

# TEKS Cluster: Data Analysis

**7.12 Measurement and data.** The student applies mathematical process standards to use statistical representations to analyze data.

Connected Knowledge and Skills 7.6

## Interpretation of Data

### *Readiness Standards*

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

### *Supporting Standards*

7.12(B) use data from a random sample to make inferences about a population

## Comparison of Data

### *Readiness Standards*

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

### *Supporting Standards*

7.12(C) compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations

## TEKS Scaffold

TEKS	Student Expectation
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**7.6 Proportionality.** The student applies mathematical process standards to use probability and statistics to describe or solve problems involving proportional relationships. The student is expected to:

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

6.13(A)	interpret numeric data summarized in dot plots, stem-and-leaf plots, histograms, and box plots (R)
6.12(A)	represent numeric data graphically, including dot plots, stem-and-leaf plots, histograms, and box plots (S)
5.9(C)	solve one- and two-step problems using data from a frequency table, dot plot, bar graph, stem-and-leaf plot, or scatterplot (R)

## Stimulus

Word Problem*	Verbal Description*	Chart/Table	Graph*
Equation/Expression	Manipulatives	Diagram/Image	Number Line
Base Ten Blocks	Measurement Tool	Formula	Geometric Figures

## Item Types

Multiselect (2 pts)	Match Table Grid (2 pts)	Drag and Drop (1-2 pts)	Fraction Model (1-2 pts)
Hot Spot* (1-2 pts)	Inline Choice (1-2 pts)	Number Line (1-2 pts)	Graphing (1-2 pts)
Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

## Content Builder (see Appendix for Tree Diagram)

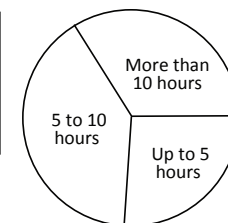
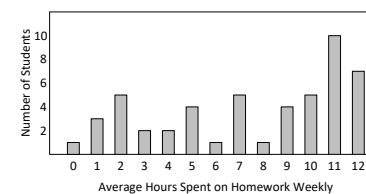
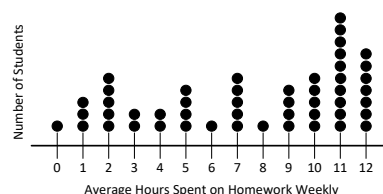
- Solve problems using data represented in bar graphs including part-to-whole comparisons/equivalents
- Solve problems using data represented in dot plots including part-to-whole comparisons/equivalents
- Solve problems using data represented in circle graphs including part-to-whole comparisons/equivalents

## Instructional Implications

Students solve problems using data summarized in graphs (e.g., bar graphs, dot plots, and circle graphs). Instruction should include a variety of graphs and allow students to use the visual image of the data to solve various problems. Students should use proportional relationships within the data when solving problems.

Instruction should include part-to-whole (e.g., approximately what percent of seventh grade students average less than 10 hours a week on homework?; justify your response) and part-to-part comparisons (approximately what percent of seventh grade students average less than 10 hours a week on homework compared to the seventh grade students who average more than 10 hours a week on homework?; justify your response).

It is important for students to understand the sum of the parts total the whole (e.g., 40% + 34% + 26% = 100%).



## Learning from Mistakes

Students may make the following mistakes:

- Not distinguishing between part-to-part and part-to-whole comparisons\*
- Not being able to describe the same data using multiple representations of rational numbers (e.g., 40% of the students are seventh graders does not mean the same thing as  $\frac{2}{5}$  of the students are seventh graders)
- Given a bar graph, having difficulty reading values between scaled intervals\*
- Not solving all the steps in a multi-step problem\*

## Academic Vocabulary

bar graph\*  
circle graph\*  
dot plot\*  
part-to-part  
part-to-whole  
percent

## Interesting Items

7.6(G) 2023 #28  
7.6(G) 2021 #15  
7.6(G) 2021 #33  
7.6(G) 2018 #6  
7.6(G) 2018 #31  
7.6(G) 2017 #15

**7.12 Expressions, equations, and relationships.** The student applies mathematical process standards to use statistical representations to analyze data. The student is expected to:

**(B) use data from a random sample to make inferences about a population**

## Role in Concept Development

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

**Connection/Relevance** As data from random samplings can be displayed in bar graphs, dot plots, and circle graphs, students need to be able to make inferences about various populations in order to solve related problems.

**When to Teach** With 7.6(G)

**Instructional Implications** Instruction should focus on the use of data from random samples (e.g., data collected from a selected group that is representative of the data from the whole group, such as asking at least one-third of seventh grade students to respond to a survey) to make inferences about a population (e.g., the whole group, such as all seventh grade students from each school in a Texas county).

