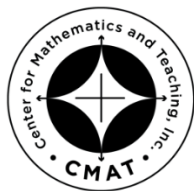


Name \_\_\_\_\_

Period \_\_\_\_\_

Date \_\_\_\_\_

**MathLinks****6-5**

STUDENT PACKET

**MATHLINKS: GRADE 6  
STUDENT PACKET 5  
DATA AND STATISTICS**

<b>5.1</b>	<b>Name Scores</b>	1
	<ul style="list-style-type: none"><li>• Collect and organize numerical data.</li><li>• Find measures of center and spread for a data set.</li><li>• Understand how outliers affect center.</li></ul>	
<b>5.2</b>	<b>Data Displays</b>	10
	<ul style="list-style-type: none"><li>• Find measures of center and spread.</li><li>• Construct dot plots, histograms, and box plots.</li><li>• Describe the distribution of a data set by examining its center, spread, and overall shape.</li></ul>	
<b>5.3</b>	<b>Data Surveys</b>	17
	<ul style="list-style-type: none"><li>• Review measures of center and spread.</li><li>• Construct dot plots, histograms, and box plots.</li><li>• Describe the distribution of a data set by examining its center, spread, and overall shape.</li><li>• Recognize and develop statistical questions.</li></ul>	
<b>5.4</b>	<b>Skill Builders, Vocabulary, and Review</b>	23

**WORD BANK**

<b>Word Phrase</b>	<b>Definition or Explanation</b>	<b>Picture or Example</b>
box plot		
dot plot		
five-number summary		
histogram		
interquartile range (IQR)		
mean		
mean absolute deviation (MAD)		
median		
mode		
number of observations		
outlier		
range of a data set		

# NAME SCORES

## Summary

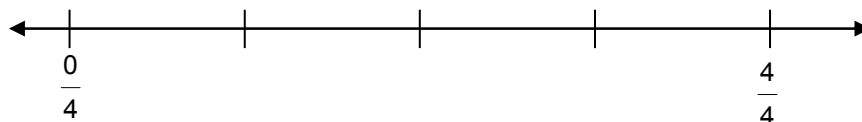
We will find our “name scores” using the given values for each letter. Then we will create a human number line to help us organize our data. We will calculate measures of center and spread for the name score data.

## Goals

- Collect and organize numerical data.
- Find measures of center and spread for a data set.
- Understand how outliers affect center.

## Warmup

1. On the number line below, write in the values for the missing tick-marks.



2. How many tick-marks are required to divide the unit from 0 to 1 into four equal quarters?

A class had five math tests so far this year. Two students' scores are shown below.

Lin's scores:

90	75	60	55	80
----	----	----	----	----

Abdul's scores:

95	80	90	50	45
----	----	----	----	----

3. Who do you think is scoring better? Defend your answer.

## NAME SCORES ACTIVITY

Before starting the name scores activity:

1. Use the values below to determine your first name score.

Example: JOEY  $\rightarrow$  J + O + E + Y  $\rightarrow$  10 + 1 + 1 + 4 = 16

A = 1	E = 1	I = 1	M = 4	Q = 10	U = 2	Y = 4
B = 4	F = 4	J = 10	N = 2	R = 1	V = 5	Z = 10
C = 4	G = 3	K = 5	O = 1	S = 1	W = 4	
D = 2	H = 3	L = 2	P = 4	T = 1	X = 8	

Write your first name. \_\_\_\_\_ Write your name score. \_\_\_\_\_

2. Your teacher will give you a small card or piece of paper. Record your name and score like this (name: **small**, number: **BIG**) on your card.

JOEY
16

3. In numerical order, list the first name scores of everyone in your class in the table below.


4. How many recorded name scores do you have? \_\_\_\_\_

We will refer to this value as the number of observations ( $n$ ).

5. List as many of the statistics words as you can remember from the name scores activity.

## NAME SCORES: CENTER

The median ( $M$ ) and mode are two measures of center for a data set.

1. Describe how we found the median of our name scores during the activity.
2. Find the median for the class data set.
3. Describe how we found the mode(s) of our name scores during the activity.
4. Find the mode(s) for the class data set.
5. Which measure of center, median or mode, do you think best reflects the center of this data set? \_\_\_\_\_ Explain.

## NAME SCORES: SPREAD

The range and interquartile range (IQR) are two measures of spread for a data set.

1. Describe how to find the range of a data set.
2. Find the range for the class data set.
3. How can you remember that quartiles 1, 2, and 3 ( $Q_1$ ,  $Q_2 = M$ ,  $Q_3$ ) divide the data points into four equal parts of data? (Hint: Refer to problem 1 in the warmup on page 1.)

4. List the five-number summary for the class data set.

(           ,           ,           ,           ,            )  
 $min$  $Q_1$  $Q_2 = M$  $Q_3$  $max$

5. Describe how to find the interquartile range (IQR).
6. Find the IQR for the class data set.
7. What percent of all observations are between  $Q_1$  and  $Q_3$ ?
6. Which measure of spread, range or IQR, do you think best represents the variability of the name score data set? \_\_\_\_\_ Explain.

# PRACTICE 1

1. Here is a list of student quiz scores from Mrs. Stern's art history class.

5	10	8	7	7	6	5	5	8	5	8	10
---	----	---	---	---	---	---	---	---	---	---	----

2. Rewrite the list of quiz scores in order from least to greatest in the table below.

[illegible]

3. How many students took the test (number of observations)?  $n =$  \_\_\_\_\_

4. Calculate measures of center of the quiz scores in Mrs. Stern's class.

Median:

Mode:

5. Calculate measures of spread and the five-number summary of the quiz scores in Mrs. Stern's class.

- a. Range: \_\_\_\_\_

- b. Five-number summary: (           ,           ,           ,           ,            )
- min*                       $Q_1$                        $Q_2 = M$                        $Q_3$                       *max*

- c. Interquartile range (IQR):  $Q_3 - Q_1$

6. What percent of the scores typically fall between  $Q_1$  and  $Q_3$ ? \_\_\_\_\_ Is this true for this data set? Explain.

7. What percent of the scores typically fall outside the interval from  $Q_1$  to  $Q_3$ ? \_\_\_\_\_

## NAME SCORES REVISITED

The mean is a measure of center for a data set.  
It is also referred to as the arithmetic average.

1. Describe how we found the mean (average) of our name scores during the activity.
  
  
  
  
  
  
  
  
  
  
2. Find the mean for the class data set.

An outlier is a data value that is unusually small or unusually large when compared to the overall pattern of values in the data set. An outlier is a “striking deviation” that exists very far from the center of the data.

Let's pretend that a student named WAQUEYZAQUEY enters our classroom and we add his first name score to the class data set.

