

# Agriculture & the Water Cycle

**Approximate Length of Activity:** One class period

## Objectives:

### Teacher:

1. Provide students with hands-on activities to understand precipitation and condensation.
2. Provide information about the earth's water cycle and its importance to agriculture.
3. Assist students with researching, graphing, measuring, and math skills.

### Students:

1. Learn about the water cycle of the earth through evaporation, condensation, and precipitation.
2. Learn how clouds form and then explain the process during an activity about cloud formation.
3. Explain why clouds and rainfall are important to Wisconsin agriculture.
4. Use research, graphing, and math skills to collect rainfall data, organize it, and answer questions about it.
5. Use measuring and graphing skills to collect rainfall.

## Wisconsin Model Academic Standards:

<b>English Language Arts</b>	<b>C.4.2</b>							
<b>Math</b>	<b>A.4.2</b>	<b>A.4.3</b>	<b>B.4.5</b>	<b>D.4.1</b>	<b>D.4.2</b>	<b>D.4.3</b>	<b>D.4.4</b>	<b>E.4.1</b>
	<b>E.4.2</b>	<b>E.4.3</b>						
<b>Science</b>	<b>A.4.3</b>	<b>C.4.1</b>	<b>C.4.2</b>	<b>C.4.4</b>	<b>C.4.5</b>	<b>C.4.6</b>	<b>D.4.3</b>	<b>D.4.4</b>
	<b>E.4.5</b>	<b>E.4.6</b>						

## Introduction:

The earth's water cycle involves the movement of water from oceans to air to land and back to the oceans. This happens through evaporation, condensation, and precipitation. Evaporation occurs when water on earth is warmed and turned into a gas that disperses in the air. Condensation occurs when water particles in the air cling together because they are in a cooler environment. Precipitation forms when water from the air falls on the earth because the condensed water has become so heavy.

Clouds are formed from condensation of water in cool air. Water that evaporates into the air becomes colder as it rises. This causes condensation of water. There are several types of clouds. The height and temperature at which the clouds are formed determine the cloud type. Cirrus clouds form as water freezes and are high and feathery.

Cumulus clouds are seen at all heights on dry, sunny days. They are fluffy with flat bases. Stratus clouds look like a low sheet across the sky and cause drizzles. Other examples of cloud types are nimbostratus, cirrocumulus, stratocumulus, and altostratus.

Often aircraft look like they leave a cloud behind them. This happens because the exhaust system sends out hot gases with water vapor. As this vapor cools, it condenses and freezes in the cold air and looks like a cloud.

Clouds are important to agriculture because they determine the amount of water that will fall on crops. Farmers depend on rainfall each year for the survival of their plants. Wisconsin receives 31.8 inches of precipitation a year on average. Some Wisconsin farmers use irrigation to provide their crops with additional water.

### **Materials Needed:**

- "Wisconsin Rainfall" worksheet
- 2 two-liter plastic bottles
- Warm water
- 3" x 5" black piece of paper
- Matches
- Small plastic resealable bag
- Ice
- Ruler

### **Activity Outline:**

1. Discuss the above information about the earth's water cycle, weather, and agriculture.
2. Define condensation and then create a cloud with your students. This activity may be done as a demonstration since a lighted match is involved.
  - a. Fill a two-liter bottle one-third full of warm water.
  - b. Tape a black 3" x 5" piece of paper on the back of the two-liter bottle.
  - c. Light a match and drop it in the container.
  - d. Immediately cover the container with a small resealable plastic bag of ice. Start a stopwatch to record the time it takes for you to see a cloud.
  - e. A cloud will form in the bottle. The black piece of paper will help you to see it.
  - f. Discuss what happened. A cloud formed because the warm water evaporated and then condensed when it was cooled. Condensing caused drops to form on small pieces of dust (match smoke). All of the drops together formed a cloud.
  - g. Try the activity again. Compare the time that passed before a cloud was seen.
3. Define precipitation and conduct rainfall activities.
  - a. Collect and measure rainfall outside your school by cutting a two-liter bottle about four inches from the top. After cutting all the way around the bottle, remove the top piece and place it upside down in the bottom piece. The top piece is now a funnel to collect the rain and a barrier to prevent some evaporation. The bottom piece is now a collecting jar. Sink the bottle in the ground away from trees and buildings to collect rain. Use a ruler to measure the rainfall by day, week, etc. and ask the students to create a graph.
  - b. Ask the students to complete the "Wisconsin Rainfall" worksheet. Students will use addition, subtraction, and averaging skills to answer questions about rainfall.

## Discussion Questions:

1. Why is precipitation important to agriculture?
2. Why are clouds important to agriculture?
3. How do clouds form?
4. What are the three simple stages of the earth's water cycle?

## Related Activities:

1. Create rain in your classroom: Boil water until steam rises because the water is evaporating. Hold an ice cube tray about five inches above the steam. As the steam rises, water droplets will form on the bottom of the ice cube tray and then fall like rain.
2. Read *The Cloud Book* by Tomie de Paola.
3. Use cotton balls to create different types of clouds on paper.
4. Watch evaporation: pour a puddle of water on the sidewalk and use chalk to draw a line around it. Look at the puddle after an hour has passed and draw a new line around it. Has some of the water evaporated? (For an additional experiment, pour a puddle in the shade and a puddle in the sun. Compare the evaporation rate.)

## Wisconsin Rainfall

The rainfall chart below reflects Wisconsin's monthly rainfall from a recent year. Use the rainfall chart to answer the following questions.

How many inches of precipitation fell in May? \_\_\_\_\_

How many inches of precipitation fell in August? \_\_\_\_\_

What was the difference in precipitation between May and August? \_\_\_\_\_

How many inches of precipitation fell in April, May, and June combined? \_\_\_\_\_

How many inches of precipitation fell in October, November, and December combined?  
\_\_\_\_\_

What was the total precipitation for the year in Wisconsin? \_\_\_\_\_

What was the average precipitation per month in Wisconsin? \_\_\_\_\_

Which month had the most precipitation? \_\_\_\_\_

### Monthly Precipitation in Wisconsin (inches)

<b>Jan</b>	1.21	<b>July</b>	2.67
<b>Feb</b>	1.69	<b>Aug</b>	4.59
<b>Mar</b>	0.67	<b>Sep</b>	4.05
<b>Apr</b>	4.93	<b>Oct</b>	2.44
<b>May</b>	4.86	<b>Nov</b>	2.28
<b>June</b>	4.84	<b>Dec</b>	1.19

## Wisconsin Rainfall

The rainfall chart below reflects Wisconsin's monthly rainfall from a recent year. Use the rainfall chart to answer the following questions.

How many inches of precipitation fell in May? 4.86

How many inches of precipitation fell in August? 4.59

What was the difference in precipitation between May and August? .27

How many inches of precipitation fell in April, May, and June combined? 14.63

How many inches of precipitation fell in October, November, and December combined?  
5.91

What was the total precipitation for the year in Wisconsin? 35.42

What was the average precipitation per month in Wisconsin? 2.95

Which month had the most precipitation? April

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