Journey to Africa: Rainfall or Drought
Students create box and whiskers graphs showing desertification.

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Grade Level
6-8

Duration
2 class periods

Overview
Box-and-whiskers and stem-and-leaf allow for comparing data sets of various sizes regardless of the size of the material. These charts break the data into fourths. As a result, it is easier to compare the data. Students can compare many sets of data at once. Desertification is difficult to visualize, but with stem-and-leaf and box-and-whisker graphs correlations between data are easily recognized.

Purpose
In this lesson students will learn how to make stem-and-leaf and box-and-whisker charts and to

<table>
<thead>
<tr>
<th>National Geography Standards</th>
<th>Arizona Geography Strand 4</th>
<th>Arizona Math Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEMENT ONE: THE WORLD IN SPATIAL TERMS</td>
<td>CONCEPT 1 The World in Spatial Terms GRADES 6, 7 and 8</td>
<td>STRAND 2 Data Analysis, Probability and Discrete Math CONCEPT 1 Data Analysis (Statistics)</td>
</tr>
<tr>
<td>1. How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective.</td>
<td>PO 3 Interpret maps, charts and geographic databases using geographic information.</td>
<td>GRADE 6</td>
</tr>
<tr>
<td>ELEMENT THREE: PHYSICAL SYSTEMS</td>
<td>CONCEPT 6 Geographic Applications GRADES 6, 7and 8</td>
<td>PO2 construct a histogram, line graph, scatter plot, or stem and leaf plot with appropriate labels and title of organized data</td>
</tr>
<tr>
<td>7. The physical processes that shape the patterns of Earth's surface.</td>
<td>PO 3 Use geographic knowledge and skills when discussing current events.</td>
<td>PO5 Find the mean, median, mode, range, and extreme values of a given numerical data set</td>
</tr>
<tr>
<td>ELEMENT SIX: USES OF GEOGRAPHY:</td>
<td></td>
<td>PO6 Identify a trend from displayed data.</td>
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<td>18. How to Apply Geography to Interpret the Present and Plan for the Future</td>
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<td>GRADE 7</td>
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<td>PO4 Interpret data displays including histograms, stem-and-leaf plots, circle graphs, and double line graphs</td>
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<td>PO5 Answer questions based on data displays including histograms, stem-and-leaf plots, circle graphs and double line graphs.</td>
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<td>PO6 Find the mean, median, mode, range, of a given numerical displayed data</td>
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<td>Interpret trends from displayed data.</td>
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<td>PO9 Solve contextual problems using histograms, line graphs of continuous data, double bar graphs and stem-and-leaf plots</td>
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<td>GRADE 8</td>
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<td>PO2 Construct box and whisker plots</td>
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<td>PO3 Determine the appropriate type of graphical display for a given set of data</td>
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<td>PO4 Interpret box-and-whisker plots, circle graphs and scatter plots</td>
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<td>PO5 Answer questions based on box-and-whisker plots, circle graphs and scatter plots</td>
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<td>PO6 Solve problems in contextual situations using the mean, median, mode, and range of a given data set.</td>
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<td>PO9 Solve contextual problems using scatter plots, box-and-whisker plots, and double line graphs of continuous data</td>
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</tbody>
</table>
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analyze data from them. Students should be able to see the relationship between the Sahel, desertification, and the area around the equator by comparing the rainfall.

Materials

- African Regions map
- African Regions and 7 Cities map
- Tables of monthly temperature and precipitation data for 7 cities in Africa
- Self-adhesive notes
- Graph paper
- Step-by-Step Procedures on How to Make a Box-and-Whisker Chart
- Step-by-Step Procedures on How to Make a Box-and-Whisker Chart overhead version
- Stem-and-Leaf Teacher Instructions
- Stem and Leaf for Dakar
- Climographs of 7 African Cities
- Paper, pencil
- Analysis Questions for Box and Whiskers Key
- Analysis Questions for Box and Whiskers
- Closure for Day One
- Teachers’ key to Box and Whisker plots
- Teacher’s key to Stem and Leaf diagrams

Objectives

The student will be able to:


2. Demonstrate analysis of stem-and-leaf and box-and-whisker by answering various questions.

3. Understand the effects of rainfall on regions of Africa.

Procedures

Prerequisite knowledge: students should have understanding of how to find median and mode.

SESSION ONE

1. Distribute the Tables of monthly temperature and precipitation data for seven cities in Africa and the African Regions map that shows the Sahel.

2. Have students place the cities on the map using the longitude and latitude coordinates of each city. (The longitude and latitude for the seven cities are found at the top of the chart data near the city name.)

3. Discuss what the area around the city might look like. If possible, show pictures of the area.

4. Draw a stem (vertical line on the board) and give each student 3 self-adhesive notes. (A piece of paper and tape can be substituted for the notes.) (See Stem-and-Leaf Teacher Instructions.)

5. Write the data for Dakar on the board including all 0’s. (Total of 12 numbers)

6. Have a student put the data for Dakar in descending order.

7. Have each student write each digit of the given numeral on separate notes.

8. Have the students place the notes on the stem according to the tens place in ascending order until all 12 pieces of data is placed. Then place all the ones on the leaf side.

9. Remove the extra “stems” (tens digits) until one is left to visually demonstrate that only one is needed. Leave all the ones (leaf”). (Do not take them off.)
10. Create a title and key for stem and leaf plot.
Title: Dakar’s Rainfall Over 12-Month Period.
Key 2/1 = 21.


13. Distribute blank papers to students.

14. Place the Overhead Procedures on the overhead projector and work one of the box-and-whiskers with the students. Keep the stem and leaf on the board so students can refer to it as you work your box-and-whiskers.

15. Have students work on the other cities in groups.

16. After they have a rough draft of the cities, distribute the graph paper and have them copy their information onto the graph paper neatly. (Be sure their scale is at the bottom of the paper.) They may need to paste two or three pieces of graph paper in order to have enough room for some of the box-and-whiskers.

17. Utilize the answer key box-and-whiskers for each of the cities to make sure the students have theirs completed theirs correctly.


SESSION TWO
1. Have students finish their box-and-whiskers.

2. When students are finished distribute the analysis questions.

3. Have the students place their box-and-whiskers and charts of cities’ rainfall on their desks so that they may refer to them to complete the questions.

4. Closure: Have students turn to the person next to them and discuss 3 things they learned today.

5. Call on students to tell what they discussed. Be sure to get beyond the math skills and focus on the effects rainfall have on Africa.

Assessment
Grade students’ box-and-whisker for each of the cities and grade the stem-and-leaf practice for math correctness. A score of 80% or higher is considered mastery.

Grade the Analysis Questions for the box-and-whisker. Questions 3B, 6, 7, 8, and 9 measure geography concepts. Questions 1, 2, 3A, 4, and 5 measure math concepts. A score of 80% or higher is considered mastery.

Extensions
Students can make a box-and-whisker for the temperature of each of the cities.

Students can make a climograph of each of the cities.

Students can make a stem-and-leaf for the temperature of each of the cities.

Sources
www.bbc.co.uk/weather/destination/static