3. What is Waqueyzaquey's name score? \_\_\_\_\_
  
  
  
  
  
  
4. Do you think Waqueyzaquey is an outlier? \_\_\_\_\_ Explain.
  
  
  
  
  
  
5. Are there any other potential outliers in your class data? \_\_\_\_\_ Explain.



## NAME SCORES REVISITED (Continued)

For problems 6-11, choose a phrase from the right column that best completes the prediction started in the left column. Write the letter for the phrase in the blank. You may use a phrase more than once.

6. _____	I think Waqueyzaquey's name score will make the <u>mean</u> of the class scores...	a. ... decrease a lot.
7. _____	I think Waqueyzaquey's name score will make the <u>median</u> of the class scores...	b. ... decrease a little.
8. _____	I think Waqueyzaquey's name score will make the <u>mode</u> of the class scores...	c. ... remain unchanged.
9. _____	I think Waqueyzaquey's name score will make the <u>range</u> of the class scores...	d. ... increase a little.
10. _____	I think Waqueyzaquey's name score will make the <u>interquartile range</u> of the class scores...	e. ... increase a little.

11. If Waqueyzaquey is included in the class data set, what is the new median? \_\_\_\_\_

Was your prediction in problem 7 above correct? \_\_\_\_\_

12. If Waqueyzaquey is included in the class data set, what is the new mean? \_\_\_\_\_

Was your prediction in problem 6 above correct? \_\_\_\_\_

13. Which measure of center, median or mean, do you think best reflects the center of the class data set if Waqueyzaquey is included? \_\_\_\_\_ Explain.

## PRACTICE 2

Here is a list of student scores from Mrs. Rozelle's spelling test.

9	9	8	10	2	8	7	6	8	10	7	8
---	---	---	----	---	---	---	---	---	----	---	---

1. Rewrite the list of quiz scores in order from least to greatest in the table below.

[illegible]

- How many students took the test (number of observations)?  $n =$  \_\_\_\_\_
- Calculate measures of center of the quiz scores in Mrs. Rozelle's class. Round to the nearest tenth.

Mean:                      Median:                      Mode:

4. Calculate measures of spread and the five-number summary of the quiz scores in Mrs. Rozelle's class.

Range: \_\_\_\_\_

Five-number summary: (  $\underline{\hspace{1cm}}$ ,  $\underline{\hspace{1cm}}$ ,  $\underline{\hspace{1cm}}$ ,  $\underline{\hspace{1cm}}$ ,  $\underline{\hspace{1cm}}$  )  
 $\hspace{10em} \text{min} \hspace{1.5em} Q_1 \hspace{1.5em} Q_2 = M \hspace{1.5em} Q_3 \hspace{1.5em} \text{max}$

Interquartile range (IQR):  $Q_3 - Q_1$

5. What percent of the scores typically lie between  $Q_1$  and  $Q_3$ ?

6. Is this true for this data set? \_\_\_\_\_ Explain.

7. Do you think that this will always be true for any data set? Explain.

8. What value in the table could be an outlier?

9. Which measures of center or spread do you think best fits this data? \_\_\_\_\_ Explain.

## MEAN ABSOLUTE DEVIATION (MAD)

The mean absolute deviation (MAD) is a measure of spread of a numerical data set. It is the arithmetic average of the distance of the data points to the mean.

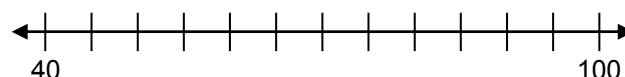
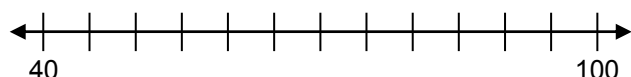
1. Consider Lin's and Abdul's math scores from the warmup on page 1. Graph the data points on the number lines below. Whose data looks more "spread out"? \_\_\_\_\_

Lin's scores:

90	75	60	55	80
----	----	----	----	----

Abdul's scores:

95	80	85	55	45
----	----	----	----	----



Finding MAD	Lin	Abdul
2. Find the mean of the data. Mark these locations on each number line with an $\bar{x}$ .	Mean: _____	Mean: _____
3. Find the distance between each data point and the mean on the number lines.	_____, _____, _____ _____, _____	_____, _____, _____ _____, _____
4. Find the sum of these distances to the mean.	Sum: _____	Sum: _____
5. Find the mean of these five distances.	MAD: _____	MAD: _____

6. What conclusions can you draw about the center (mean) and spread (MAD) of the test data for Lin and Abdul?
7. Who do you think is scoring better? Defend your answer.

Challenge: Find the MAD for the first set of class name score data. Compare it to the other measures of spread.

## DATA DISPLAYS

## Summary

We will display data by constructing dot plots, histograms, and box plots. We will describe and analyze the overall shape of the data.

## Goals

- Find measures of center and spread.
- Construct dot plots, histograms, and box plots.
- Describe the distribution of a data set by examining its center, spread, and overall shape.

## Warmup

The data set below shows the number of video games owned by each person in a group of friends.

12	25	15	10	10	20	1	15	16	10	8	11	2
----	----	----	----	----	----	---	----	----	----	---	----	---

1. Rewrite the data set in order from least to greatest in the table below.

[illegible]

2. Calculate some statistics for this data set.

number of observations ( $n$ ):                      range:                      mean:

median ( $M$ ):            mode:            interquartile range (IQR):

Five-number summary: (  $\underline{\hspace{1cm}}$ ,  $\underline{\hspace{1cm}}$ ,  $\underline{\hspace{1cm}}$ ,  $\underline{\hspace{1cm}}$ ,  $\underline{\hspace{1cm}}$  )  
 $\text{min}$        $Q_1$        $Q_2 = M$        $Q_3$        $\text{max}$

3. Add to the data set the number of video games owned by two more friends. Choose values so that the mean of the data set changes, but the median stays the same.

