**Title: Mean, Median, or Mode — Which Is the Best Measure of Central Tendency? Washington Redskin's Scores**

**Link to Outcomes:**

- **Statistics** Students will organize data; construct a stem and leaf plot; and perform mean, median, and mode calculations, as well as, quantifying the range numerically.
- **Problem Solving** Students will work in a cooperative environment to determine the best measure of central tendency.
- **Reasoning** Students will demonstrate the ability to work in groups to organize data and develop a summary of their interpretation of the measure of central tendency.
- **Communication** Students will communicate data results both orally and in written form. They will read, write, and discuss mathematics with language and the signs, symbols, and terms of the discipline.
- **Probability** Students will identify and predict trends from the data provided.
- **Connections** Students will demonstrate their ability to connect mathematical topics within the discipline and with other disciplines.
- **Technology** Students will demonstrate their ability to solve problems using arithmetic operations with technology where appropriate.

**Brief Overview:**

Students will work in groups to arrange, analyze, and interpret data given on the Washington Redskin's scores for the football seasons 1990 through 1994. Students will construct a stem and leaf plot. In addition, students will use the mean, median, and mode to determine the best measure of central tendency for each year of data provided. Using this information, they will construct a bar graph. Students will then summarize the data and predict the average score for the 1995 football season. Students will share this information both orally and in written form.

**Grade/Level:**

Grades 3 - 5

**Duration/Length:**

This activity could take three class sessions. (It may take an extra session for third graders to complete all tasks assigned).

## Prerequisite Knowledge:

Students should have a working knowledge of the following skills:

- organizing data.
- constructing a stem and leaf plot.
- calculating the mean, median, and mode.
- constructing a bar graph.
- interpreting and predicting trends.

## Objectives:

- Students will work cooperatively in groups.
- Students will organize and interpret data.
- Students will construct a stem and leaf plot.
- Students will calculate the mean, median, mode, and range.
- Students will construct a bar graph.
- Students will determine the best method of central tendency.
- Students will identify and predict trends.
- Students will communicate results both orally and in written form.

## Materials/Resources/Printed Materials:

### Materials per group of four

- Activity data sheets for: vocabulary, calculation of mean, median, mode, range, and summary
- Graph paper
- Construction paper
- Rubrics for Activity Data Sheet
- Calculator
- Ruler
- Pencils with erasers

## Development/Procedures:

### Day 1

Students will review organization of data and construct a stem and leaf plot. Students will define and provide an example for each vocabulary word on Activity Data Sheet #1. Students will record all work on Activity Data Sheet #1.

- Review with students organization of data and construction of a stem and leaf plot.
- Ask students to organize scores for each year from Activity Data Sheet #2 and construct stem and leaf plot from data.
- Ask students to discuss organization of the data and their construction of the stem and leaf plot.

**Day 2**

Students will utilize the data provided on Activity Data Sheet #2 to calculate the mean, median, mode, and range for each year and construct a bar graph using the best method of central tendency calculated by year.

- Ask groups to explain calculation of mean, median, mode, and range.
- Ask individual groups to demonstrate construction of the bar graph.
- Students will show all calculations and discuss their results on Activity Data Sheet #2.

**Day 3**

Students will write a summary explaining selection of the best method of central tendency, identifying trends, and predicting the average score for the 1995 season.

- Students will use the rubrics provided to write the summary.
- Students will record all responses on Activity Data Sheet #3.
- Students will share through group presentations.

## Evaluation:

Teacher will evaluate students based on the following criteria:

- Group participation and performance
- Written summary - Rubric scoring

  4pts. -excellent
  3pts. -good
  2pts. -satisfactory
  1pt. -passing
  0pt. -unsatisfactory

- Oral presentation scoring

  3pts. -good quality
  2pts. -good content
  1pt. -presentation
  0pt. -no presentation

## Extension/Follow Up:

Possible math, science, social studies, and language arts extension would be to apply skills learned to generate histograms, pie charts, frequency tables, and pictographs.

## Authors:


| | | |
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# Vocabulary

Define the vocabulary words. Provide an example of each.

1. Mean
2. Median
3. Mode
4. Range
5. Data
6. Predict
7. Central Tendency
8. Summary
9. Outcome
10. Trend

# Football Scores By Year

| 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|
| 31 | 45 | 10 | 35 | 7 |
| 13 | 33 | 24 | 10 | 38 |
| 19 | 34 | 13 | 31 | 23 |
| 39 | 34 | 24 | 10 | 20 |
| 20 | 23 | 34 | 7 | 7 |
| 18 | 20 | 16 | 6 | 17 |
| 10 | 42 | 15 | 10 | 16 |
| 41 | 17 | 7 | 30 | 41 |
| 14 | 16 | 16 | 6 | 21 |
| 31 | 56 | 16 | 6 | 22 |
| 17 | 41 | 3 | 14 | 7 |
| 42 | 21 | 41 | 23 | 19 |
| 10 | 27 | 28 | 0 | 21 |
| 25 | 20 | 20 | 30 | 15 |
| 28 | 34 | 13 | 3 | 14 |
| 29 | 22 | 20 | 9 | 24 |

**Activity #2 Calculate mean, median, mode, and range for each year.**

**Activity #3** **Explain how and why you selected the best method of central tendency.**

**Activity #4** **Write a summary of the data provided from 1990 through 1994, and predict the average score for 1995. Explain your answer.**

# Rubrics for Activity Data Sheet

| | |
|---|---|
| 4 Pts. | Identify trends; predict future outcomes; determine the best method of central tendency; calculate the mean, median, mode, and range; organize data; construct a stem and leaf plot; present oral and written summary. |
| 3 Pts. | Determine the best method of central tendency; calculate the mean, median, mode, and range; organize data; construct stem and leaf plot. |
| 2 Pts. | Calculate the mean, median, mode, and range; organize data; construct a stem and leaf plot. |
| 1 Pt. | Organize data and construct stem and leaf plot. |
| 0 Pts. | Unrelated comments. |