## Stimulus

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Text Entry (1-2 pts)	Equation Editor (1-2 pts)	Multiple Choice* (1 pt)	

## Academic Vocabulary

certain\*  
random sampling\*

## Learning from Mistakes

Students may make the following mistakes:

- Identifying the mostly likely probability data as “certain” to happen (e.g., you are certain to pull a consonant from the alphabet because there are more consonants than vowels)\*

## Interesting Items

7.12(B) 2018 #18

## TEKS Scaffold

TEKS	Student Expectation
7.12(A)	<b>7.12 Expressions, equations, and relationships.</b> The student applies mathematical process standards to use statistical representations to analyze data. The student is expected to: <b>(A) compare two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads</b>
6.12(B)	use the graphical representation of numeric data to describe the center, spread, and shape of the data distribution (S)
6.12(C)	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 (R)

## Stimulus

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## Content Builder (see Appendix for Tree Diagram)

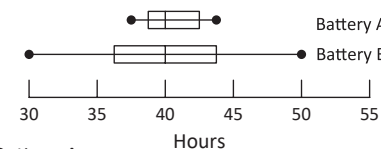
- Compare two groups of numeric data using dot plots
  - shape
  - centers
  - spreads
- Compare two groups of numeric data using box plots
  - shape
  - centers
  - spreads

## Instructional Implications

Students should compare two groups of numeric data using comparative graphical representations (e.g., dot plot or box plot) and compare the centers, spreads, and shapes of the distribution (e.g., the data is skewed right (heavily weighted to the left of the center), skewed left (heavily weighted to the right of the center), or is symmetrical to the center). To use comparative graphs, students need to understand that all graphs convey information, but different types of graphs highlight different features of the data (e.g., dot plots provide a graphic display used to compare frequency counts within groups; box plots display the median and information about the spread and distribution of the data).

Instruction should include comparisons of real-world situations, such as the box plot example shown at right. Given the battery life on two types of batteries, Battery A and Battery B:

- The two box plots have the same center (e.g., median is 40 hours of battery life for Battery A and Battery B)
- The spread for Battery B has a greater range than the spread for Battery A
- The shape of the distribution for Battery B is symmetrical to the center and the shape of the distribution for Battery A is slightly skewed to the right



## Learning from Mistakes

Students may make the following mistakes:

- Not realizing two box plots have the same median if the data for one box plot is more spread out than the data for the other box plot (e.g., consider the example of the box plots shown above)
- Thinking there are more data points in a part of a box plot because the range is greater (e.g., the lower and upper whiskers both contain 25% of the data even if one whisker is longer than the other)
- Confusing the mean, median, mode, and range\*
- Confusing quartile with interquartile range\*

## Academic Vocabulary

asymmetrical	mean	range*
box plot*	measures of center	shape of the data distribution*
center	measures of spread	skew*
center	median*	spread
dot plot*	mode*	symmetrical*
interquartile range* (IQR)	outlier	
	quartile*	

## Interesting Items

- 7.12(A) 2023 #10
- 7.12(A) 2019 #32
- 7.12(A) 2018 #13
- 7.12(A) 2016 #51

**7.12 Expressions, equations, and relationships.** The student applies mathematical process standards to use statistical representations to analyze data. The student is expected to:

- 7.12(C) **(C) compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations**

## Role in Concept Development

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

**Connection/Relevance** Informally comparing random sample populations provides the foundation for more formal comparisons of the shape, center, and spread of data.

**When to Teach** With 7.12(A)

**Instructional Implications** In conjunction with 7.12(A), instruction should focus on the comparison of data in random samples (e.g., data collected from a selected group that is representative of the data from the whole group, such as asking at least one-third of seventh grade boys and one-third of seventh grade girls from the same school to respond to a survey) to make informal comparative inferences about differences between two populations (e.g., the whole group, such as all seventh grade girls/boys from the same school).

It is important that students begin to understand that all populations may not yield the same inference (e.g., the favorite sport of seventh grade girls may not be the same as the favorite sport of seventh grade boys in a school).

Instruction should include comparisons of the shape, center, and spread of data from random samples presented in comparative dot plots or box plots. Informal comparisons about differences between populations may include quantitative and qualitative descriptions.

Instruction should also include students evaluating comparative inferences to determine if they are accurate about differences between two population.

**Learning from Mistakes**

Students may make the following mistakes:

- Thinking that any type of sample, other than random, is representative of a population

## Stimulus

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## Academic Vocabulary

asymmetrical  
center  
mean  
measures of center  
measures of spread  
median\*

mode\*  
outlier  
range\*  
skew\*  
symmetrical\*

## Interesting Items

7.12(C) 2023 #20