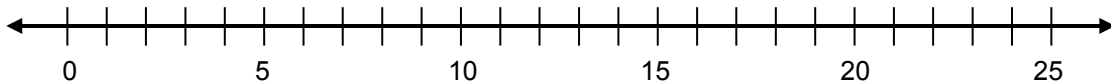
[illegible]

4. What is the new mean of the data set?

## THREE DATA DISPLAYS

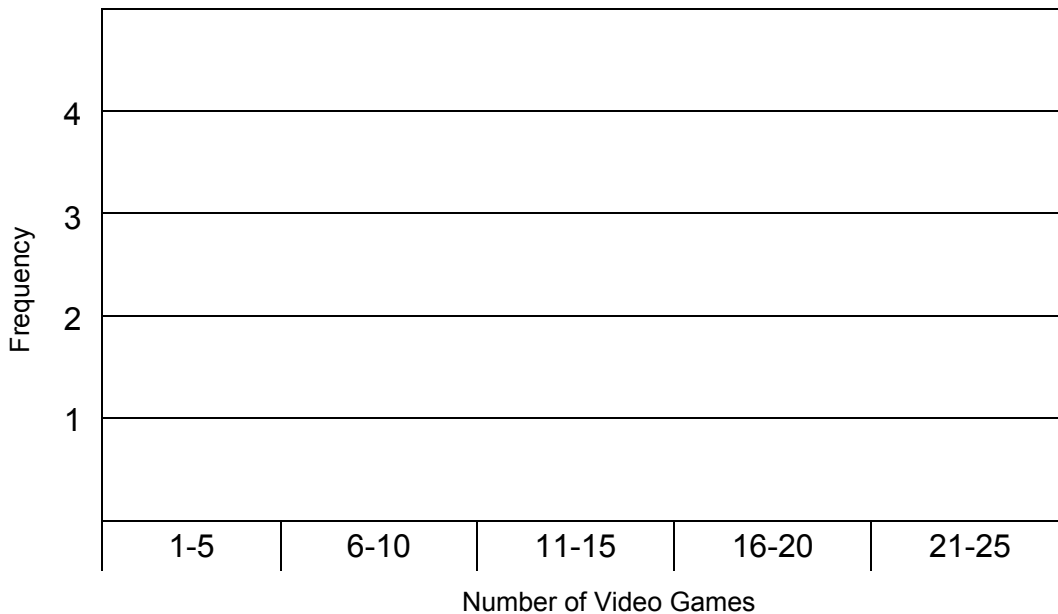
A line plot (or dot plot) represents each data value above a number line with a mark such as a dot (•) or an x to show the frequency of data values.

1. Construct a dot plot for the original video game data in the warmup on page 10. Label the graph appropriately.



A histogram is a data display that uses adjacent rectangles to show the frequency of data values in intervals. The height of a given rectangle shows the frequency of data values in the interval shown at the base of the rectangle.

2. Construct a histogram for the video game data in the warmup on page 10.



3. Describe any symmetry, clusters, peaks, or gaps you see in the data from either of the displays.

## THREE DATA DISPLAYS (Continued)

A box plot (or box-and-whisker plot) is a visual display of a data distribution that shows the median (a measure of center) and the spread. The display is based on the five-number summary.

To make a box plot:

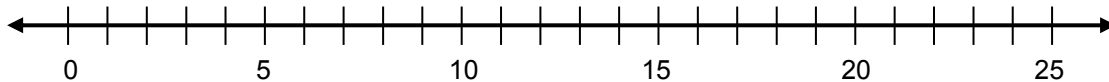
- Find the five-number summary.
- Locate the five-number summary values on a number line, and indicate with vertical segments.
- Create a “box” by connecting segments between  $Q_1$  and  $Q_3$ .
- Create “whiskers” by extending segments from  $Q_1$  to the minimum value and from  $Q_3$  to the maximum value.

Construct a box plot for the original video game data.

4. Copy the five-number summary from the warmup on page 10.

(           ,           ,           ,           ,            )  
            $min$              $Q_1$              $Q_2 = M$              $Q_3$              $max$

Use the five-number summary to construct the box plot. Label and title the graph appropriately.



5. Explain which data display(s) give the best picture of:

a. the overall shape of the data.

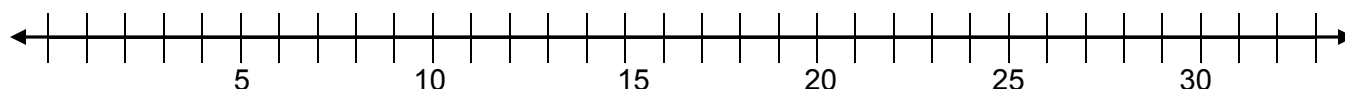
b. the center of the data.

c. the spread of the data.

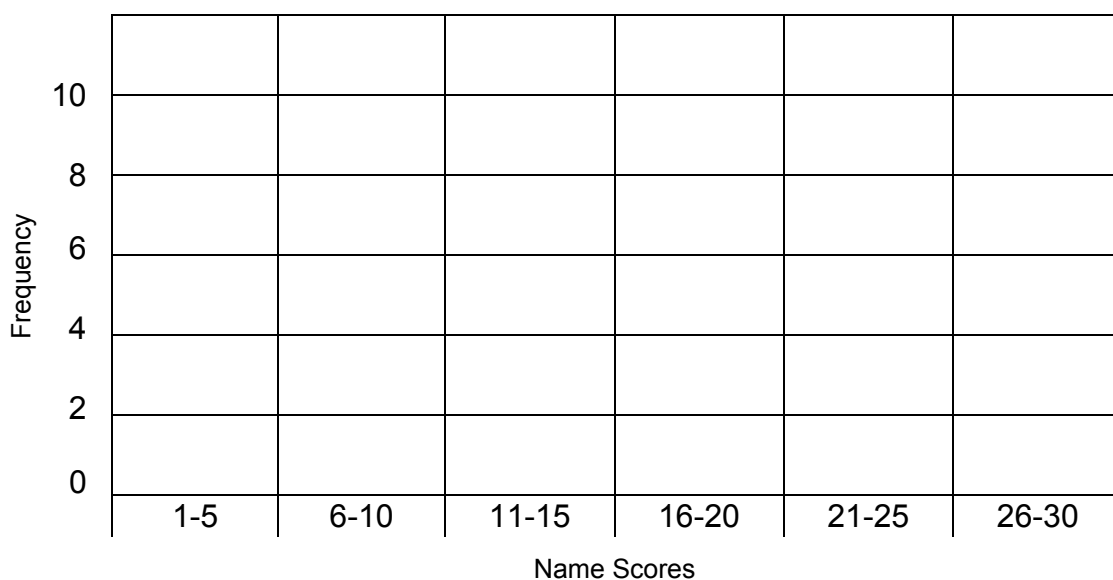
## CREATING DATA DISPLAYS

Use the class name score data from page 2 to create the following data displays.

- Construct a line plot of the class name score data. Extend the number line if necessary. Label and title the graph.

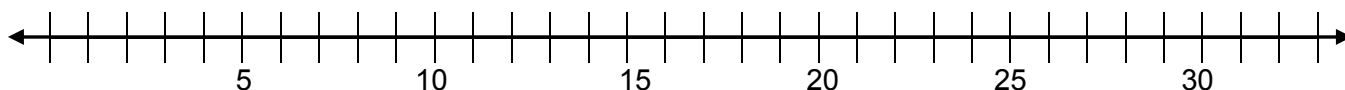


- Construct a histogram of the class name score data. Extend the histogram if necessary. Be sure each interval is the same size. Title the graph.



