# JOURNEY OF A DROP

## THIRD GRADE TEACHER GUIDE

Ecology in Classrooms & Outdoors

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# JOURNEY OF A DROP
# UNIT OVERVIEW

## SUMMARY

This unit is all about water! The water cycle is a continuous process in nature that affects every living and non-living thing on Earth. Throughout this unit, students will participate in lessons that follow the journey of a drop of water, understanding that water can be found in different forms depending on where it is in the water cycle. In addition, students will explore water through the lens of the Pacific Northwest ecosystems by discussing where water is found, in what forms, and how it has affected the landscape and climate over time.

## OVERALL GUIDING QUESTIONS

**1. How does the water cycle affect life on Earth?**

**2. How does the water cycle affect my life and where I live?**

## OBJECTIVES

**Each student will be able to:**

- Name and describe the steps in the water cycle, understanding that water can be found as a liquid, gas, or solid
- Draw conclusions about how themselves and others can conserve and protect water resources on Earth
- Explain ways in which water plays a role in the landscape and climate of the Pacific Northwest

## USING THIS GUIDE

The ECO Journey of a Drop unit incorporates four interdisciplinary lessons to fully explore the water cycle and engage students across science, math, English language arts, and art. It is necessary to present the science lesson before the additional lessons to lay the foundation of understanding. ECO has created a recommended order beyond the science lesson, but teachers are free to modify the sequence.

Each lesson offers suggestions for a closing circle, discussions, or journal prompts. These suggestions may be used anytime throughout the unit as an assessment to monitor student progress.

Each Place-Based Unit has been intentionally designed to consider Diversity, Equity, and Inclusion in every classroom.


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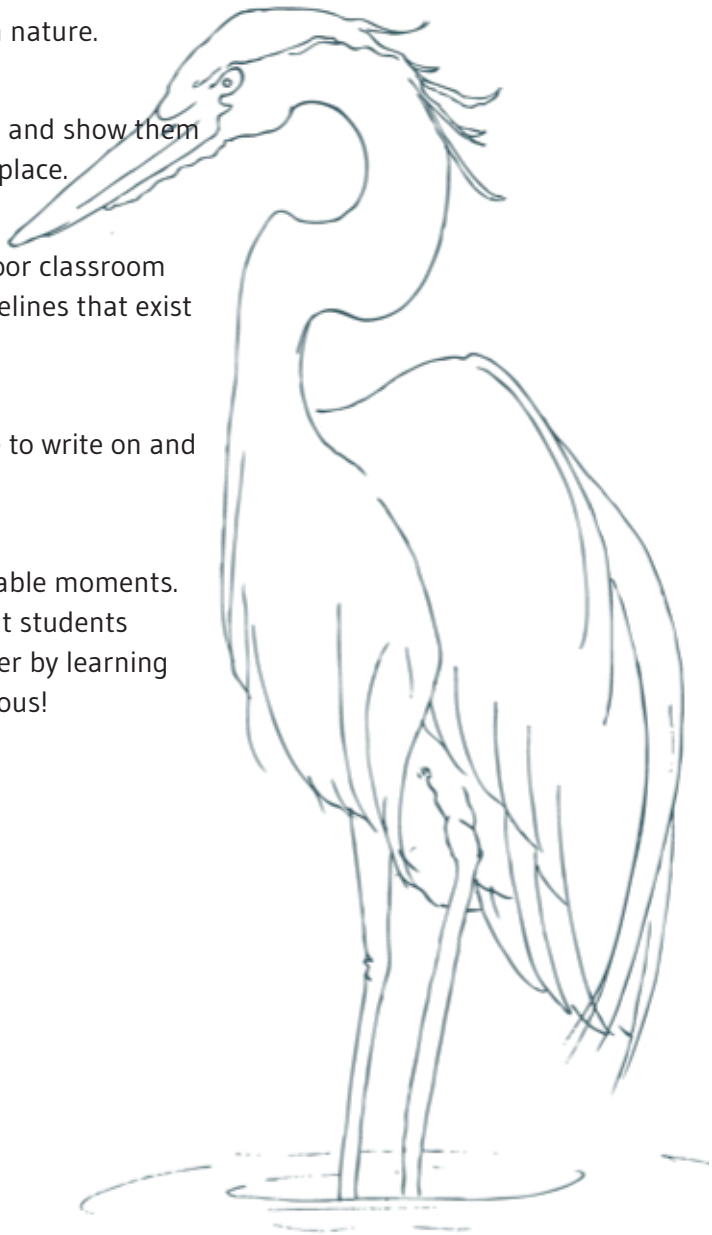
# JOURNEY OF A DROP
# UNIT OVERVIEW

## WANT TO TAKE THE LEARNING OUTSIDE?

This unit is designed to be delivered indoors or outdoors! We encourage teachers to find spaces in the schoolyard where students are able to learn and interact directly with nature.

- Take students on a walk around the schoolyard and show them the outdoor classroom before the lesson takes place.
- List expectations and boundaries for your outdoor classroom so that students remember that the same guidelines that exist inside, exist outdoors.
- Make sure to bring clipboards or a hard surface to write on and have students wear appropriate clothing.
- Remember, outdoor learning is all about teachable moments. Encourage curiosity, pause for observations that students are excited about, and nurture a sense of wonder by learning alongside your students. Enthusiasm is contagious!



## SUPPORT

Please contact **support@ecologyoutdoors.org** with any questions or concerns.

## TRAINING

Videos of ECO educators delivering select sections of the lessons are available. Contact **support@ecologyoutdoors.org** for access.

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JOURNEY OF A DROP

# STANDARDS OVERVIEW

## SCIENCE (NGSS)

- 5-ESS2-2 Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
- 4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

## MATH

- (NGSS) 3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
- 3.MD 3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step how many more and how many less problems using information presented in scaled bar graphs.

## ELA

- 3.W.3 Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.
- 3.W.3c Use temporal words and phrases to signal event order.

## ART

- VA.1.CR1.3

1. Generate ideas for narrative or events that could be the basis of art works using personal experiences (e.g. diagram or map places that are part of the student's everyday life).
2. Apply knowledge of available resources, tools, and technologies to investigate one's own ideas through the artmaking process.
3. Constructively use and explore materials in creating a work of art or design to communicate an idea.


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# JOURNEY OF A DROP BACKGROUND

Water goes on a cyclical "journey" on planet Earth. As water moves through the cycle, it can be found in three different forms: liquid, gaseous, or solid. This is unique, and in general, water molecules behave quite differently than other molecules of the same size. Water makes it possible for life on Earth to exist, and for this reason, it is important that students understand how the water cycle functions.

Water in a liquid state may be found in many different bodies of water; some examples include lakes, oceans, rivers, streams, groundwater, ponds, bogs or wetlands, and human-made reservoirs. Water in a solid state is also known as ice. Ice can be found frozen in glaciers, which remain frozen at the poles of the planet or on high-elevation mountain tops. Water in a gaseous state moves around through the atmosphere, moving the cycle along. The movement of water in the water cycle depends on landforms, temperature, and pressure. Below are the definitions of the steps in the water cycle.

**Evaporation:** The change from a liquid state to a gaseous state off of the surface of the Earth or bodies of water.

**Transpiration:** When plants absorb water from their roots and release it as water vapor through their leaves. 97-99.5% of water absorbed by plants is given off through transpiration.

