

Raindrops: Where Does Rain Fall in Arizona?

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Grade Level 6
Duration 2 class periods

National Standards

GEOGRAPHY
Element 3: Physical Systems
7. The physical processes that shape the patterns of Earth's surface.

AZ Standards

MATHEMATICS
Statistics and Probability
6.SP.A.1 Display and interpret numerical data by creating plots on a number line including histograms, dot plots, and box plots.

Arizona Social Science Standards

GEOGRAPHY
The use of geographic representations and tools helps individuals understand their world.
6.G1.1 Use and construct maps, graphs, and other representations to explain relationships between locations of places and regions. Key concepts include major landforms and water bodies, countries, cities, ecosystems, climate, languages, religion, economic systems, governmental systems, population patterns, disease, trade routes, and settlement patterns
Global interconnections and spatial patterns are a necessary part of geographic reasoning.
6.G4.1 Explain why environmental characteristics vary among different world regions. Key concepts include but are not limited to latitude, elevation, landforms, location, and human factors

Overview

Arizona is often characterized as one large desert with little or no rainfall. Rainfall varies in different parts of the state, creating different landscapes and geographical areas.

Purpose

In this lesson students will gain a better understanding of the geographical regions of Arizona through an analysis of rainfall and elevation in a scatter plot.

Materials

- Handout #1: Arizona Cities map
- Colored pencils or markers
- Handout #2: Average Annual Rainfall and Elevations of Arizona Cities and Answer Sheet
- Arizona Landforms Regions map
- Handout #3: Graph Template and Answer Key
- Handout #4: Raindrops Quiz and Answer Key
- Handout #5 Scatter Plot Samples

Objectives

The student will be able to:

1. Locate major geographical areas of Arizona.
2. Locate major cities on a map of Arizona and describe the general climate of the cities.
3. Create, read, and analyze scatter plots.
4. Explain the correlation between elevation and precipitation in Arizona.

Procedures

Prerequisite Skills: Students should have experience in constructing and reading scatter plots. Use or display Handout #5 - Sample Scatter plots for review of interpreting scatter plots if necessary.

SESSION ONE

1. Ask students to describe the climate of Arizona. Make a list of words students use to describe the climate.
2. Distribute Handout #1 – Arizona Cities map. Ask students which cities they have visited. What is the climate like in those cities? How does the climate in those cities differ from our city?

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3. Ask students to predict which cities get the least rainfall and which get the most rainfall. Pass out Handout #2 – Annual Average Precipitation and Elevations of Arizona Cities. Ask students to look at the fourth column, which gives average annual precipitation for each city. Compare students' predictions with figures on chart.

4. Explain to students that they will be using the elevation and precipitation data to make a graph later in this lesson. Because some of the numbers are not very "friendly", students will need to round them off for ease of use in making the scatter plot. Elevations should be rounded to the nearest hundred. Ask students to name multiples of 100: 100, 200, 300, etc. All of the numbers should end with one of these multiples. Model the concept with Morenci that is not included in the table. Elevation: 4,747 feet is closer to 4,700 than to 4,800 feet and will be rounded to 4,800. (See Answer Sheet for all the other cities.)

5. Students should also round precipitation data to the nearest whole number. One way to explain this is to relate it to money. Using Morenci again as an example: Morenci has an average precipitation of 15.89 inches of rain. Ask students if \$15.89 is closer to \$16.00 or closer to \$15.00. The correct answer is 16.

6. Distribute colored pencils or markers. Have students color each city according to the amount of rainfall each gets. They will need five different colors to mark cities with the following amounts of rain:

- Less than 5 inches
- 5 – 9 inches
- 10 – 14 inches
- 15 – 19 inches
- More than 20 inches

Again, model using Morenci as an example and color in the triangle and that appropriate part of the Precipitation Key.

7. Ask students what conclusions they can draw from looking at the color patterns on the map. (*All of the cities with less than 5 inches of rain are along the western border of the state. The only cities with more than 20 inches of rain are in the north central part of the state. Most of the cities receive between 5 and 14 inches of rain per year and most of those cities are in the southern part of the state.*) Project the Arizona Landform Regions map. Ask students to pencil in the three regions on Handout #1 – Arizona Cities. Why do certain areas of the state get more rain than others? (*Students should determine that some cities have higher elevations than others. They should notice that the driest places are at low elevations, and that the places with the most precipitation are at higher elevations.*)

8. To verify that there is a relationship between the amount of rainfall in a city and its elevation, have students create a scatter plot of the two sets of data.

Pass out Handout #3 - Graph Template and ask students to begin a scatter plot. The template already has the x and y axes labeled for students. (*If students have experience making scatter plots, give them blank graph paper and let them determine the labels and scales for the axes.*) The students should begin with the first city, Ajo. Since the elevation is 1800 feet, students should go between 1000 and 2000 on the x -axis, but a little closer to 2000. They should then continue up vertically and plot a point in the middle of 5 and 10 on the y -axis, as the precipitation for Ajo is 8 inches.

9. Assign the scatter plot for homework if it is not done by the end of the session.

SESSION TWO

1. Ask students to direct their attention to the scatter plot that they completed. What conclusions can they draw from analyzing the scatter plot? Is there a relationship between the elevation of a city in Arizona and the amount of rain it gets? In other words, do cities with higher elevations get more rainfall, and cities with lower elevations get less rainfall? The students should notice that the points on the graph generally follow a trend from the lower left corner of the graph towards the upper right corner. If students have difficulty seeing this, show them the first two examples of positive correlations in Handout #5.

2. Are there exceptions to the general positive trend in the Arizona scatter plot? Which cities are they? Why don't they fit the trend?

3. Pass out the Raindrops Quiz. Students should work individually or in small groups to answer the questions.

Assessment

Students will be evaluated by their scores on the quiz. Questions 1, 3, 5, 7 and 10 can be used to evaluate math skills. Questions 2, 4, 6, 8 and 9 can be used to evaluate geography concepts. A score of 80% or more indicates mastery of the objectives.

Extensions

Project the Average Yearly Rainfall in a Normal Period map to show how a choropleth map uses color to show precipitation.

More information on the climate of Arizona can be found at the Western Regional Climate Center's web site. There are many interesting

- Historical Climate Information:
- <http://www.wrcc.dri.edu/CLIMATEDATA.html>
- Climate Narrative of Arizona:

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- <http://www.wrcc.dri.edu/narratives/ARIZONA.htm>
- Climate Extremes by state:
- http://www.wrcc.dri.edu/htmlfiles/state_extremes.html

Western Regional Climate Center, wrcc@dri.edu

Ideas for this lesson were adapted from *Arizona Water Story, An Upper Elementary School Unit of Study*. <http://www.cap-az.com/education/arizona-water-story-4-6>

Sources