

Unit 11 - Data Analysis and Statistics - Deconstructing TEKS

5. Question Stems

- ❖ How can you use measures of center to describe a data set?
- ❖ How can you use a box plot and measures of spread to describe a data set?
- ❖ How can you summarize and display numeric data?
- ❖ How can you display data in a stem-and-leaf plot. In a histogram?
- ❖ How can you summarize and describe categorical data?
- ❖ Why is it helpful to determine the mean of a data set?
- ❖ How are mean and median similar?
- ❖ Describe the difference between measure of center and measure of spread.
- ❖ How is using a dot plot useful to interpret data?
- ❖ Which measure(s) of center are easier to determine in a stem-and-leaf plot? Explain.
- ❖ Why would you create a frequency table before creating a histogram?
- ❖ How is the information you can learn from a box plot different from what you can learn from the same set of data shown in a dot plot?
- ❖ Why does the choice of measure of center and spread vary based on the type of data display?
- ❖ How can you use measures of center to summarize categorical data?
- ❖ Why is it important to choose the appropriate display for a set of data?
- ❖ How can you use proportional reasoning to solve problems involving graphs of data?
- ❖ How can I use a bar graph or dot plot to make comparisons and equivalents?
- ❖ How is using a circle graph useful to analyze and compare data?
- ❖ How can you use proportional reasoning to solve problems involving graphs of data?
- ❖ How do you compare two sets of data displayed in dot plots?
- ❖ How do you compare two sets of data displayed in box plots?

4. Learning Targets

Focus: Data Analysis - representing

I can...

- Represent numeric data on a dot plot
- Represent numeric data on a stem-and-leaf plot
- Represent numeric data on a histogram
- Represent numeric data on a box plot

Focus: Data Analysis - describing and summarizing

I can...

- Describe center, spread and shape of a distribution
- Summarize numerical data by calculating the mean, median, range, and interquartile range
- Summarize categorical data by calculating the mode, the percent values in each category
- Interpret numeric data summarized in dot plots, stem-and-leaf plots, histograms and box plots
- Distinguish between situations that yield data with and without variability
- solve problems using data represented in bar graphs including part-to-whole and part-to-part comparisons and equivalents
- solve problems using data represented in dot plots including part-to-whole and part-to-part comparisons and equivalents
- solve problems using data represented in circle graphs including part-to-whole and part-to-part comparisons and equivalents

Focus: Comparison Data Analysis

I can...

- compare two groups of numeric data using comparative dot plots by comparing their shapes, centers, and spreads
- compare two groups of numeric data using comparative box plots by comparing their shapes, centers, and spreads

1. TEKS: What do want students to know and be able to do?

6.12C summarize numeric data with numerical summaries, including the mean and median (measures of center) and the range and interquartile range (IQR) (measures of spread), and use these summaries to describe the center, spread, and shape of the data distribution

6.12D summarize categorical data with numerical and graphical

summaries, including the mode, the percent of values in each category (relative frequency table), and the percent bar graph, and use these summaries to describe the data distribution

6.13A interpret numeric data summarized in dot plots, stem-and-leaf plots, histograms, and box plots

7.6G solve problems using data represented in bar graphs, dot plots, and circle graphs, including part-to-whole and part-to-part comparisons and equivalents

7.12A compare two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads

3. Specific Skills

6.12.C - Students are first introduced to mean, median, range, and interquartile range in this grade level. Students use these measures to summarize numeric data from a list or table and describe the shape, center, and spread of the data distribution. In combination with 6.12A and 6.12B as students begin representing numeric data graphically, they will begin to summarize numeric data with numerical summaries (measures of center mean and median and measures of spread- range and interquartile range)

Mean - a central balance-point computed by adding all the numbers in the set of data and dividing the sum by the number of elements added.