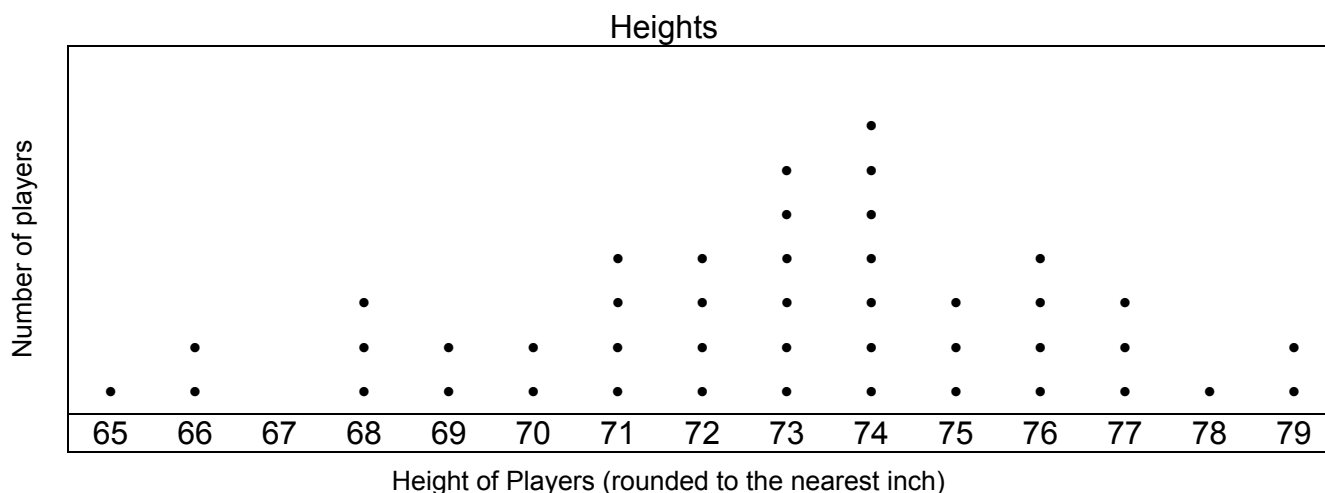
- Use the five-number-summary to construct a box plot of the class name score data.

(           ,           ,           ,           ,            )  
            $min$        $Q_1$        $Q_2 = M$        $Q_3$        $max$



## INTERPRETING DATA DISPLAYS 1

The dot plot below shows the heights (in inches) of players on Litchfield High School's football team. (Note: 72 inches = 6 feet.)



Write the value of each measure and explain what it means in the context of the data set.

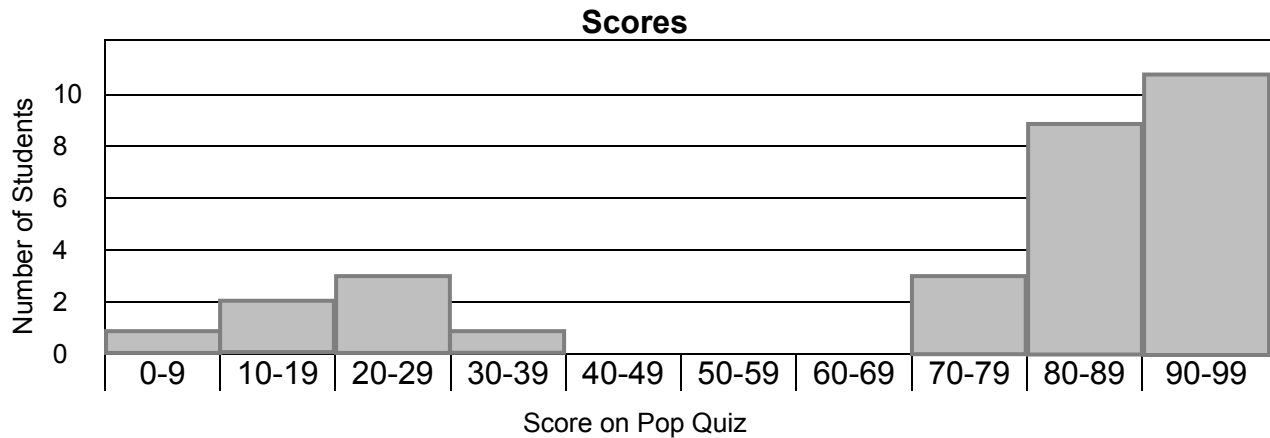
Measure	Value	Explanation
1. Mode		
2. Median		
3. Range		

- Litchfield's football coach, Mr. Clifton, is scouting another team and finds out that the mode of the heights of players on that team is 72 inches. Can Mr. Clifton conclude for certain that Litchfield's team is taller? \_\_\_\_\_ Explain.
- A new student comes to Litchfield High School and joins the football team. That player's height increases the range by 2 inches. What could the height of the new player be? Explain.
- Two identical twins join the team and change the mode. How tall are the twins, assuming they are the same height?

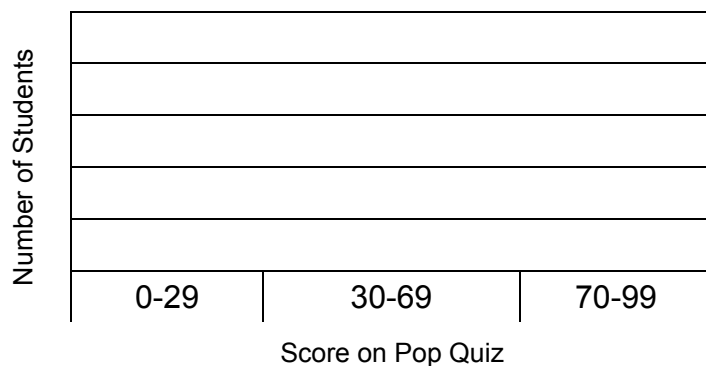


## INTERPRETING DATA DISPLAYS 2

Ms. McCabe assigned Chapter 3 from *Where the Red Fern Grows* for homework. The histogram shows student scores on Ms. McCabe's Chapter 3 pop quiz.

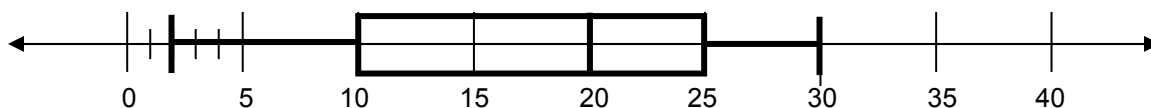


- How many students are in Ms. McCabe's class? \_\_\_\_\_
- Describe any symmetry, clusters, peaks, or gaps you see in the data from the histogram.
- Which interval contains the median score? Explain.
- Ms. McCabe gave the pop quiz because she suspected that some students were not keeping up with their reading homework. Does the data confirm her suspicion that some students in the class are not doing their homework? \_\_\_\_\_ Explain.
- Complete the histogram of Ms. McCabe's pop quiz data using larger intervals and a different vertical scale. Can she still use this histogram to determine if students are doing their homework? Explain.



