

Teacher Led PRE Activity: Math Watershed Program

Subject Area: Math

Grade Level: 5th-8th

Duration: 1 hour

Unit Title: *Watersheds: Through the Mountain to the Valley*

Lesson Title: Compare Precipitation at Oregon Caves NM and Deer Creek Center

Objectives

Students will be able to:

- Determine the mean, median, and range of precipitation for 2008 at each site.
- Create a line graph displaying the precipitation amounts at each site.
- Use the graph to compare precipitation for 2008 at each site.
- Understand how precipitation affects the character of a watershed.

Materials/Resources

- Graph paper
- Pencils
- Ruler
- White board or overhead
- Optional: calculator

Anticipatory Set

Ask Students:

- How could you measure the amount of rain that falls in one place?
- How does the amount of rain or snow that falls in one location affect plants? Animals? Soil and rocks?
- Would more rain fall on top of a mountain or on the bottom of a valley? Explain your answer.

Objective/Purpose

The water cycle is the largest physical process on Earth. Measuring precipitation is one way to observe the water cycle in action. Trends in daily weather observed over time provide a picture of yearly weather patterns called climate. Weather and climate are an important factor in describing the character of a watershed. Explain to students that they will compare

precipitation at Oregon Caves NM and Deer Creek Center (DCC) by computing precipitation statistics and creating a graph of the data.

Input

Precipitation is the water which falls from the atmosphere to the Earth. Precipitation can be measured with a rain gage – a tube-shaped device attached to a ruler. Scientists use a rain gage to make inquiries based on precipitation measurements. Measurements are recorded daily at specific sites and the monthly totals are reported in inches. The amount of precipitation that occurs at a location determines the plants, animals, and organisms that survive, the amount of water in surface streams and the groundwater table, and the general character of the watershed at that location.

Trying to determine trends or make inferences about data by reading long lists of numbers can be difficult. But, having graphs and models to represent the data allows easier comprehension. During the last step of the scientific process, scientists interpret experimental or observational results. This step helps to draw conclusions about the study. Graphs, charts, or models make this information readily available to others.

Model

1. Display the data sets for precipitation at Oregon Caves NM and Deer Creek Center on a black board, overhead projector or as a handout.
2. Students will begin by calculating the mean, median, and range of monthly precipitation for 2008 at each location.

For example: The mean (or average) monthly precipitation of Oregon Caves NM in 2008 is the precipitation, in inches, for each month added together and divided by 12. This gives you the average monthly precipitation at Oregon Caves NM for 2008.

3. Ask students to review the parts of a line graph: title, labels, scale, points, and line.
4. Students will create a line graph depicting precipitation at each site for 2008.

X-axis label= Months 2008
X-axis units= 12 months Jan- Dec.
Y-axis label= Precipitation in inches
Y-axis units= Inches

5. Students should graph precipitation data for both Oregon Caves NM and Deer Creek Center. Note: Graphing both data sets on the same graph allows easier comparison of the sites.

Check for understanding

1. What is the scale of range?
2. Which location has a higher average precipitation during 2008?

3. Which month has the highest precipitation at each site? Is it the same at each location?
4. Would you expect to see the same trends in precipitation from month to month in the year 2010? Why or why not?

Closure

Inform students that Oregon Caves NM is located on the side of a mountain at 4,000 feet above sea level. Deer Creek Center is located at the bottom of a valley at 1,200 feet above sea level. The two sites are approximately 14 miles apart as the crow flies. Drawing a picture on the blackboard may help communicate this clearly.

Using this information and your graph:

1. What conclusions could be drawn when comparing precipitation on a mountain and precipitation in a valley both occurring in the same region?
2. Would you expect to find larger amounts of snow at Oregon Caves NM or Deer Creek Center? Why?
3. Describe how precipitation might affect the character of a watershed. Include the effects on plants, animals, and rocks (geology).

Oregon State Standards: Math (2007)

5th Grade

5.1.2

Use decimal models, place value, and number properties to add and subtract decimals (to the thousandths).

5.1.7

Construct and analyze double bar, line, and circle graphs to solve problems involving fractions and decimals.

6th Grade

6.1.2

Use and analyze a variety of strategies, including models, for solving problems with multiplication and division of fractions.

6.3.5

Represent, analyze, and determine relationships and patterns using tables, graphs, words and when possible, symbols.

7th Grade

7.2.1

Represent proportional relationships with coordinate graphs and tables, and identify unit rate as the slope of the related line.

7.2.3

Use coordinate graphs, tables, and equations to distinguish proportional relationships from other relationships, including inverse proportionality.

8th Grade

- 8.1.1 Translate among contextual, verbal, tabular, graphical, and algebraic representations of linear functions.
- 8.2.1 Organize and display data (e.g., histograms, box-and-whisker plots, scatter plots) to pose and answer questions; and justify the reasonableness of the choice of display.
- 8.2.3 Interpret and analyze displays of data and descriptive statistics.

Oregon State Standards: Science (2009)

5th Grade

- 5.3S.1 Based on observations and science principles, identify questions that can be tested, design an experiment or investigation, and identify appropriate tools. Collect and record multiple observations while conducting investigations or experiments to test a scientific question or hypothesis.
- 5.3S.2 Identify patterns in data that support a reasonable explanation for the results of an investigation or experiment and communicate findings using graphs, charts, maps, models, and oral and written reports.
- 5.3S.3 Explain the reasons why similar investigations may have different results.
- 5.4D.1 Using science principles describe a solution to a need or problem given criteria and constraints.

6th Grade

- 6.1P.1 Describe physical and chemical properties of matter and how they can be measured.
- 6.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct an investigation that uses appropriate tools and techniques to collect relevant data.
- 6.3S.2 Organize and display relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions.
- 6.3S.3 Explain why if more than one variable changes at the same time in an investigation, the outcome of the investigation may not be clearly attributable to any one variable.

7th Grade

- 7.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools and techniques to collect relevant data.
- 7.3S.2 Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of an investigation, and communicate the conclusions including possible sources of error.

8th Grade

- 8.3S.1 Based on observations and science principles, propose questions or hypotheses that can be examined through scientific investigation. Design and conduct a scientific investigation that uses appropriate tools, techniques, independent and dependent variables, and controls to collect relevant data.
- 8.3S.2

Organize, display, and analyze relevant data, construct an evidence-based explanation of the results of a scientific investigation, and communicate the conclusions including possible sources of error. Suggest new investigations based on analysis of results.

Monthly Precipitation at Oregon Caves NM (OCNM) and Deer Creek Center (DCC)

<u>Month</u>	<u>OCNM 2008 Rain</u>	<u>DCC 2008 Rain</u>
January	6.24"	4.43"
February	3.87"	2.75"
March	5.27"	4.95"
April	3.81"	2.48"
May	0.98"	0.96"
June	0.14"	0.09"
July	0.02"	0.00"
August	0.00"	0.00"
September	0.05"	0.00"
October	2.26"	2.11"
November	6.98"	6.05"
December	7.88"	5.9"
