

# Grand Canyon: A River Rafting Trip

Joanne Munson

*On a journey through the Grand Canyon, students practice finding elevations on a topographical map and determine measures of central tendency.*

**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 Meade 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.

## 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)
- 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.

## Standards

### National Geography Standards

Element Two: Places and Regions

4. The physical and human characteristics of places.

### Arizona Geography Standards

Essentials 3SS-E1 Demonstrate understanding of the physical and human features that define places and regions in Arizona, including the use of geographic tools to collect, analyze, and interpret data with emphasis on:

PO2 explaining and using map titles, symbols, scale, cardinal and intermediate directions, and elevation on map of Arizona.

### Arizona Math Standards

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.

### National Social Studies Performance Expectation

III. c. Use geographic tools such as ... grid systems, charts, graphs, and maps to generate, manipulate, and interpret information.

- (Optional) Show pictures of a river-rafting trip on the Colorado River.
- Distribute copies of the “Hike to Indian Garden map (inside back cover) and “Elevations along the Colorado River” map.
- Discuss how to determine elevations (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 at intervals of 500 and 1000 feet and the light lines show increases or decreases of 100 feet in elevation.)
- 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.)

- Give the assessment outlined below. Use the “Elevations along the Colorado River” map. Remind students to show their work.

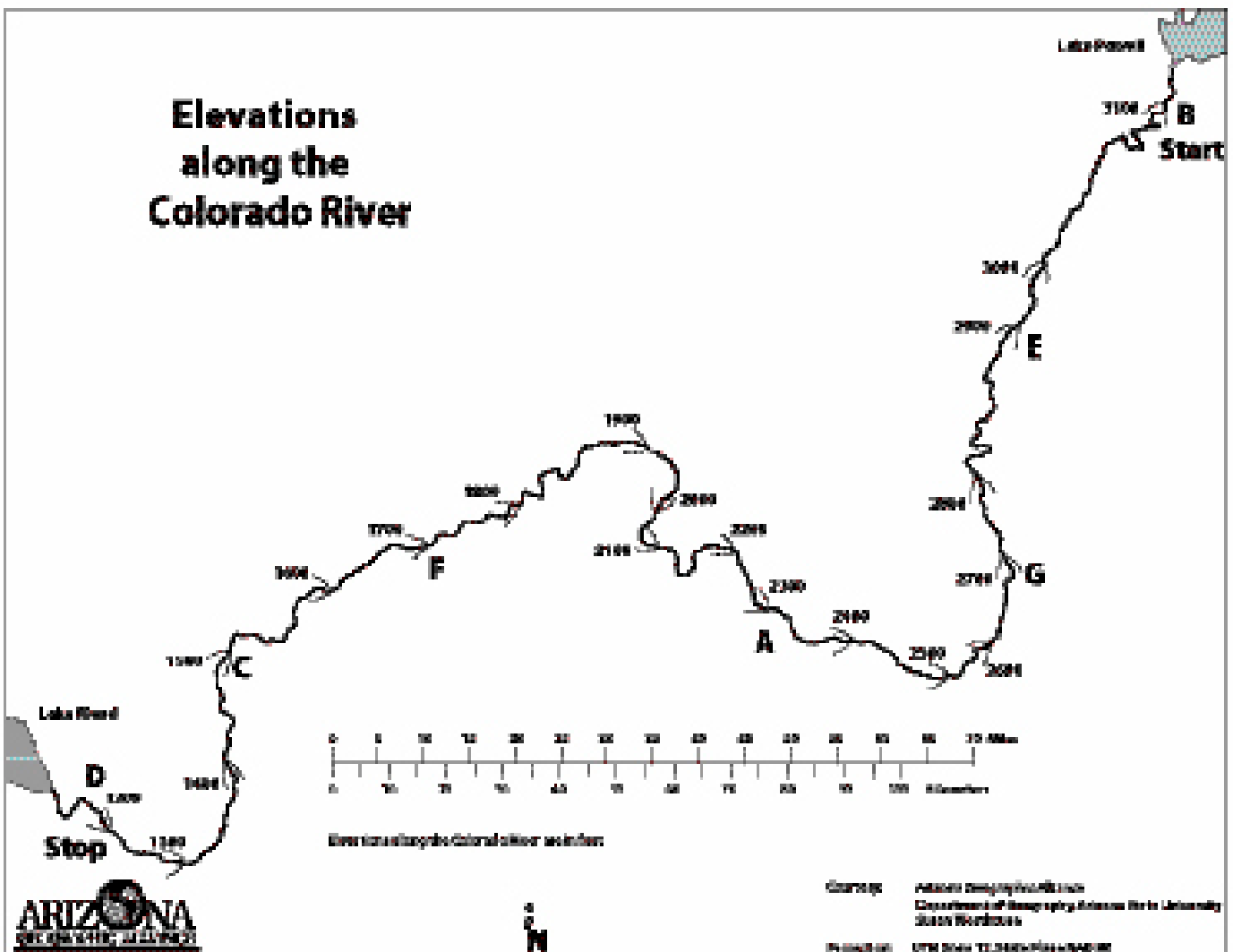
**Assessment**

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


**Math:** The 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**

- Graph the elevations on a line graph.
- Find elevations on other topographical maps.
- Shade the steepest areas on a topographical map and compare it to a landform map.
- Put teacher-selected sites on the blank map.
- Make a simple topographical map with intermediate contour lines not marked on it.
- Use string and measure the distance between 200’ (teacher selected) elevations. Discuss where the river