**Condensation:** The change from a gaseous state to a liquid state, as seen in cloud formation.

**Precipitation:** Rain, snow, sleet, or hail that falls to the ground.

**Precipitation:** Gravity pulling water into the soil to be stored in aquifers or as groundwater.

The water cycle follows a typical pattern that forms a relationship between ocean, land, and our atmosphere. Sun will warm liquid or solid water from the surface of our earth and cause **evaporation** into the atmosphere. Once at a higher elevation, this water cools and **condenses**, thus forming rain or snow clouds. Clouds will become too heavy with water and cause **precipitation**, or water falling back onto earth's surface. This water reaches earth's surface and will collect in numerous places- rivers, lakes, mountains, and cities. Much of this water will flow back into the ocean,which is an important piece of the water cycle because it holds 97% of the total water on our planet.[1,2]

## WHY STUDY THE WATER CYCLE?

The water cycle is what distributes, or moves, water around the planet. Without the water cycle, the land on Earth would be dry and arid, not able to support life in the way it currently does. Learning about the water cycle both helps students understand the processes that take place that move water from the seas to the skies to the land and glaciers as well as the importance of taking care of clean water sources and conserving water when we can. Water is necessary for all life, but it is a somewhat scarce resource, especially when human activities degrade or lower the quality of the water that is available for use. In fact, less than 1% of water on the planet is readily available for us to drink. In addition, water moving through the water cycle supports other forms of life, allowing ecosystems to support biodiversity, which helps to stabilize our climate and produce the oxygen that we need to breathe.

The water cycle plays a role in all weather patterns on Earth. The cycle from clouds, to land, to ocean, and back to the clouds is linked to energy that will determine a region's **climate**, or the generally prevailing weather patterns of an area averaged over a series of years. Understanding Earth's climate can help us in many ways; from knowing when to stay off the roads because a huge snow storm is coming, to preparing for natural disasters, such as hurricanes, to predicting where our food sources are best suited to be grown.

### ACADEMIC VOCABULARY

**water cycle**
**evaporation**
**transpiration**
**condensation**
**precipitation**
**infiltration**
**climate**

[1] https://pmm.nasa.gov/education/water-cycle https://science.nasa.gov/earth-science/oceanography/ocean-earth-system/ocean-water-cycle
[2] https://www.usgs.gov/special-topic/water-science-school/science/fundamentals-water-cycle?qt-science_center_objects=0#qt-science_center_objects

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SCIENCE LESSON

# JOURNEY OF A DROP

## SUMMARY

In this lesson, students will join a water drop along its journey through clouds and oceans, rivers and lakes, soil and glaciers, plants and animals. Students learn about the water cycle and then reenact a water journey of their own in a fun game that demonstrates how water moves via precipitation, evaporation and condensation.

## OBJECTIVES

**By the end of the lesson, students will be able to:**

- Name and describe the steps in the water cycle
- Explain that water can be found in a liquid, gas, or solid state
- Explain ways in which the water cycle affects the world around them

## GUIDING QUESTIONS

1. What forms does water take?
2. What are the steps in the water cycle?
3. How does the water cycle affect the planet?

## LESSON-AT-A-GLANCE

**GRADE LEVEL** 3

**INTEGRATED LEARNING FOCUS** Science

**LESSON PREP** 10 minutes to set up signs and stickers, print worksheets

**LESSON DURATION** 45 minutes

**CLASS SIZE** 30

**MATERIALS**

- Paper or science journals
- Pencils
- Water Drop's Incredible Journey worksheet printed for each student (included)
- Book: *A Drop Around the World* by Barbara Shaw McKinney
- 8 signs for stations: river, lake, ocean, glacier, animal, plant, clouds, soil
- 8 labeled sticker containers for stations
- Stickers included in containers; reach out to ECO for refills if needed

## SCIENCE

- 3-ESS2-2.Obtain and combine information to describe climates in different regions of the world.

## ACADEMIC VOCABULARY

**evaporation**
**transpiration**
**condensation**
**precipitation**
**aquifer**
**surface runoff**
**gravitational force**
**infiltration**


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## ACTIVITY PROCEDURE

### 1. PREPARE THE ACTIVITY

Prior to the lesson, set up the signs and stickers for the river, lake, ocean, glacier, animal, plant, clouds, and soil stations around the classroom.

### 2. INTRODUCE THE WATER CYCLE

Invite students to take out a pencil and a piece of paper or science journal to follow along with the lesson.

**Ask: What is a cycle?**
A cycle is a series of events that are regularly repeated in the same order.

**Ask: What shape best represents a cycle?**
A circle.

### 3. DRAW A CIRCLE ON THE BOARD

**Ask: What are some other cycles you can think of?**
Plant cycle, rock cycle, carbon cycle, life cycle, etc... All life on Earth is involved in a cycle.

Have students draw a circle on their piece of paper.

### 4. WHAT IS THE WATER CYCLE?

Explain to students that since the beginning of Earth's creation, there has always been the same amount of water. We will never have new water added to Earth. That means, we are drinking the same water that dinosaurs drank over 65 million years ago!

Tell students that it is also known that water is always changing and moving, and it goes through different stages in its journey. For your use during the lesson, see attached water cycle diagram included in this guide.

**Ask: Where have you seen water?**
Pond, lake, sink, shower, ocean, ice cubes, steam, etc... Students will be able to name many places and types of water.

It is important to note that water is able to exist in three states of matter - solid, liquid, and gas.

### 5. JOURNEY OF A DROP

Explain to students that they will be going on a journey of a water drop through the water cycle using their imagination. On the bottom of the circle you drew on the board, draw waves.

Invite students to close or soften their eyes and imagine that they are a tiny little drop of water in the ocean, floating amongst trillions of salty friends. On one fateful day, you are lifted up out of the ocean through the process of **evaporation**.

**Ask: What does evaporation mean? What clues were in the imagined example?**
Evaporation is water rising off of the surface of the earth, changing from a liquid to a gas. Evaporation is always happening, but it happens faster when the temperature increases.

Draw an arrow from the waves to the next spot where you can draw a sun and wavy lines with an arrow pointing up, label it "evaporation". Students should also draw this on their circles.

Now, invite students to imagine themselves flying through the sky, with the birds, as a gas.

**Ask: Have you ever felt humidity, or a day when the air feels thick, almost wet? Or noticed clouds in the sky? Or seen steam rise off of a tea kettle when the water is boiling?**
Those are all examples of water in the air as a gas.

There is another process that transforms liquid water into its gaseous state. **Transpiration**. Transpiration is the movement of water through a plant from the roots all the way up to the leaves. The water then evaporates off the leaves and is released as gas or water vapor into the atmosphere.

Just under the drawing of the sun and evaporation lines, draw a plant with wavy lines coming off of it with an arrow pointing up, label it "transpiration". Students draw this on their circle.

**Explain:** When the conditions are just right, the water vapor in the atmosphere starts to condense (more and more molecules are packing closer together) ,going through a process called **condensation**.

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**Ask: Can you define condensation?**
An example of condensation is the water drops that form on the outside of a glass that is holding an ice cold drink when the air temperature is warm.

Condensation is water vapor or the gas form of water converting into a liquid. When water vapor condenses in the atmosphere it forms clouds.

Draw an arrow from transpiration and draw a picture of a cloud, label it "condensation". Have students draw this on their circle.

