________________________

4. **You Predict!** What will happen when the water droplets or ice crystals become too heavy and numerous?
   ____________________________________________________________

After you watch the video, test your knowledge with these questions.

1. The water ________ is the continual movement of water between earth and the air.

2. ________ involves liquid water changing into water vapor.

3. Plants give off large amounts of water ________.

4. Clouds form via the process of ________.

5. Rain and snow are examples of ________.
Use these words to fill in the blanks next to the sentences below.

<table>
<thead>
<tr>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>gas</td>
</tr>
<tr>
<td>water cycle</td>
</tr>
<tr>
<td>phase change</td>
</tr>
<tr>
<td>condensation</td>
</tr>
<tr>
<td>vapor</td>
</tr>
<tr>
<td>precipitation</td>
</tr>
<tr>
<td>sleet</td>
</tr>
<tr>
<td>clouds</td>
</tr>
</tbody>
</table>

1. ____________ The continual movement of water between earth and air.
2. ____________ When water changes from one phase to another.
3. ____________ Structures formed when air cools and condenses into millions of tiny water droplets or ice crystals.
4. ____________ The process by which water changes from liquid to a gas.
5. ____________ One form water can take, also referred to as water vapor.
6. ____________ Plants give off large amounts of water vapor through this process.
7. ____________ A type of precipitation.
8. ____________ The process by which water vapor changes from a gas to a liquid.
9. ____________ Another name for water in the form of a gas. It can be produced by plants, animals, and people.
10. ____________ The process by which water returns to earth. This can occur in the form of rain, snow, sleet, or hail.
Use the correct word from above to complete the sentences in the following paragraph.

The _____________ is the continual movement of water between earth and the _____________ . On a lake surrounded by trees, lake water turns into water vapor through the process of _____________ . The plants and animals that live around the lake also give off _____________ . As the water vapor rises, it cools and _____________ into tiny drops of liquid water or ice crystals. When enough of these gather, a _____________ forms. When the water droplets and/or ice crystals become too heavy, they fall to the earth via the process of _____________. Precipitation may fall in the form of rain, sleet, _____________ , or hail. Some precipitation falls directly into the lake or other bodies of water, while other precipitation falls onto the land. Rain can be absorbed by the soil or run over the earth as surface runoff. Water runoff flows into lakes, streams, and rivers, and eventually to the _____________.

In Your Own Words

1. What causes precipitation?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2. List and define the three main processes in the water cycle.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

3. Define a phase change and list the three phases in which water exists.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
The Life of a Water Droplet

Have you ever thought what it must be like to be a water droplet, constantly moving and changing forms? This is your chance! Write a story about a water droplet as it travels through the water cycle. The only rules are to: 1) include the three primary processes of the water cycle (evaporation, precipitation, and condensation), 2) make sure the droplet completes the water cycle and finds its way back to the ocean, and 3) be creative. To help you begin writing, refer to the diagram below and consider the following questions:

• Does the water droplet have a name?
• In what body of water will the droplet begin its journey?
• Does the droplet have a favorite process in the water cycle? For example, does it like to travel into the air by evaporation, or fall back to the earth via precipitation? Why does the droplet prefer this process?
• What is the droplet’s least favorite process. Why?
• In what form of precipitation will the droplet fall back to the earth?
• Where will the droplet land?
• How will the droplet make its way back to the ocean?
Background: The water cycle is happening all around us. Consider how the water cycle occurs at a lake surrounded by trees. Lake water becomes water vapor through the process of evaporation. Water vapor changes back to liquid water through the process of condensation. This condensed water creates clouds, where the water is stored until it returns to the earth via precipitation in the form of rain, snow, sleet, or hail. Did you know that you this process can be re-created using a few simple objects found in your home or classroom? Let’s see how!