would be moving the fastest, slowest, etc. Calculate the mean, median, mode, and range for these numbers.

7. Use the "Hike to Indian Gardens" map on the inside back cover 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

Hobbs, Will. *River Thunder*. New York: Dell Laurel Leaf, 1999.

Over the Edge (Mysteries in Our National Parks Series). Washington, DC, National Geographic Society Reading Expeditions, 2003.

Thanks to Nancy Selover, Asst. State Climatologist of AZ in the Geography Dept. of Arizona State University and to Niccole Cerveny, Faculty, Mesa Community College

#### ASSESSMENT

1. Determine the elevation of each of the sites listed below on the "Elevations along the Colorado River" map, and you should stick to that of the Colorado River through the Grand Canyon. Site Elevation A B C D E F G
2. Find the range of the elevations of the sites. Show your work.
3. Put the elevations in order and find the median. Show your work.
4. Is there a mode? If so, what is it?
5. Find the mean of the elevations of the sites. Show your work.

#### ASSESSMENT KEY

1. Determine the elevation of each of the sites listed below on the topographical map of the Colorado River through the Grand Canyon.

Site	Elevation
A	2300'
B	3100'
C	1500'
D	1200'
E	2900'
F	1700'
G	2700'

2. Find the range of the elevations of the sites. Show your work.  
 $3100 - 1200 = 1900$   
*Range = 1900ft.*
3. Put the elevations in order and find the median. Show your work.  
 $1200, 1500, 1700, 2300, 2700, 2900, 3100$   
*Median = 2300 ft.*
4. Is there a mode? If so, what is it?  
*No mode since each elevation is listed only once.*
5. Find the mean of the elevations of the sites. Show your work.

$$1200 + 1500 + 1700 + 2300 + 2700 + 2900 + 3100 = 15,400$$

$$15,400 / 7 = 2200$$

*Mean = 2200 ft.*

#### Grading Rubric for Mathematics Questions

- 4 - The student set up the problem correctly. The answer is correct.
- 3 - The student set up the problem correctly. The answer is not correct.
- 2 - The student set up the problem using the wrong method. (For example, the student used the method for median for the mean or the range for the mode.)  
 The answer was not correct, but would have been for the method used.
- 1 - The student set up the problem incorrectly and the answer was not correct.
- 0 - The student made no effort to work the problem.