Invite students to imagine themselves getting squeezed together with more and more water vapor molecules to form a cloud.

When the water vapor becomes heavy enough there is **precipitation**.

**Ask: Can anyone define precipitation?**
Precipitation is water falling to the ground as a liquid or solid. In the Pacific Northwest, we are known for how much precipitation we have!

**Ask: What are some examples of precipitation?**
Rain, snow, sleet, hail.

Draw an arrow from condensation and draw a picture of rain, snow, hail, etc, and label it "precipitation." Have students draw this on their circle.

Invite students to imagine themselves as precipitation falling all the way back down toward the ground and landing in a large body of water, like the ocean

**Explain:** Precipitation can fall and land in the ocean, starting the cycle all over again. Precipitation can also land on land, especially around areas like mountains or high elevation. If the temperature is below freezing the liquid rain will freeze as snow or ice. If it is not freezing, then the rain will become **surface runoff** and begins to flow downhill, pulled by the force of gravity.

Invite students to imagine themselves as precipitation that falls to the ground, on the top of the mountain. Now they are a small drop joining other small drops and forming a creek, stream, or river heading down the mountain. They are being pulled down the mountain, all the way to the ocean due to the **gravitational force**.

Some water will soak into the ground and move through the soil to be stored as groundwater or in **aquifers**, which are underground bodies of water. This is called **infiltration**.

Draw an arrow from precipitation and draw a picture of rain, snow, hail, etc, landing on top of a mountain and label it "surface runoff". Draw a small stream collecting and traveling down the mountain. Have students draw this on their circle.

Draw an arrow from "surface runoff" into the ground, labeling it "infiltration." Have students draw this on their circle.

Invite students to imagine themselves back in the ocean and at the beginning of the water cycle all over again

### 6. READ "A DROP AROUND THE WORLD"

While reading, point out where The Drop goes and how The Drop gets to these places. Reinforce vocabulary as you read.

Highlight how the water drop's cycle plays out differently in different regions of the world, due to their climate.

### 7. PLAY WATER DROP'S INCREDIBLE JOURNEY

Now it is time to play the game Water Drop's Incredible Journey. Hand each student a worksheet to use and have them put their name on the paper.

Walk to each of the signs you have placed around the classroom and point out their titles: river, lake, ocean, glacier, animal, plant, clouds, and soil.

Spread students out evenly assigning each one to a station to start from and instruct them to write That name under the first circle of their worksheet.

At each station there is a container filled with stickers that are labeled with the other locations around the classroom. When a student visits a station, they must pull out a sticker and place that sticker on the next open line on their worksheet. The sticker will tell them which station they will visit next.


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Students should play until they have filled in each line of their worksheet.

Sometimes a sticker will tell a student to stay in the same place, or go to a station they've already visited. Remind students that water drops do not get to pick and choose where they go, and that some drops stay in the same place (the ocean or glaciers, for example) for a very long time.

Once students have filled out their worksheets, have them return to their seats and begin writing in how they traveled from one location to the next using the vocabulary they learned in the water cycle. Consider using words like surface runoff, seep, flow, rain, snow, evaporate, etc.,

They will be finished when each transition from sticker to sticker has something written in as an explanation.

## CLOSING CIRCLE

Begin a discussion as a class,asking questions to get students thinking about how they traveled from one place to another. Have students turn to a neighbor and describe how their journey went. Then, invite them to share.

- Did anyone get stuck in one place the whole time? Could that really happen to a drop of water?
- Did anyone have the exact same journey as another "drop"?

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# THE WATER CYCLE

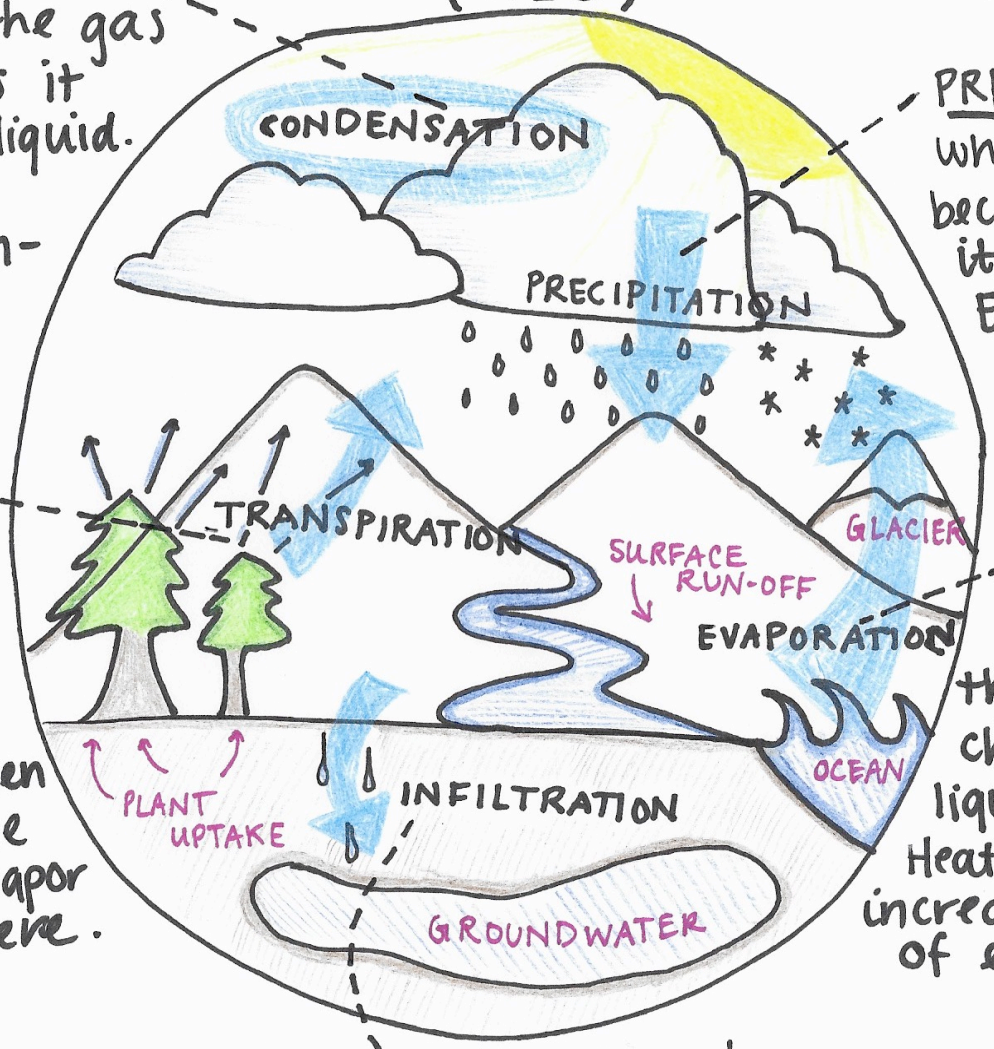
($H_2O$)

**CONDENSATION:**
$H_2O$ vapor — or, the gas form of $H_2O$ - as it converts into a liquid. $H_2O$ vapor in the atmosphere condenses into clouds.

**PRECIPITATION:**
when $H_2O$ vapor becomes heavy enough it falls to the Earth's surface as a liquid or solid. (rain, sleet, snow, or hail).

