

3.F.1 The Water Cycle: Part 1

Students will learn to demonstrate the various phases of the water cycle

Grade Level	3
Sessions	(1): 1 at 40-50 minutes
Seasonality	None
Instructional Mode(s)	Whole Class
Team Size	N/A
WPS Benchmarks	03.SC.TE.04, 03.SC.PS.05, 03.SC.PS.06
MA Frameworks	3-5.TE.2.2, 3-5.PS.0.3
Key Words	Condensation, Evaporation, Gas, Liquid, Precipitation, Solid, Water Cycle

Summary

This lesson reinforces basic concepts learned about the water cycle. Children will revisit the various phases of water (ice, water, water vapor) and will recall facts that they have learned about the characteristics of solids, liquids, and gases. After confirming that students have a solid understanding of evaporation, condensation, and precipitation, the instructor will create a simple working model of the Water Cycle.

Learning Objectives

2002 Worcester Public Schools (WPS) Benchmarks for Grade 3

1. 03.SC.TE.04 Describe different ways in which a problem can be represented, e.g., sketches, diagrams, graphic organizers, and lists.
2. 03.SC.PS.05 Describe how water can be changed from one state to another by adding or taking away heat.
3. 03.SC.PS.06 Do simple investigations with evaporation, condensation, freezing and melting. Confirm that water expands upon freezing.

2001 Massachusetts Frameworks for Grade 3

1. 3-5.TE.2.2 Describe different ways in which a problem can be represented, e.g., sketches, diagrams, graphic organizers, and lists.
2. 3-5.PS.3 Describe how water can be changed from one state to another by adding or taking away heat.

Additional Learning Objectives

1. Students will correctly use the terms evaporation, precipitation, and condensation.

Required Background Knowledge

1. A good understanding of solids, liquids and gases.
2. A good understanding of how evaporation, condensation, and precipitation relate to the water cycle.

Essential Questions

1. What is a phase?
2. What is evaporation?
3. What is condensation?
4. What is precipitation?
5. What are the three phases of water present in the water cycle?
6. What are the four stages of the water cycle?
7. What happens when heat is added to water?
8. What happens when heat is taken away from water?

Introduction / Motivation

The instructor might begin the lesson by reviewing a visible chart or diagram of the water cycle. (S)he might then lead the class in a discussion about specific examples of solids, liquids, and gases and list these examples in a visible location.

Procedure

The instructor will:

1. Write the four stages of the water cycle on the board (see Appendix A: Instructor's Notes).
2. Review *condensation*, *evaporation*, and *precipitation* (see Vocabulary with Definitions).
3. Construct a model of the water cycle (see Materials List).
 - Fill the plastic container with several cups of warm water and add a few drops of blue food coloring.
 - Cover the plastic container with plastic wrap and tape it firmly in place.
 - Place a frozen icepack on top of the plastic wrap.
 - Let the cycle sit for about ten minutes until the water cycle begins.
4. While waiting for the water cycle to begin, lead students through questions 1 through 8 on the attached worksheet.

5. Allow students to observe the water cycle.
 - Explain the three phases of water (gas, liquid, and solid).
 - Show where condensation, evaporation, and precipitation are occurring.
6. Explain the three phases of water to the students: the icepack is a solid; the rain (condensation below icepack) is a liquid; and the water vapor (invisible, but eventually condenses into liquid droplets) is a gas.
7. Lead students through questions 9 through 15 on the attached worksheet.

Materials List

Materials per class	Amount	Location
Clear Plastic Container	One	Home
Blue Food Coloring	Several drops	Home, grocery store
Plastic Wrap	One piece	Classroom, grocery store
Tape	One roll	Classroom, drugstore
Warm Water	Two – Three cups	Tap, coffeemaker, microwave oven
Icepack	One	Home, grocery store

Materials per student	Amount	Location
<u>The Water Cycle</u> Worksheet	One	End of lesson plan – print or photocopy

Vocabulary with Definitions

1. *Condensation* – the process by which a gas changes into a liquid, usually by cooling.
2. *Evaporation* – the process by which a solid (ex. ice) or liquid (ex. water) changes into a gaseous phase (ex. water vapor), usually by taking in heat.
3. *Gas* – a substance that has neither independent shape nor volume but tends to expand indefinitely.
4. *List* – a group of words, organized by category.
5. *Liquid* – a fluid without an independent shape but with a definite volume (unlike a gas).
6. *Precipitation* – any form of water that falls to the Earth’s surface from clouds; examples include: rain, snow, sleet, and hail.
7. *Solid* – a substance that has a definite shape and volume.
8. *Water Cycle* – the repetition of evaporation and condensation that distributes Earth’s water throughout the planet.