## INTERPRETING DATA DISPLAYS 3

This box plot contains only numbers. No context is expressed.



1. What might be an appropriate context and title for this box plot? Be creative.
2. List the five-number summary. (           ,           ,           ,           ,            )  

*min* $Q_1$  $Q_2 = M$  $Q_3$ *max*
3. What is the range of the data set?
4. The median is not in the exact center of the box plot. Explain how this might make sense.
5. What does your answer to problem 4 possibly tell you about the shape of the data?

## DATA SURVEYS

### Summary

We will gather data through a class activity. We will display data by constructing dot plots, histograms, and box plots. We will describe and analyze the overall shape of the data.

### Goals

- Review measures of center and spread.
- Construct dot plots, histograms, and box plots.
- Describe the distribution of a data set by examining its center, spread, and overall shape.
- Recognize and develop statistical questions.

### Warmup

The data below represent the time it takes for 10 teachers to drive from home to school in the morning.

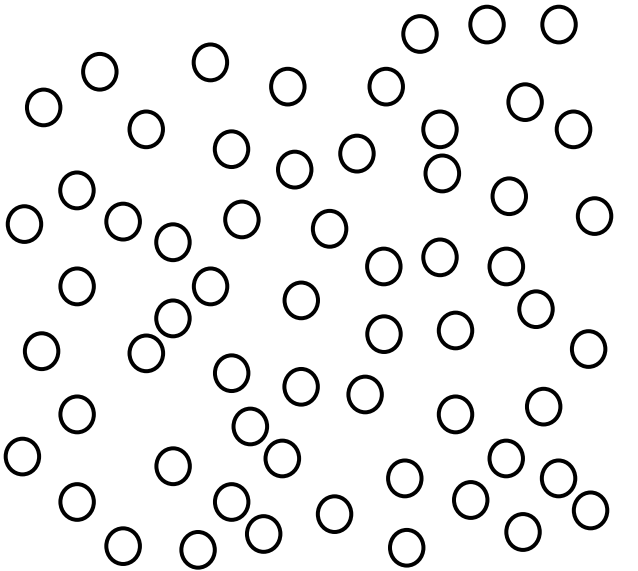
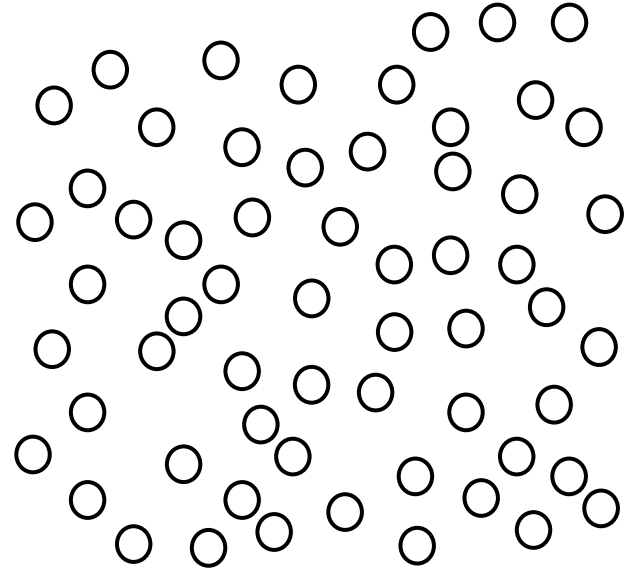
10	20	30	100	30	10	40	10	40	10
----	----	----	-----	----	----	----	----	----	----

Use the data for problems 1-4.

1. What unit of time would be a reasonable unit of measurement for the data?
2. Find the following measures of center for the data.  
Mean: \_\_\_\_\_ Median: \_\_\_\_\_ Mode: \_\_\_\_\_
3. Explain why the mode does not appear to be the most appropriate measure for the center of the data.
4. Identify any potential outliers in the data set.

## LEFTY-RIGHTY EXPERIMENT

Wait for your teacher's signal to start each experiment below. Stop when your teacher says time is over.

<p>Use your <u>left hand</u> to write as many X's as you can inside the circles.</p> 	<p>Use your <u>right hand</u> to write as many X's as you can inside the circles.</p> 
---	---

1. Count the number of circles that have an X on your **lefty** side. \_\_\_\_\_
2. Count the number of circles that have an X on your **righty** side. \_\_\_\_\_
3. Which side has more X's? \_\_\_\_\_
4. Do you think your answer to problem 3 is true for most of your classmates? Explain.

## MEASURES OF LEFTY-RIGHTY DATA

1. Record the class data in the tables below.

LEFTY DATA							

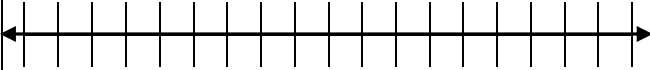
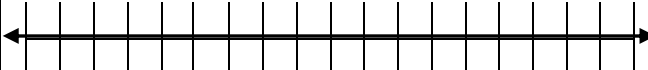
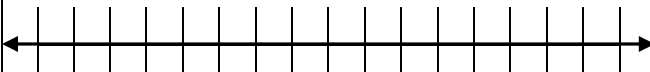
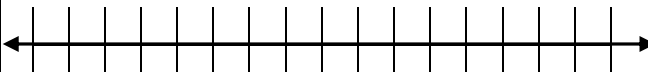
RIGHTY DATA							

2. Find each of the following statistical measurements for both data sets.

LEFTY DATA	RIGHTY DATA
Number of data points ( $n$ ) = _____	Number of data points ( $n$ ) = _____
<u>Measures of Center</u>	<u>Measures of Center</u>
Mean: _____	Mean: _____
Median ( $M$ ): _____	Median ( $M$ ): _____
Mode(s): _____	Mode(s): _____
<u>Measures of Spread</u>	<u>Measures of Spread</u>
Range: _____	Range: _____
IQR: _____	IQR: _____
<u>Five-number summary</u>	<u>Five-number summary</u>
( _____, _____, _____, _____, _____ ) <div style="display: flex; justify-content: space-around; font-size: small;"> <span><math>min</math></span> <span><math>Q_1</math></span> <span><math>Q_2 = M</math></span> <span><math>Q_3</math></span> <span><math>max</math></span> </div>	( _____, _____, _____, _____, _____ ) <div style="display: flex; justify-content: space-around; font-size: small;"> <span><math>min</math></span> <span><math>Q_1</math></span> <span><math>Q_2 = M</math></span> <span><math>Q_3</math></span> <span><math>max</math></span> </div>

## DISPLAYS OF LEFTY-RIGHTY DATA

Complete the following displays for each set of data. Remember to label each display.