**TRANSPIRATION:**
The movement of $H_2O$ through a plant from the root + up through its leaves. $H_2O$ then evaporates off the leaves as water vapor into the atmosphere.

**EVAPORATION:**
$H_2O$ rising off the Earth's surface, changing from liquid to gas. Heat from the sun increases the rate of evaporation.




**INFILTRATION:**
The process by which ground water enters the soil.

Name: _____

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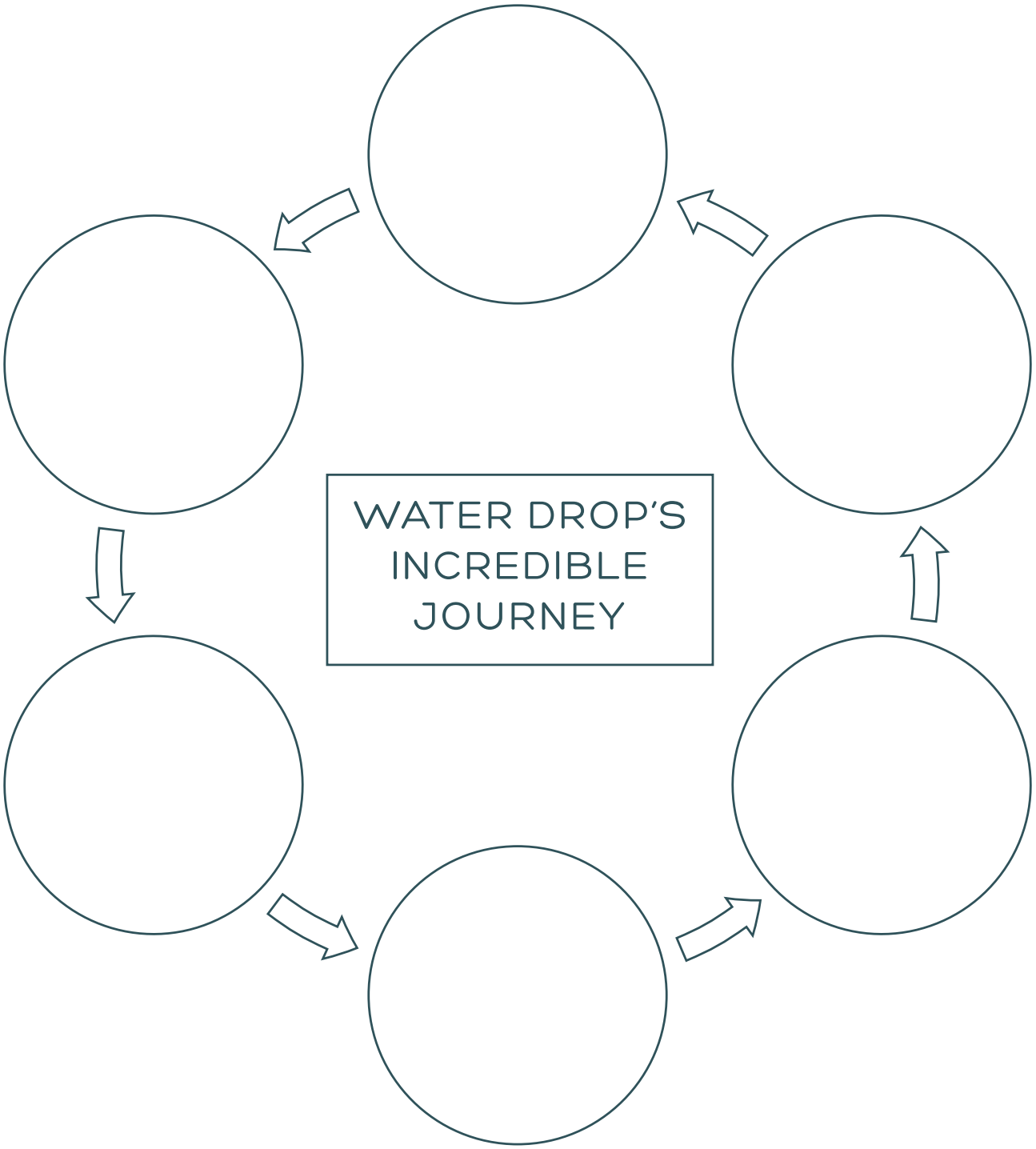


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MATH LESSON

# THE POWER OF PRECIPITATION

## SUMMARY

In this lesson, students create bar graphs that represent the amount of precipitation an area gets per month. This lesson uses precipitation numbers from the U.S. Climate Data website, rounded to whole numbers for grade-level use. By comparing and contrasting data, students can conclude that precipitation levels depend on regional climate differences, getting them to think about the climate and weather in their own region of the Pacific Northwest. In drawing their own graphs, students will be able to demonstrate their ability to understand data as well as identify seasonal differences.

## OBJECTIVES

**By the end of the lesson, students will be able to:**

- Observe scientific tables showing monthly precipitation data in two separate locations
- Create two bar-graphs using scientific data provided
- Analyze the bar graph and use addition to calculate average yearly rainfall
- Investigate a math word problem and use division to calculate average daily rainfall
- Observe a color-coded map of Oregon to understand how geography affects rainfall

## GUIDING QUESTIONS

1. How much does it rain in Portland, OR compared to Tillamook, OR and John Day, OR?
2. How does geography affect rainfall?

## LESSON-AT-A-GLANCE

**GRADE LEVEL** 3

**INTEGRATED LEARNING FOCUS** Math

**DURATION** 45 minutes

**CLASS SIZE** Any

**ACTIVITY TEAMS** Pairs

**MATERIALS**

- Power of Precipitation worksheets for each student
- Pencils
- Colored pencils
- Presentation titled *Power of Precipitation* presentation
- Plastic soda bottle, tape, rocks, permanent marker for rain collection system (optional for extension activity)

## MATH

- (NGSS) 3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
- 3.MD 3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step how many more and how many less problems using information presented in scaled bar graphs.
- 3.OA 3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem


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## ACADEMIC VOCABULARY

| | |
|---|---|
| **bar graph** | **precipitation** |
| **data** | **legend** |

# ACTIVITY PROCEDURE

### 1. PREPARE THE ACTIVITY

Print copies of the Power of Precipitation worksheet, included in this guide, for each student.

Set up presentation titled Power of Precipitation on the thumb drive.

### 2. INTRODUCE BAR GRAPHS

**Slide 2: What is a bar graph?**

**Ask: What is a bar graph?**
A bar graph is a tool you use to show a set of numbers in a picture. You draw a bar to represent how many or how much of something there is. A taller bar represents a higher number, a shorter bar represents a smaller number. Together, the set of numbers is called **data**. Show students the example in the slideshow.

**Slide 3: Measuring precipitation: how much did it rain?**

**Ask: If we made a bar graph to show how much it rains in Portland, what unit would we measure the amount of rain with?**
Rainfall is measured in inches. Remind students that rainfall is called **precipitation**, and the amount of precipitation an area gets changes based on the season. Students are likely familiar with the fact that in parts of Oregon, it can be particularly rainy throughout fall, winter, and spring!

### 3. LOOK AT THE DATA

Explain to students they will be looking at the data that measured how much average precipitation (rainfall) occurred each month in different areas in Oregon. First, you will start with Portland, the largest city in Oregon.

