Grand Canyon: A River Rafting Trip

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Grade Level	6-7
Duration	1 class period

National Standards	AZ Standards	Arizona Social Science Standards
GEOGRAPHY **Element 1: The World in Spatial Terms** 1. How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information **Element 2: Places and Regions** **4.** The physical and human characteristics of places.	**MATHEMATICS** **Statistics and Probability** 6.SP.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. 6.SP.5. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. 7.SP.1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	**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. **The use of geographic representations and tools helps individuals understand their world.** 7.G1.1 Use and construct maps and other geographic representations to explain the spatial patterns of cultural and environmental characteristics. Key tools and representations such as maps, globes, aerial and other photos, remotely sensed images, tables, graphs, and geospatial technology 7.G1.2 Analyze various geographic representations and use geographic tools to explain relationships between the location of places and their environments.

Overview

Students will take a virtual rafting trip on the Colorado River from Lake Powell to Lake Meade through the Grand Canyon. They will stop at several sites along the river.

Purpose

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Students will interpret a topographical map of the Colorado River through the Grand Canyon. Using the information from the map, elevations of various sites will be determined. The elevations found will be used to find the mean, median, mode, and range of the data.

Materials

- Elevations along the Colorado River map (no elevations given) https://geoalliance.asu.edu/sites/default/files/LessonFiles/Munson/CANYON/coloradoriv-blank.pdf
- Elevations along the Colorado River map (elevations given) https://geoalliance.asu.edu/sites/default/files/LessonFiles/Munson/CANYON/ColoradoRiver2.pdf
- US map (with state names) https://geoalliance.asu.edu/sites/default/files/maps/US-NAMES.pdf
- Arizona's Landforms and Rivers map https://geoalliance.asu.edu/sites/default/files/maps/AZPHYSICAL.PDF
- Assessment
- Assessment Key
- Grading Rubric for Mathematical Questions
- Satellite pictures and Movies (optional)
- Tutorial on How to Read Topographic Maps (optional)
- Photographs of a Rafting Trip Down the Grand Canyon
- Hike to Indian Garden map https://geoalliance.asu.edu/sites/default/files/maps/BW_Indian_Gardens_ft.pdf
- Photographs of Hiking Bright Angel Trail to Indian Garden
- Hike to Indian Garden map Photo Locations map https://geoalliance.asu.edu/sites/default/files/LessonFiles/Munson/CANYON/indgardenMapPhotos.pdf

Objectives

The student will be able to:

1. Determine the elevation of several sites along the Colorado River from Lake Powell to Lake Meade through the Grand Canyon using a topographical map.

2. Calculate the mean, median, mode, and range of the elevations.

Procedures

Prerequisite Skills: Students should have experience in finding measures of central tendency: mean, median, and mode, as well as the range.

1. Ask if students have ever been to the Grand Canyon. Have them describe the setting.
2. Locate the Grand Canyon on a US map and an Arizona map.
3. (Optional) Project the satellite picture of the Grand Canyon and Lake Powell and the satellite picture of Lake Powell and the city of Page. Project the movies that accompany this lesson.
4. (Optional) Project pictures of a river-rafting trip on the Colorado River.
5. Distribute copies of "Hike to Indian Garden map and Elevations along the Colorado River map" along the Colorado River (for practice) map to the students. Show the photographs of the Hike to Indian Garden.
6. Discuss how to determine the elevations of the points on the blank map. (On "Elevations Along the Colorado River" map, the elevations are given as numbers on the river. On "Hike to Indian Gardens", the elevations marked on darker lines show elevations by 500 foot
increase or decrease and the light lines show 100-foot increase or decrease in elevation.)
7. Discuss where the terrain is steep and where it is relatively flat and how this is depicted on a topographical map. (The closer the lines are together, the steeper the terrain.)
8. Give assessment. Use "Elevations along the Colorado River with labels" map (for assessment). Remind students to show their work.

Assessment

Geography: Mastery for reading a topographical map is 6 out of 7 correct on the elevations.

Mathematics: Calculation of mean, median, mode, and range can be assessed using the grading rubric. Mastery of the math skills is 13 points out of a possible 16 points.

Extensions

1. Graph the elevations on a line graph.

2. Find elevations on other topographical maps.

3. Shade the steepest areas on a topographical map and compare it to a landform map.

4. Put teacher selected sites on the blank map.

5. Make a simple topographical map with intermediate contour lines not marked on it.

6. Use string and measure the distance between 200' (teacher selected) elevations. Discuss where the river would be moving the fastest, slowest, etc. Calculate mean, median, mode, and range for these numbers.

7. Use the “Hike to Indian Gardens” map for a more detailed elevation map. Do the same activities with this map.

8. Determine the elevation of specific locations on the “Hike to Indian Garden” map, such as, Burro Spring, Plateau Point, Horn Creek Rapids, etc.

9. Students create a hiking trail on the “Hike to Indian Garden” map. Explain why they chose the route including a discussion of the terrain.

10. Make a contour map of a potato or sweet potato to represent a mountain. Slice the potato in half and trace around the edge. Slice the potato in 5mm or 1cm intervals and trace after each slice. This creates a topographical map of the potato.

Sources

Nancy Selover, State Climatologist of Arizona

Niccole Cerveny, Faculty, Mesa Community College

Language Arts Connections:
River Thunder by Will Hobbs
ISBN 0-440-22681-3

Over the Edge: Mysteries in our National Parks#7 by Skurzynski & Ferguson. National Geographic Society Reading Expeditions series
ISBN 0-7922-6686-2