<b>LEFTY DATA</b>	<b>RIGHTY DATA</b>												
<p>1. Dot Plot</p> 	<p>2. Dot Plot</p> 												
<p>3. Histogram</p> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); border: 1px solid black; padding: 5px; margin-right: 10px;">Frequency</div> <table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="height: 150px;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> </div>							<p>4. Histogram</p> <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); border: 1px solid black; padding: 5px; margin-right: 10px;">Frequency</div> <table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="height: 150px;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> </div>						
<p>5. Box Plot</p> 	<p>6. Box Plot</p> 												

7. About 90% of people are right-handed. Does your classroom data support this statistic? Explain.

## STATISTICAL QUESTIONS

Statistics help us answer questions about populations. Statistical questions anticipate that variability will be involved. Answers to statistical questions generally require many data values.

Example of a statistical question: “How many hours of TV do students in my class watch each week?”

This is a statistical question because we would expect the number of hours watching TV to vary from student to student.

NOT a good statistical question: “How many hours of TV did you watch last week?”

This is *not* a statistical question because there is just one value to check.

For each pair of questions, put a check next to the better statistical question.

1. What is the average length of hair for girls in your school?  
How long is your hair?
2. How far is it from Los Angeles to San Francisco?  
How long does it take people to drive from Los Angeles to San Francisco?
3. How many points did Kobe Bryant score last night?  
How many points per game does Kobe Bryant score?
4. Are blue whales an endangered species?  
How many blue whales did you see on your whale-watching tour?
5. How tall are you?  
Are you taller or shorter than students your age?
6. Do 6<sup>th</sup> graders today watch more TV compared to 6<sup>th</sup> graders 10 years ago?  
How much TV did you watch yesterday?
7. What ice cream flavor do you like the most?  
What ice cream flavor is most popular in the United States?
8. Write a statistical question that you think can be answered based on the data we calculated for first name scores.
9. Write a statistical question that you think can be answered based on data from the lefty-righty experiment.

## COLLECTING YOUR OWN DATA

1. What are some qualities of a good statistical question?
2. State three statistical questions that you could answer using data that you can collect. Then put a star by the question you would like to explore further.
3. What will you measure to answer your question?
4. What units of measurement will you use?
5. How will you measure it?
6. How many observations ( $n$ ) will you make?
7. List steps that you would need to take in order to collect your data to answer your question.

Challenge: Collect data, analyze your data using measures of center, spread, and data displays, and answer your statistical question.



**SKILL BUILDERS, VOCABULARY, AND REVIEW****SKILL BUILDER 1**

1. Find the quotient of  $542 \div 14$ . Check your answer using multiplication.

2. Choose ALL of the following that are equivalent to  $\frac{60}{100}$ .

A.  $\frac{6}{10}$

B. 0.6

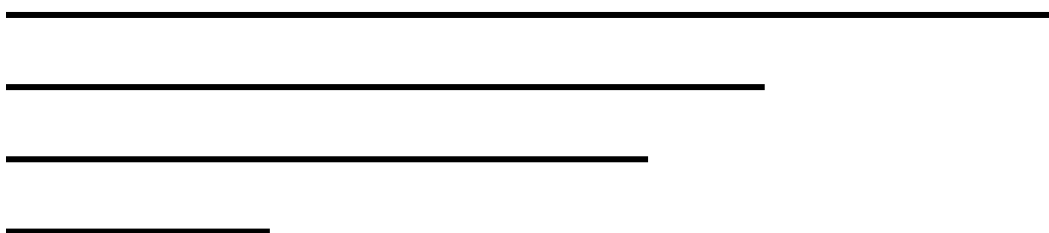
C. 0.06

D. 60%

E. 6%

3. Which is greater,  $\frac{1}{3}$  or  $1 - \frac{1}{3}$ ? Explain.

4. Use a ruler to measure each line segment below to the nearest eighth of an inch.



5. Write an expression equal to  $3 \times 3 \times 3 \times 3 \times 3 \times 3$  using exponents. \_\_\_\_\_

The base is \_\_\_\_\_ and the exponent is \_\_\_\_\_.

**SKILL BUILDER 2**

Complete the table below by writing each number in either standard or expanded form.

	Standard Form	Expanded Form
1.	532.1	
2.		$3000 + 20 + 4 + 0.01$
3.		$40 + 1 + 0.2 + 0.003$
4.	34005	

5. What is the place value of the “7” in each of the numbers below?

37,500 \_\_\_\_\_

4,800.87 \_\_\_\_\_

6. Use any process to find the LCM and the GCF for 32 and 24.

LCM: \_\_\_\_\_

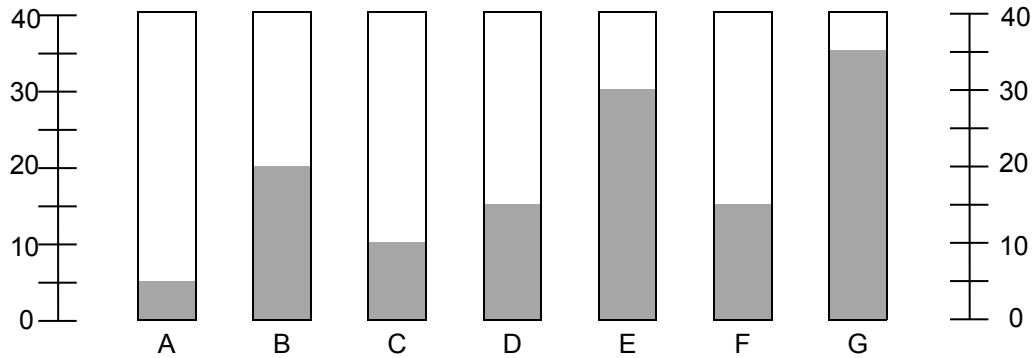
GCF: \_\_\_\_\_

7. Order the following fractions from least to greatest:  $\frac{3}{5}$ ,  $\frac{1}{5}$ ,  $\frac{5}{5}$ ,  $\frac{4}{5}$

8. Order the following fractions from least to greatest:  $\frac{4}{5}$ ,  $\frac{4}{6}$ ,  $\frac{4}{100}$ ,  $\frac{4}{4}$

## SKILL BUILDER 3

Each rectangle below represents a container partially filled with a liquid (the shaded portion). The measuring tools at both ends represent milliliters.