**Slide 4: Let's look at Portland**

Show students the location of Portland on the map. Click the slide to show students the table, pointing out that each month has a number next to it. The value represents the number of inches of rain measured by month. When creating a bar graph, they will count the number of spaces that corresponds with the inches of rain, then draw a bar that is the same as the inches of rain per month.

**Tip**: If you would like to explain what an average is, you may spend time doing so, but it is not necessary for this lesson. Note that these numbers have been rounded to whole numbers.

### 4. GRAPH THE RAINFALL IN PORTLAND

**Slide 5: Make a bar graph (worksheet questions 1 & 2)**

Invite students to take out their worksheets and a pencil and begin creating a bar graph that shows the inches of rainfall in Portland each month.

**AVERAGE PRECIPITATION FOR PORTLAND, OREGON (INCHES)**

| | |
|---|---|
| January | 5 |
| February | 4 |
| March | 4 |
| April | 3 |
| May | 2 |
| June | 2 |
| July | 1 |
| August | 1 |
| September | 2 |
| October | 3 |
| November | 6 |
| December | 6 |

Source: https://www.weather-us.com/en/oregon-usa/portland-climate#rainfall

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You may choose to do the entire graph as a class to prepare students to do the next two graphs on their own. Once the bar graph is complete, show the slide with the finished graph.

**Tip**: Point out he x and y axis on the graph, and explain that each line on their graph on the worksheet represents one unit, with the axis labeled in twos.

Ask a student volunteer to read the first question (below) on their worksheet out loud, and give students time to write their answer on their worksheet. Repeat this with the second question in the set.

1. Let's look back on the bar graph we just created! It shows us how many inches of rain Portland received each month.

How much rain did Portland receive for the *entire year*?
Add each month together:
5+4+4+3+2+2+1+1+2+3+6+6 = 39 inches.

2. It's finally the rainy season here in Oregon! You turn on the weather channel and the weather person tells you that it has rained an average of 20 inches over the last 10 days!

How many *inches per day* did it rain?
Divide 20 inches/10 days = 2 inches per day.

### 5. GRAPH THE RAINFALL IN TILLAMOOK

**Ask: What can you guess about the amount of rainfall on the coast compared to the amount of rainfall here in Portland?**
Have students take a vote to guess which place has more rain, explaining that their next graph will show them the answer!

### Slide 6: Tillamook (coast)

Repeat the process in step 4 using the data from Tillamook, Oregon. Remind students that Tillamook is on the Oregon Coast.

**AVERAGE PRECIPITATION FOR TILLAMOOK, OREGON (INCHES)**

| | |
|---|---|
| January | 12 |
| February | 10 |
| March | 9 |
| April | 7 |
| May | 4 |
| June | 2 |
| July | 0 |
| August | 1 |
| September | 1 |
| October | 5 |
| November | 11 |
| December | 15 |

Source: https://www.weather-us.com/en/oregon-usa/brookings-climate

### Slide 7: Make a bar graph (worksheet questions 3 & 4)

Have students work on the next two questions on the worksheet (below):

3. Let's look back on the bar graph we just created! It shows us how many inches of rain Tillamook received each month.

How much rain did Tillamook receive for the *entire year*?
Add each month together:
12+10+9+7+4+2+0+1+1+5+11+15 = 77 inches.

4. A huge rainstorm has passed through Tillamook and caused a record breaking amount of rain! For 25 days, it has rained non-stop! Finally, the sky cleared and scientists measured that it rained 100 inches over the 25 days of endless rain.

Scientists want to know: On average, how many inches did it rain *per day*?
Divide 100 inches/25 days = 4 inches per day.


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## 6. GRAPH THE RAINFALL IN JOHN DAY

**Ask: What can you guess about the amount of rainfall in Eastern Oregon, known as the high desert, compared to the amount of rainfall in Portland or on the coast?**
Have students take a vote to guess which place has more rain, explaining that their next graph will show them the answer!

**Slide 8: John Day (high desert)**

Repeat the process in step 4 using the data from John Day, Oregon. Remind students that John Day is in Eastern Oregon, which is considered a high desert ecosystem.

**AVERAGE PRECIPITATION FOR JOHN DAY, OREGON (INCHES)**

| | |
|---|---|
| January | 1 |
| February | 1 |
| March | 1 |
| April | 1 |
| May | 2 |
| June | 2 |
| July | 0 |
| August | 1 |
| September | 1 |
| October | 1 |
| November | 1 |
| December | 1 |

Source: https://www.weather-us.com/en/oregon-usa/john-day-climate

**Slide 9: Make a bar graph (worksheet questions 5 & 6)**

Have students work on the next two questions on the worksheet (below):

5. Let's look back on the bar graph we just created! It shows us how many inches of rain John Day received each month.

How much rain did John Day receive for the *entire year*?
Add each month together:
1+1+1+1+2+2+0+1+1+1+1+1 = 13 inches.

6. There has been a drought in John Day for the entire summer. There hasn't been a rain cloud in the sky for months! It rained 0 inches over 100 days

On average, how many inches did it rain *per day*?
Divide 0 inches/100 days = 0 inches per day. Zero divided by anything is zero!

## 7. COMPARE AND CONTRAST

**Slide 10: Compare the three bar graphs you have created**

**Ask: Compare the three bar graphs you have created. What are some observations you can make about rainfall in Portland, Tillamook, and John Day? Why do you think that is?**
Even though these are all found in Oregon, they are different [regions, ecosystems, habitat types, areas on a map, climates, types of weather]. Write students' answers on the board as you discuss their thoughts.

## 8. WHAT DOES THE MAP SHOW?

**Slide 11: What are we looking at?**

Introduce the map in the slideshow, and have students guess what it is a map of. Read the title of the map out loud.

**Ask: Based on your observations, what do you think all the different colors mean?**
Colors on the map show a range of how much precipitation is found in different parts of the state!

Point out that the map has a **legend**, which is a

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type of key used to tell the reader of the map what each color represents. On this map, the legend shows precipitation in inches. Cool colors show more rainfall while warmer colors show less rainfall. Point out where Portland, Tillamook, and John Day (generally) are located.

**Ask: By looking at this colorful map, what can you tell about average rainfall throughout the state of Oregon? Does rainfall change depending where you live? If yes, how so?** Lead a short discussion, having students make observations about the map and study how the legend shows rainfall from under 10 inches per year to over 180 inches per year.

## CLOSING CIRCLE (EXTENSION ACTIVITY)

Set up a rain collection system outside your classroom using a plastic soda bottle, and have students record how many inches of rainfall within a time period of your choosing (one week, one month).

- Cut the top portion off of the plastic soda bottle
- Put a layer of rocks in the bottom of the bottle and add enough water to cover the rocks
- Use a ruler and permanent marker to make a scale, in inches, with zero starting at the top of the water mark
- Flip the bottle top upside down and tape to the top of the bottle so it forms a funnel system

Have students record the data in the classroom and create a bar graph at the end of how much rain was collected per day in the time period.

## ASSESSMENT OPTIONS

Use worksheets and discussion as assessment tools.