Assessment / Evaluation of Students

The instructor may assess the students in any/all of the following manners:

1. Collect student worksheets and determine whether the students understand:
 - a. The water cycle
 - b. The various phases of water (gas, liquid, solid)
 - c. The differences among solids, liquids and gases
 - d. The terms *precipitation*, *condensation*, and *evaporation*.

Lesson Extensions

1. Teach lesson 3.F.2 Water Cycle 2.

Attachments

1. Appendix A: Instructor's Notes
2. The Water Cycle

Troubleshooting Tips

1. Explain to students that in nature, the sun warms the water in oceans, lakes and streams. The sun provides the *energy* that water needs to change phase from liquid (water) to gas (water vapor). In the classroom, the Water Cycle demonstration uses warm water because it evaporates rather quickly. In nature, both warm and cool water evaporate, but warm water evaporates faster.

Safety Issues

1. None

Additional Resources

1. Brummett, D.C, Lind, K.K, Barman, C.R., DiSpezio, M.A., and Ostlund, K.L. Destinations in Science. Addison-Wesley; Reading, MA. 1995.

Appendix A: Instructor's Notes

The following information is from the Addison-Wesley textbook, Destinations in Science, pages D16, D17, D22, and D23.

The Water Cycle:

- “Energy from the sun heats water in the oceans, lakes, rivers and streams. The water evaporates and becomes water vapor that moves into the air.”
- “Water vapor rises high into the air. High above the earth’s surface, the air cools. Water vapor condenses into tiny water droplets to form clouds.”
- “Billions of tiny drops come together to form larger drops of water. When the drops become too heavy, they fall to the earth’s surface as rain, snow or hail.”
- “At the surface, some water falls into rivers, lakes and oceans. Some soaks into the ground. Rivers and ground water flow downhill into oceans or lakes.”

The Water Cycle

Name: _____

Date: _____

Directions: Answer the questions below. Think about words that you have learned, such as: water vapor, water, ice, condensation, evaporation, and precipitation.

Visualize how your bathroom looks after you take a hot bath or shower.

1. How does the air feel? _____

2. How does the mirror look? _____

Imagine that you are outside on a hot summer day. You are drinking a cold glass of

lemonade with ice cubes.

3. What happens to the *outside* of the glass of lemonade? _____

Imagine that a pot of water is **heated** on a stove.

4. What is the **state** or **phase** of the water in the pot? _____

5. What is the **state** or **phase** of the water leaving the pot? _____

6. What is the special word for the process of water leaving the pot? _____

Imagine that it is December and water, in the form of snow, falls from the sky.

7. What is the special word for when water, **in any form**, falls from the sky? *Hint: the*

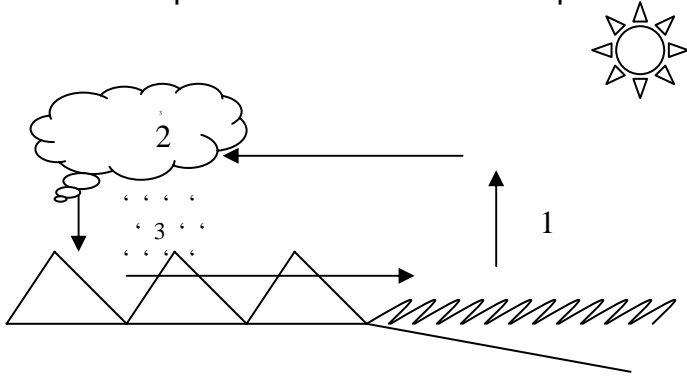
answer is not "snow"! _____

8. What is the **state** or **phase** of the snow? _____

In the boxes below, draw pictures that illustrate the different **states** or **phases** of water. The last one is very tricky!

Solid Water	Liquid Water	Water Vapor

Look at the picture below and answer questions 9, 10 and 11.



9. At which number in the diagram does condensation occur? _____

10. At which number in the diagram does evaporation occur? _____

11. At which number in the diagram does precipitation occur? _____

Think about the water cycle demonstration that you saw.

12. Was the water in the bottom of the container *warm* or *cold*? _____

13. In nature, can both *warm* and *cold* water evaporate? _____

14. What did the water in the bottom of the container *represent*? _____

15. Where did you see the “raindrops”? _____

16. Did you see water vapor? Why or why not? _____