1. Estimate the number of milliliters of liquid in each container.

A: \_\_\_\_\_ B: \_\_\_\_\_ C: \_\_\_\_\_ D: \_\_\_\_\_ E: \_\_\_\_\_ F: \_\_\_\_\_ G: \_\_\_\_\_

2. List these numerical measures in order from least to greatest.

\_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_

3. Which one of these measures is the middle value? \_\_\_\_\_ Which measure of center is related to this value?

4. Try to “level out” the liquid. In other words, share the liquid among all the containers so each container has the same amount. Round to the nearest tenth.

What is this amount? \_\_\_\_\_ Which measure of center is related to this value?

5. Is there a liquid level that occurs more than once (is in more than one container)? \_\_\_\_\_ Which measure of center is related to this value?

6. If another container were introduced that had 40 milliliters of liquid in it, explain which measure(s) of center will change, and find the new value(s).

7. If the new container introduced had 80 milliliters of liquid in it instead of 40, explain which measure(s) of center will change, and find the new value(s).

8. Which measure of center is potentially most sensitive to new data values being introduced?

**SKILL BUILDER 4**

For each pair of numbers below, circle the greater number.

1. 0.5 and 0.13

2. 1.4 and 1.92

3.  $\frac{3}{5}$  and 0.35

4.  $\frac{5}{3}$  and 3.5

Determine if the following statements are true or false. If false, explain why.

5. In the data set {2, 3, 4, 5, 6, 5, 3, 2, 8}, the mode is 5.

6. In the data set {2, 3, 4, 5, 6, 5, 3, 2, 8}, the median is 6.

7. The sum of 45 and 13 is 32.

8. The difference between 45 and 13 is 32.

9. The average of 10 and 20 is 15.

Below is a data table that shows how much money each person in a group of friends has in his or her pocket. Answer the questions based on the information in the table.

\$3.50	\$10.00	\$20.00	\$2.50	\$4.00
--------	---------	---------	--------	--------

10. Put the data in numerical order from least to the greatest.

--	--	--	--	--

11. How many friends have more than \$5.00 in their pocket? \_\_\_\_\_

12. What is the total amount (the sum) of the money in the group? \_\_\_\_\_

13. Divide the result from problem 12 by 5. What does this number represent?

**SKILL BUILDER 5**

The test scores for three groups of five students in a math class are shown below. Find the mean, median, and mode for each group.

## 1. Test Scores for Group 1

78	84	100	78	81
----	----	-----	----	----

Mean: \_\_\_\_\_

Median: \_\_\_\_\_

Mode: \_\_\_\_\_

## 2. Test Scores for Group 2

100	63	89	82	82
-----	----	----	----	----

Mean: \_\_\_\_\_

Median: \_\_\_\_\_

Mode: \_\_\_\_\_

## 3. Test Scores for Group 3

92	85	85	99	92
----	----	----	----	----

Mean: \_\_\_\_\_

Median: \_\_\_\_\_

Mode: \_\_\_\_\_

4. Which group had the highest mean score? \_\_\_\_\_ median score? \_\_\_\_\_ mode score? \_\_\_\_\_

5. Without doing any calculation, which group would you say has the greatest mean absolute deviation (MAD)? Explain.

6. Without doing any calculation, which group would you say has the least mean absolute deviation (MAD)? Explain.

## SKILL BUILDER 6

Use **mean**, **median**, or **mode** in the blanks for problems 1-3.

1. The \_\_\_\_\_ is/are the value(s) that appear(s) most often in a data set.
2. The \_\_\_\_\_ is the sum all the values in a data set divided by the number of values in the data set.
3. The \_\_\_\_\_ is the middle number in a data set arranged in numerical order.
4. Ken rolled five number cubes with sides labeled 1-6. He found that the sum of the numbers showing was 15. What was the mean (average) of the numbers showing?
5. Suppose none of the number cubes that Ken rolled were sixes. What could the five numbers be from Ken's roll from the previous question?

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

6. What is/are the mode(s) of your numbers from problem 5? \_\_\_\_\_
7. Six students recorded the number of hours they watched TV over the weekend.
  - The minimum number of hours watched was 4 and the maximum was 9.
  - Their mean time was 7 hours.

How much TV might each student have watched?

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

8. Jackie played in 5 basketball games.
  - She always scored more than 5 points.
  - She scored 10 or more points only once.
  - Her median score was 8.

What might her 5 scores be so that her mean is also 8?

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

9. What is the range for Jackie's scores from your answer to problem 8? \_\_\_\_\_

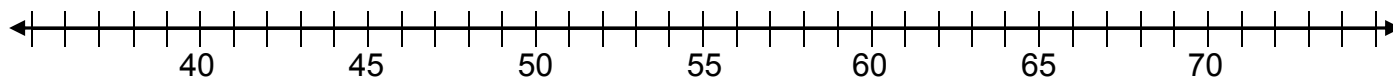
## SKILL BUILDER 7

The data in the table below represents the number of multiplication problems individual students answered correctly in two minutes.

35	40	37	50	38	45	35	74	36	46	35	40
42	45	49	45	44	42	44	73	52	50	42	45

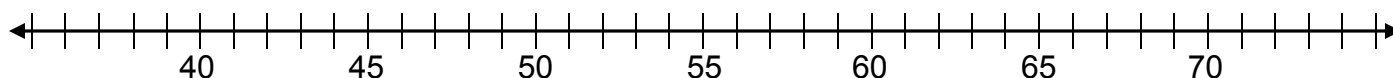
1. Arrange the data in numerical order in the table below and then make a dot plot for the data using the number line.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



2. Calculate the five-number summary for the data and then use the number line to construct a box plot for this data.

(                      ,                      ,                      ,                      ,                      )  
                     *Min*                      *Q<sub>1</sub>*                      *Q<sub>2</sub> = M*                      *Q<sub>3</sub>*                      *Max*



3. Construct a histogram for this data

Frequency								
	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74

4. Describe any symmetry, clusters, peaks, or gaps you see in the data from any of the displays.

**FOCUS ON VOCABULARY****Word List**

mean	median	mode	interquartile range (IQR)	box plot
five-number summary	quartiles	outlier	dot plot	range
histogram	statistical question			

Select the word or phrase from the word list that best completes each sentence.

1. The \_\_\_\_\_ is the length of an interval containing half the data values.
2. A \_\_\_\_\_ is a visual display that uses the five-number summary.
3. Three measures of center are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
4. A \_\_\_\_\_ is a visual display that uses adjacent rectangular bars to show the frequency of data points in certain intervals.
5. The \_\_\_\_\_ of a data set is the length of an interval that includes the minimum value, the first quartile, the median, the third quartile, and the maximum value of the data set.
6. A data value that is significantly far from the measures of center might be a(n) \_\_\_\_\_.
7. A \_\_\_\_\_ is a visual display that shows the frequency of each data point on a number line.
8. A \_\_\_\_\_ anticipates variability in the responses.