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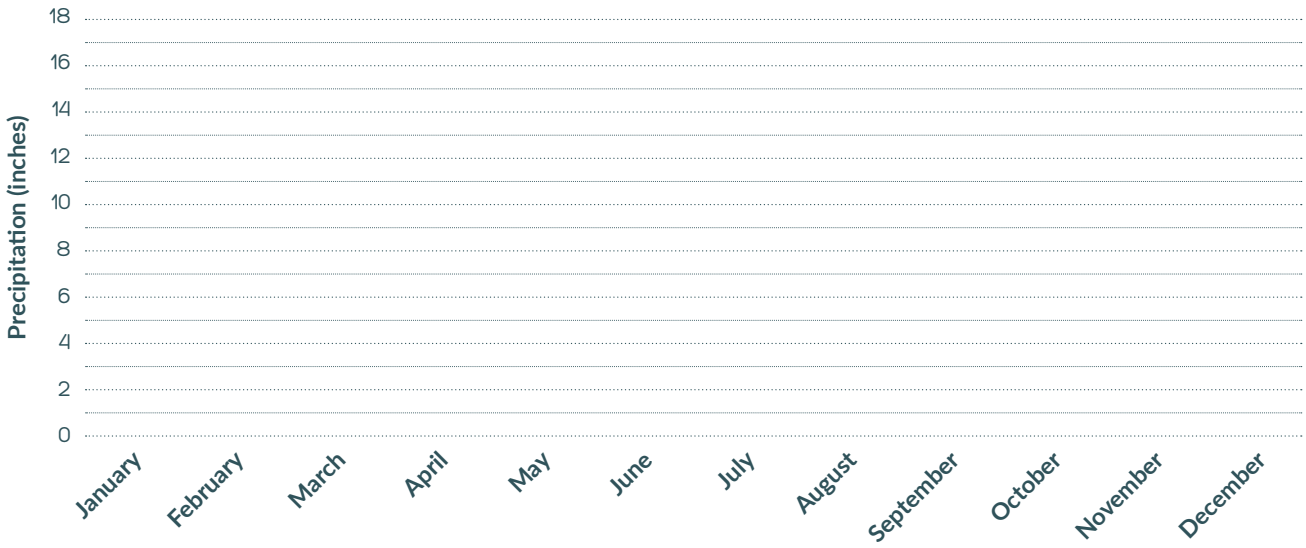
# THE POWER OF PRECIPITATION

## Average Precipitation for Portland, Oregon (inches)

| | |
|---|---|
| January | 5 |
| February | 4 |
| March | 4 |
| April | 3 |
| May | 2 |
| June | 2 |

| | |
|---|---|
| July | 1 |
| August | 1 |
| September | 2 |
| October | 3 |
| November | 6 |
| December | 6 |

## Average Precipitation in Portland, Oregon




1. Let's look back on the bar graph we just created! It shows us how many inches of rain Portland received each month.

How much rain did Portland receive for the *entire year*?

2. It's finally the rainy season here it Oregon! You turn on the weather channel and the weather person tells you that it has rained an average of 20 inches over the last 10 days!

How many inches *per day* did it rain?

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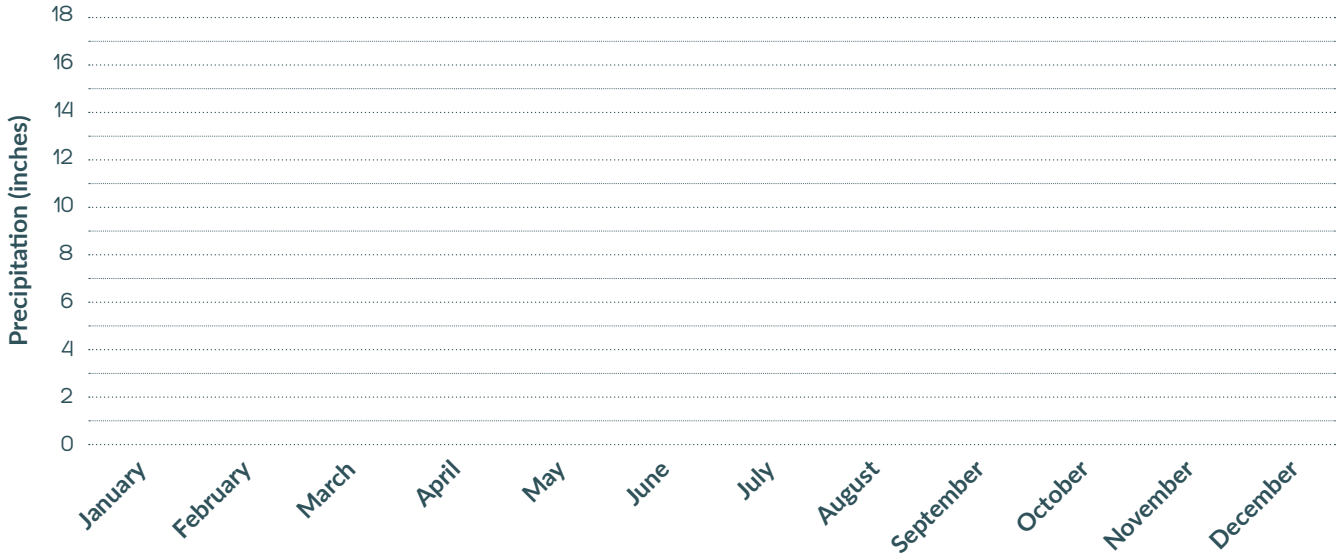
## Average Precipitation for Tillamook, Oregon (inches)

| | |
|---|---|
| January | 12 |
| February | 10 |
| March | 9 |
| April | 7 |
| May | 4 |
| June | 2 |

| | |
|---|---|
| July | 0 |
| August | 1 |
| September | 1 |
| October | 5 |
| November | 11 |
| December | 15 |

## Average Precipitation in Tillamook, Oregon




3. Let's look back on the bar graph we just created! It shows us how many inches of rain Tillamook received each month.

How much rain did Tillamook receive for the *entire year*?

4. A huge rainstorm has passed through Tillamook and caused a record breaking amount of rain! For 50 days, it has rained non-stop! Finally, the sky cleared and scientists measured that it rained 100 inches over the 25 days of endless rain.

Scientists want to know: On average, how many inches did it rain *per day*?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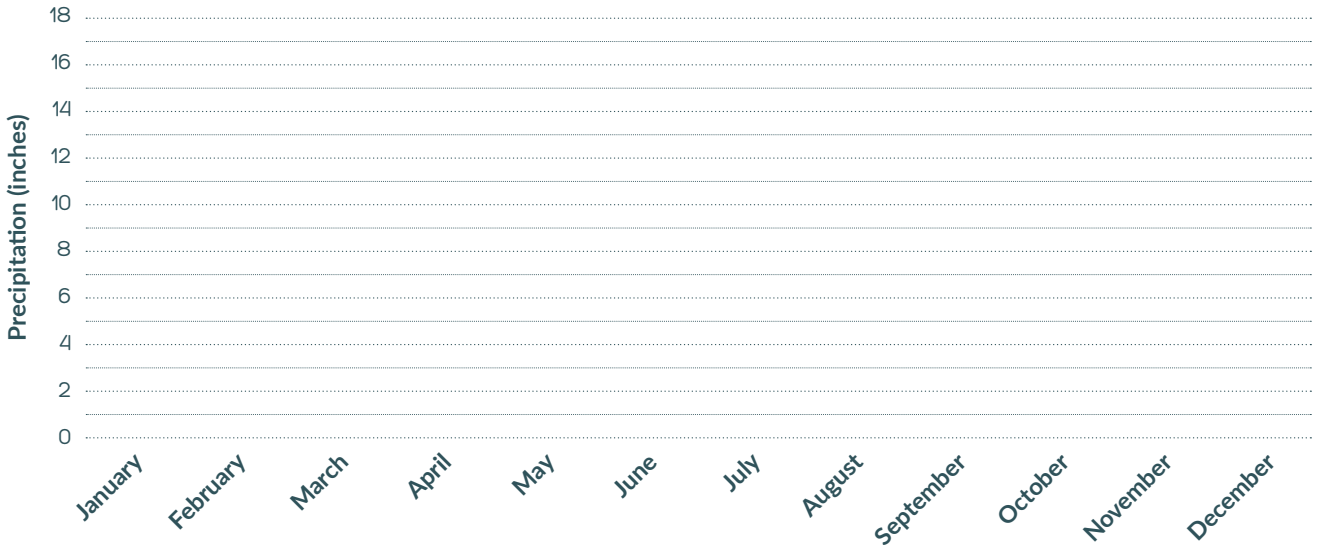
## Average Precipitation for John Day, Oregon (inches)

