Grand Canyon: A River Rafting Trip
On a journey through the Grand Canyon, students practice finding elevations on a topographical map and determine measures of central tendency.

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Grade Level: 4-5
Duration: 1 class periods

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

Purpose
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.

National Geography Standards
ELEMENT TWO: PLACES AND REGIONS
4. The physical and human characteristics of places.

Arizona Geography Strand 4
CONCEPT 1
World in Spatial Terms
GRADE 4
PO 1 Use different types of maps to solve problems.
PO 7 Locate physical and human features in Arizona using maps, illustrations or images:
   a. physical--Grand Canyon, Mogollon Rim, Colorado River, Gila River, Salt River
GRADE 5
PO 1 Interpret information from a variety of maps:
   contour, population density, natural resource and historical maps.
PO 4 Locate physical and human features in the United States and world on an appropriate type map.

Arizona Math Standard
STRAND 2: Data Analysis, Probability, and Discrete Mathematics
CONCEPT 1: Data Analysis (Statistics)
GRADE 4
PO5 Identify the mode(s) of given data.
GRADE 5
PO5 Identify the mode(s) and mean (average) of given data.

Materials
- Elevations along the Colorado River map
- Elevations along the Colorado River map (with labels)
- Hike to Indian Garden map
- Hike to Indian Garden colored map
- Hike to Indian Garden map Photo Locations
- US map with names
- Arizona’s Landforms and Rivers map
- Assessment
- Answer key
- Grading Rubric
- Satellite pictures (optional)
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- Colorado River rafting pictures (optional)
- Indian Garden hike pictures (optional)

**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) Show the satellite picture of the Grand Canyon and Lake Powell and the satellite picture of Lake Powell and the city of Page.

4. (Optional) Show 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.

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.

*Math:*

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, Asst. State Climatologist of AZ in the Geography Dept. of Arizona State University.

Nicolle Cerveny, Faculty, Mesa Community College

Language Arts Connections:
River Thunder by Will Hobbs

Over the Edge: Mysteries in our National Parks#7 by Skrzynski & Ferguson. National Geographic Society Reading Expeditions series