**SELECTED RESPONSE**

Show your work on a separate sheet of paper and choose the best answer.

---

1. The data set below shows the number of hours that twelve student spent during the last summer volunteering at a local animal shelter.

7	11	10	10	18	11	9	9	7	8	12	6
---	----	----	----	----	----	---	---	---	---	----	---

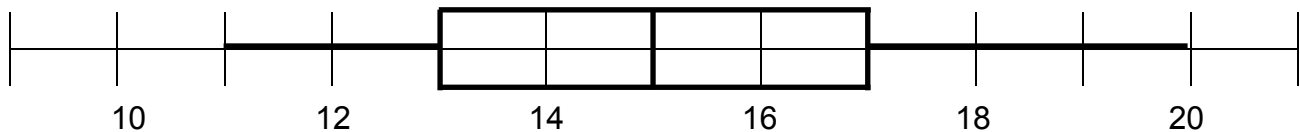
Suppose a new student who volunteered for 40 hours was added to the data set. Which measure of center would be most affected by this new value?

- A. mean                      B. median                      C. mode                      D. IQR
- 

2. Juan's first four test scores of the term were 60, 70, 80, and 90. The mean of his first four test scores is 75. Juan takes two more tests this term, but his mean test score stays the same. What could those test scores be?

- A. 70 and 90                      B. 60 and 90                      C. 70 and 75                      D. 60 and 80
- 

3. In the box plot below, what is a number that could be in the first quartile?



- A. 10                      B. 12                      C. 16                      D. 18
- 

4. The data set shown below has two modes. Which number could be added to the table to make a data set with only one mode?

12	13	13	6	8	10	8	11	14	7
----	----	----	---	---	----	---	----	----	---

- A. 6                      B. 8                      C. 12                      D. 15
-

## KNOWLEDGE CHECK

Show your work on a separate sheet of paper and write your answers on this page.

### 5.1 Name Scores, 5.3 Data Surveys

The data table below represents the number of fish that students have in their aquariums. Use the data table below to answer the following questions.

2	3	3	4	5	5	6	6	6	9
---	---	---	---	---	---	---	---	---	---

- Find the measures of center. Mean: \_\_\_\_\_ Median: \_\_\_\_\_ Mode: \_\_\_\_\_
- Find the five-number summary of this data set.

( \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ )  
                   min             $Q_1$              $Q_2 = M$              $Q_3$             max

- What is a statistical question that you could answer with this data?

### 5.2 Data Displays

Use the data table above to construct the following data displays.

- Construct a dot plot.
- Construct a histogram.
- Construct a box plot.



- What might be an appropriate title for these displays? \_\_\_\_\_
- If a new student who joined the class had 24 fish in his aquarium, which measure of center would change most, the mean, median, or mode? \_\_\_\_\_
- Which measure(s) of center would remain unchanged? \_\_\_\_\_

## HOME-SCHOOL CONNECTION

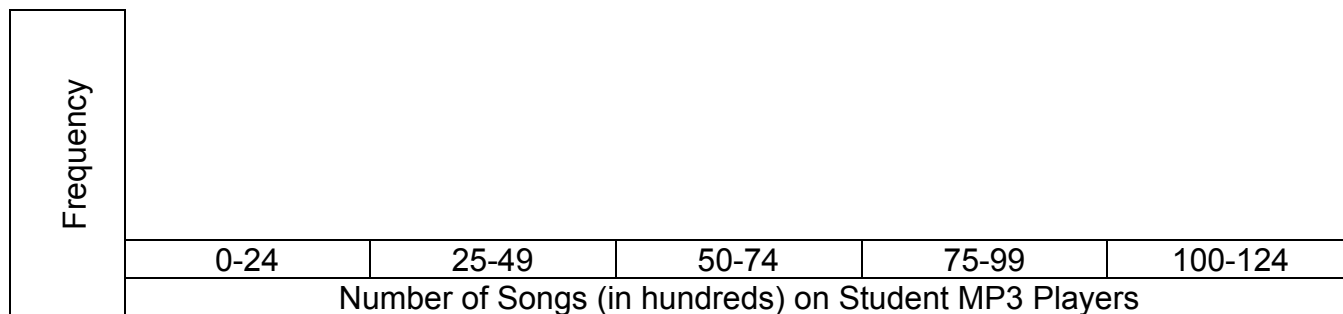
Here are some problems to review topics from these lessons with your young mathematician.

The data below contains the number of songs (in hundreds) that 15 students have on their MP3 players. (Note: 110 → 11,000 songs)

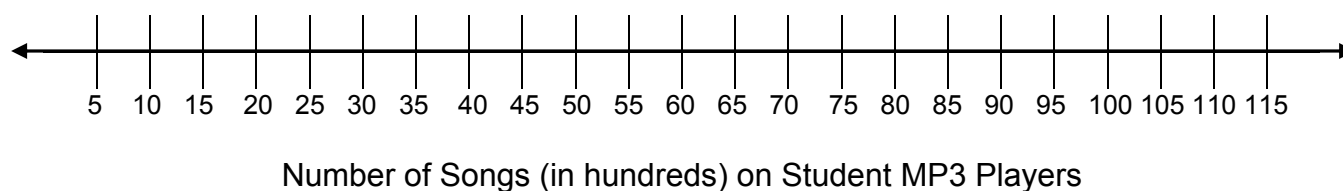
6	12	17	24	43	50	51	52	55	70	75	75	75	80	110
---	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

1. Find the measures of center. Mean: \_\_\_\_\_ Median: \_\_\_\_\_ Mode: \_\_\_\_\_

2. Construct a histogram for the data.



3. Construct a box plot for the data.



Parent (or Guardian) Signature \_\_\_\_\_

# COMMON SCORE STATE STANDARDS – MATHEMATICS

## STANDARDS FOR MATHEMATICAL CONTENT

### 6.SP.A Develop understanding of statistical variability.

6.SP.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.*

6.SP.2 Understand that a set of data collected to answer a statistical question has a distribution that can be described by its center, spread, and overall shape.

6.SP.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

### 6.SP.B Summarize and describe distributions.

6.SP.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

6.SP.5a Summarize numerical data sets in relation to their context, such as by reporting the number of observations.

6.SP.5b Summarize numerical data sets in relation to their context, such as by describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

6.SP.5c Summarize numerical data sets in relation to their context, such as by giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

6.SP.5d Summarize numerical data sets in relation to their context, such as by relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

## STANDARDS FOR MATHEMATICAL PRACTICE

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and critique the reasoning of others.

MP4 Model with mathematics.

MP5 Use appropriate tools strategically.



9 7 8 1 6 1 4 4 5 0 1 0 8

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