| | |
|---|---|
| January | 1 |
| February | 1 |
| March | 1 |
| April | 1 |
| May | 2 |
| June | 2 |

| | |
|---|---|
| July | 0 |
| August | 1 |
| September | 1 |
| October | 1 |
| November | 1 |
| December | 1 |

## Average Precipitation in John Day, Oregon




5. Let's look back on the bar graph we just created! It shows us how many inches of rain John Day received each month.

How much rain did John Day receive for the *entire year*?

6. There has been a drought in John Day for the entire summer. There hasn't been a rain cloud in the sky for months! It rained 0 inches over the 100 days of endless rain.

On average, how many inches did it rain *per day*?

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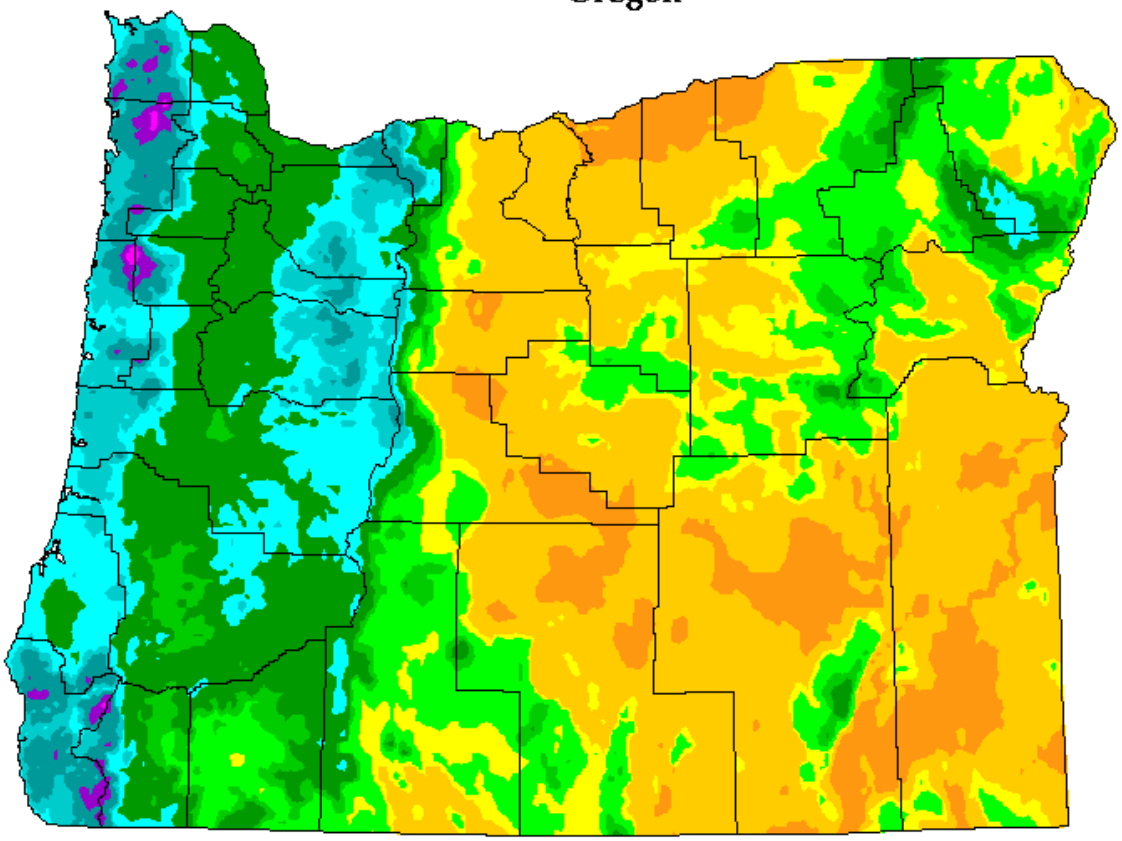
## Average Annual Precipitation

## Oregon



Legend (in inches)

| | |
|---|---|
| Under 10 | 60 to 80 |
| 10 to 15 | 80 to 100 |
| 15 to 20 | 100 to 140 |
| 20 to 30 | 140 to 180 |
| 30 to 40 | Above 180 |
| 40 to 60 | |

This is a map of annual precipitation averaged over the period 1961-1990. Station observations were collected from the NOAA Cooperative and USDA-NRCS SnoTel networks, plus other state and local networks. The PRISM modeling system was used to create the gridded estimates from which this map was made. The size of each grid pixel is approximately 4x4 km. Support was provided by the NRCS Water and Climate Center.

Copyright 2000 by Spatial Climate Analysis Service, Oregon State University

For information on the PRISM modeling system, visit the SCAS web site at http://www.ocs.orst.edu/prism

The latest PRISM digital data sets created by the SCAS can be obtained from the Climate Source at http://www.climatesource.com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ELA LESSON

# ONCE UPON A WATER CYCLE

## SUMMARY

In this lesson, students will write a creative story describing the journey of a water drop in their own words. From an ice cube in a glass of lemonade to a snowflake on Mt. Hood, students are encouraged to use all three states of water (liquid, solid, and gas) in their story, and draw from their own surroundings for inspiration.

## OBJECTIVES

**By the end of the lesson, students will be able to:**

- Demonstrate their understanding of the water cycle through an imaginative story
- Imagine the journey of a water drop in the context of their local surroundings

## GUIDING QUESTIONS

1. What are some ways water travels from one place to another?
2. Where can you find water in a solid state? A liquid state? A gaseous state?

## LESSON-AT-A-GLANCE

**GRADE LEVEL** 3

**INTEGRATED LEARNING FOCUS** ELA

**LESSON DURATION** 45 minutes

**CLASS SIZE** Any

**MATERIALS**

- Pencils
- Lined paper or writing journals
- Colored pencils/crayons
- 8 station signs: rive, lake, ocean, glacier, animal, plant, clouds, soil

## ELA

- 3.W.3 Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.
- 3.W.3c Use temporal words and phrases to signal event order.