Median - middle value in an ordered set of data such that 50% of the data is below and 50% is above the middle value

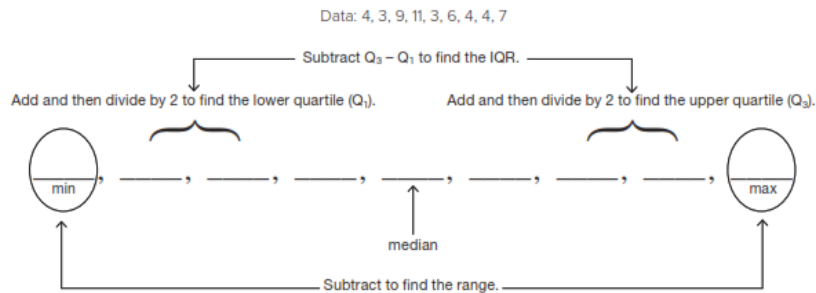
Range - the distance between highest and lowest data values

Interquartile range - The difference between quartile 3, median of upper 50% of data, and quartile 1, median of lower 50% of data

Instruction should provide many experiences for students to use the summaries to describe the center, spread, and shape of data distribution.

2. Academic Vocabulary

box plot
maximum value
center of data distribution
mean
outlier
compare
measures of center
measures of central tendency
shape of data distribution
data distribution
measures of spread
skewed data distribution
data point
median
spread of data distribution
dot plot
minimum value
symmetric distribution
interquartile range (IQR)
mode
upper quartile (Q_3)
lower quartile (Q_1)
bar graph
circle graph
percent
proportion
Ratio
bar graph
circle graph



6.12.D - In Grade 5, students built upon earlier work with graphic representations to summarize categorical data with bar graphs and frequency tables. Categorical data are data that can be sorted into categories according to the attributes of the data, such as shoe colors or favorite vegetables.

Students will summarize categorical data (data that is not numerical, but categories such as favorite ice cream where the frequency of each category would be represented as the height of a bar in a bar graph) with numerical and graphical summaries. Included in the summaries will be the mode (the category that occurs the most, not the frequency of the category), the percent values in each category (percentage is calculated using a relative frequency table - divide the frequency for each category by the total number surveyed and find the percentage) and the percent bar graph (the frequency of data where boys and girls indicated their favorite ice cream is displayed using percentages of the frequency of the data).

Example:

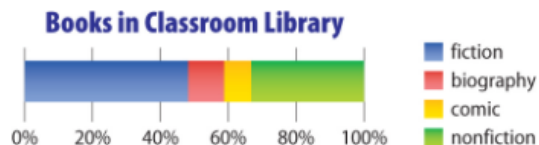
The table shows the number of students that have visited various amusement parks. Determine the relative frequency for each amusement park. Summarize and describe the data using the relative frequency. Summarize also using a percent bar graph

Park	Number of Students	Relative Frequency
Joyland Amusement Park	10	12.5%
Sandy Lake Amusement Park	8	10%
Six Flags Fiesta Texas	24	30%
Six Flags Over Texas	20	25%
Western Playland	18	22.5%

percent
 proportion
 Ratio
 Variability
 interval
 stem-and-leaf plot
 data point
 trend
 frequency table
 vertical
 histogram
 numerical data
 horizontal
 range
 data

Example:

The percent bar graph shows the types of books in a classroom library collection. Summarize and describe the data shown in the graph.



6.13A - In Grade 4, students solved one- and two-step problems using data in whole number, decimal, and fraction form in a frequency table, dot plot, or stem-and-leaf plot.

In Grade 5, students solved one- and two-step problems using data from a frequency table, dot plot, bar graph, stem-and-leaf plot, or scatterplot.

As students represent data on a dot plot, stem-and-leaf plot, histogram, and box plots instruction for this SE extends to the interpretation of the numeric data summarized in the graphs. Instruction should include a variety of graphs and allow students to shift from the visual image of the data to the numeric data summarized in the graph such as the measures of spread (range and interquartile range) or the measures of center (mean, median, mode). By describing numeric data summarized in the graphs, students should be able to understand how this numeric data is the element used to discuss and analyze the shape of the data distribution (spread, skewed, symmetrical).

6. Common Misconceptions

- ❖ Be aware that students may forget to arrange numbers in numerical order when determining the median or calculating the interquartile range.
- ❖ Note that students may incorrectly calculate the interquartile range when the data contains an even number of values because they do not include the 2 values in the middle when finding the upper and lower quartiles.
- ❖ Be aware that some students may misinterpret data from a percent bar graph
- ❖ Watch for students who have difficulty determining the “whole” to which the percent refers.
- ❖ Watch for students who misinterpret the data from a specific type of display.
- ❖ Be aware of students who struggle to interpret the fraction or percent of data represented in part of a display.
- ❖ Box Plots - quartiles representing 25% of the data set (even though they look like they are different sizes)