Materials:
• Hot plate
• Safety goggles
• Glass beaker (a pot can also be used)
• Glass plate (or mirror or lid to pot)
• Water
• Tongs

Activity:
Due to safety reasons, the teacher should demonstrate this activity for the class.
1. Place the glass beaker on the burner and add water. Be sure to measure and record the amount of water before you begin.
2. Bring the water to a boil.
3. When the water starts boiling, use the tongs to hold the glass plate a few inches (about 8 cm) over the water. Tilt the plate slightly.
4. Observe what is happening to the plate, the air above the boiling water, and the water in the pan or glass beaker.
5. Continue holding the plate until water begins to drip off of it.
6. Turn off the hot plate and allow the beaker to cool before moving it. Once the water has cooled, measure it.
7. Answer the questions on the following page.
Questions:
1. Describe what you observed on the glass plate. To what structure in the atmosphere is this similar?

2. What happened to the water in the beaker or pan? Was there more, less, or the same amount at the end of the experiment?

3. What processes of the water cycle did you observe in this experiment?

4. What caused the water to evaporate so quickly?

5. Explain where you observed condensation occurring.

6. Draw a picture of the experiment, using arrows to show the direction of the water. Label the processes of condensation, evaporation, and precipitation.
Save Earth’s Water!

Directions: Read the information below. Answer the questions that follow on a separate piece of paper.

Water is everywhere! Over 70% of the Earth’s surface is covered by water. However, much of that water is salt water, which we cannot use. In fact, only 3% of the Earth’s water is safe to drink, and three quarters (75%) of that 3% is frozen in ice caps near the North and South Pole. So while it may seem like there is an abundant supply of water for humans to use, there actually is not that much when you think about how many people live on Earth. You have learned that Earth’s water is being constantly recycled. So why do we need to conserve, or not waste, water? The answer has to do with the fact that Earth’s population is growing very quickly and the Earth can’t replenish the water fast enough to keep up. The average American uses between 40 to 130 gallons at home everyday! To conserve Earth’s water supply, you and your family can do the following:

- Take quick showers (staying in the shower for under five minutes can save 1,000 gallons per month).
- Fix leaking faucets - even a dripping faucet can waste a lot of water.
- Only flush the toilet when necessary. Throw trash (tissues, hair, etc.) in the garbage instead of the toilet. Every flush uses 3-6 gallons of water.
- Turn the water off when you are brushing your teeth.
- Only run the dishwasher and washing machine when they are full.
- Only water the lawn or garden when necessary. Avoid watering in the middle of the day or when it is windy. Heat and wind cause water to evaporate more quickly.
- If you want a cold drink of water, don’t let the faucet run until the water gets cold. Keep a container of water in the refrigerator to drink.
- Sweep your driveway or sidewalk instead of hosing it off.
- When waiting for tap water to get hot, place a watering can under the faucet to water your plants.

Questions:
1. Why is it important to conserve water?
2. How much of Earth’s water is readily available for humans to drink?
3. How does your family conserve water?
4. List one way you can conserve water at home.
5. Write down your own water conservation tip.
6. How many gallons per day do you think you can save by turning off the water when you brush your teeth?
7. How many gallons of water do you think the dishwasher uses each time it is run?
Let It Rain

Background: Different parts of the world receive different amounts of rain. For example, Ketchikan, a town in Southeast Alaska, receives an average of 160 inches (406.4 cm) of rain each year. However, Tucson, Arizona receives an average of only 12.7 inches (32.3 cm) of rain per year. Depending on where you live, it might rain for weeks at a time or it might rain very little. Do you know what causes rain? Rain occurs when water droplets, contained in clouds, become too heavy and numerous and eventually fall to the ground. Rain is one type of precipitation - the process through which liquid water returns to the earth. Did you know that you could make it rain in your classroom? Read below to learn how.

Materials:
• Hot water
• Ice cubes
• Large glass jar
• Plate

Activity:
1. Pour 1/2 cup of hot tap water into the jar. Be careful not to burn yourself!
2. Cover the jar with the plate and allow to stand for 5 minutes.
3. Place the ice cubes on the plate and observe what happens.
4. Answer the questions below.

Questions:
1. What happens to the water in the jar?

2. Where does condensation occur?

3. Describe how evaporation occurs.

4. How does condensation occur in this experiment?

5. What do you think would happen if you used cold tap water? Try it!