## ACADEMIC VOCABULARY

**water cycles**
**sequence**

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## ACTIVITY PROCEDURE

### 1. REVIEW THE WATER CYCLE

Review the **water cycle** with the class by having them help draw a diagram on the board, as it was done in the science lesson. Take this time to invite students to revisit their own diagrams and describe each step with their table partners.

**Ask: Where have you found water in a solid state? Where have you found water in a liquid state? Where have you found water in a gaseous state?**
Have students turn to a desk partner or group and discuss the question prompts. Once students are winding down with their partner, have a few students share out what examples they discussed.

Pull out the eight station signs from the science lesson and review each image with the class to give a visual example of places in the Pacific Northwest that water can be found. Display them at the front of the classroom for students to reference while they write

### 2. ELEMENTS OF A GOOD STORY

Explain to students they will be writing their own story about the journey of a water drop, much like the book *A Drop Around the World*. However, in this story, their water drop will be making a journey through places the students themselves have been

For example, students may include their home or neighborhood, school and schoolyard, or parks and natural spaces they have visited in Oregon or the Pacific Northwest. You may come up with some examples, such as a nearby river or lake, the ocean, a commonly known mountain, etc.

**Tip:** Use this activity after an outdoor field trip, using the field trip site as a setting or jumping off point.

Their story could be an adventure that takes place over many days or years, or it could be all in one day. The challenge is that the drop must find itself in a liquid state, solid state, and gaseous state throughout its journey.

Remind students that their story needs some other elements to be considered well-written:

- a beginning, middle, and end
- use descriptive language
- use words and phrases that connect their story from one idea to the next (a **sequence**), for example: one day, first, then, all of a sudden, finally, etc.

### 3. TIME TO WRITE

Have students take out their pencils and lined paper or writing journals, as well as colored pencils or crayons for illustration.

As students are writing, circulate throughout the room to help with ideas.

When students are finished with their writing, invite them to create an illustration that depicts one part of their story.

### CLOSING CIRCLE

Create a real or imaginary stage in the classroom and have students take turns reading their stories to the class. Remind students that reading your work out loud can be challenging and to give one another respect by listening and giving snaps or silent applause when peers are finished. Bind all of the stories together and keep it for your classroom library.

### ASSESSMENT OPTIONS

Use the closing circle as an assessment tool. Have students go back and edit their stories if pieces of their story don't make sense or lack adequate detail.


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ART LESSON

# WATER CYCLE WATERCOLORS

## SUMMARY

In this lesson, students create a beautiful work of art showing the journey of a drop on their paper using watercolors and a straw, with the option of adding salt to create a unique look and explore how water and salt interact. Students will create a drawing of a landscape of their choosing and then add "water" to the landscape they drew, thinking about how water moves in the water cycle and their area.

## OBJECTIVES

**By the end of the lesson, students will be able to:**

- Artistically represent an aspect of the water cycle using water-based painting methods

## GUIDING QUESTIONS

1. How does water move through the water cycle on Earth?
2. Where can water be found in different stages?
3. How will you use water-based painting methods to show a unique water scene?

## LESSON-AT-A-GLANCE

**GRADE LEVEL** 3

**INTEGRATED LEARNING FOCUS** Art

**LESSON DURATION** 45 minutes

**CLASS SIZE** Any

**MATERIALS**

- Paper or bamboo straws
- Watercolor paper
- Liquid watercolors (blue and green)
- 20 plastic dropper bottles
- Crayons, colored pencils

## ART

- VA.1.CR1.3

1. Generate ideas for narrative or events that could be the basis of art works using personal experiences (e.g. diagram or map places that are part of the student's everyday life).
2. Apply knowledge of available resources, tools, and technologies to investigate one's own ideas through the artmaking process.
3. Constructively use and explore materials in creating a work of art or design to communicate an idea.

## ACADEMIC VOCABULARY

**artistic representation**

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## ACTIVITY PROCEDURE

### 1. PREPARE THE ACTIVITY

Divide the materials so that each student will have access to one piece of watercolor paper, a set of crayons and/or pencils, their own straw, and a set of blue and green liquid watercolors in plastic dropper bottles* to share with a table group.

*Prepare the paint by filling 10 plastic dropper bottles with water and a few drops of blue liquid watercolor and 10 with water and a few drops of green liquid watercolor, so students don't pour them out themselves (they can be messy!). Adjust the ratio of water to watercolor as needed to get the desired hue - it should be fairly watery and light.

### 2. REVIEW THE WATER CYCLE

Using the science lesson's water cycle drawn with the class, review the different steps. Take this time to invite students to revisit their sticker worksheets and describe their journey with their table partners.

After discussing each point in the water cycle, tell students that they will be creating an art piece inspired by the water cycle, using water-based methods to make their pieces beautiful. On the board, draw a picture of water falling from a cloud, landing on a mountain, traveling down a river on the mountain, to a larger body of water. This is an **artistic representation** of the water cycle.

While you are drawing, pause to ask questions: **What are examples of precipitation? Where does water land? Where does water flow?**

Remind students of the water cycle game, and how they went to different locations: clouds, rivers, lakes, glaciers, soil, animal, and ocean.

### 3. INTRODUCE THE ART PROJECT

As you introduce each of the materials, hold them up or display them on the document camera so that students can see them.

- Watercolor paper is thicker than regular paper so that it will not rip as easily.
- Crayons or pencils may be used before the paint to create the outline of the piece. Remind students not to use markers because they will bleed on the paper when wet.
- Liquid watercolors are mixed with water in plastic dropper bottles so they can apply paint in drops of their desired size and color.
- A straw will be used to blow the watercolors around on the paper.
- Sea salt can be used on top of the paint to create a very unique effect. Tell students that salt absorbs water, which will happen when they put salt on the wet paint. Once their painting dries, they can brush off the salt, leaving star-like shapes behind. Lead students to think about where they would have salty water depicted (ocean or sea).

You may choose to show a video (https://www.youtube.com/watch?v=8o5zT1_aKf8 — "Blow Painting With Straws") of straw painting or do an example by first drawing an image of your choice on a piece of paper with a crayon or pencil, squeezing the color wanted from the plastic bottle to the watercolor paper, then blowing with the straw to create the "splatter" pattern.

Invite students to turn to their neighbor and share which station in the water cycle game they are going to have as their theme for their artwork.


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### 4. CREATE A WATER-FUL MASTERPIECE

Bring students back together, pass out paper, crayons, and pencils, and have them begin their pieces by drawing their scene.

As students are ready, pass out watercolors, eye-droppers, and straws, inviting students to add watercolors to their drawings and use straws to blow water to fill in their illustration.

Students may want to sprinkle salt onto the watercolors while it is still wet to get a star-burst effect, or if they are depicting salt water (ocean or sea) in their image. If they choose to do so, leave the salt on the page while it dries and gently brush it off afterwards.

## CLOSING CIRCLE

Create a classroom gallery and invite students to share with one another about the part of the water cycle they have chosen to represent.

## ASSESSMENT OPTIONS

Have students hold their artwork and create a group storyline with their pieces, arranging themselves from beginning to end as if they were re-creating the journey of a drop.

## FURTHER READING

*Find your watershed: https://water.usgs.gov/wsc/map_index.html*

*Blow painting: https://artfulparent.com/blow-painting-with-straws/*

*Salt painting tutorial: https://www.youtube.com/watch?v=4P2yeKmMSWo*

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# APPENDIX
## IMAGE ATTRIBUTIONS

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