

# **6th GRADE ACCELERATED MATH**

## **Unit 2** **Statistics**

**Name** \_\_\_\_\_



## KEY CONCEPT



KEY  
CONCEPT

To recognize and write statistical questions, determine whether the question has only one answer or several different answers. Statistical questions have a variety of different answers.

How many nickels are in a dollar?

Not statistical

Which former U.S. president appears on a nickel?

Not statistical

How many nickels are in your backpack?

Statistical

## Do You Understand?

- 1. Essential Question** How are statistical questions different from other questions?
- 2. Generalize** How does examining the answers to a question help you determine if the question is a statistical question? © MP.8
- 3.** Write a question about movies that your classmates saw last month. Is the question you wrote a statistical question? Justify your response.
- 4.** Choose which is a statistical question: *What are the ages of the students in this class?* or *How many pennies equal 1 dollar?* Explain.

## Do You Know How?

- 5.** Determine which of the questions below are statistical questions.
  - a.** In which months are the birthdays of everyone in your class?
  - b.** Does Sue wear glasses?
  - c.** Who is the current president of the United States?
  - d.** How tall are the students in Grade 6?
  - e.** What is the least populated state?
  - f.** How many fish are in the pond?
- 6.** Mr. Borden asked his students, *How far from school do you live?* Is his question a statistical question? Explain.
- 7.** Mr. Borden also asked his students, *How do you get to school each day?* Is this question statistical? Explain.



Name: \_\_\_\_\_



PRACTICE



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## 8-1 Additional Practice

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Multimedia



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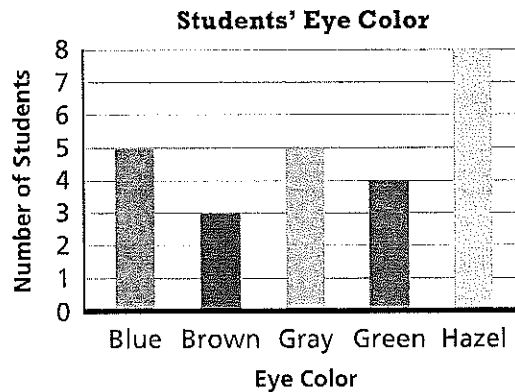
In 1 and 2, determine whether each question is *statistical* or *not statistical*.

1. How long does it take sixth-grade students to eat lunch?
2. When does Carver Elementary School's summer break begin?
3. Write a statistical question that you might ask to gather data on the cost of a restaurant meal.
4. Write a statistical question that you might ask to gather information about the recycling habits of your neighbors.
5. Tiana asked her classmates, "Will you take Chorus or Music Appreciation next semester?" She collected these responses: 11 classmates chose Chorus and 17 chose Music Appreciation. Make a frequency table to display these data.
6. Dean asked his classmates, "How many apples did you eat last week?" He got the following responses: 7, 5, 5, 5, 7, 3, 2, 1, 0, 0, 4, 3, 2, 1, 0, 7, 5, 6, 7, 0, 2, 2, 1, 4. Make a dot plot to display the data.
7. Why is the following a statistical question? Explain.  
*In which months were the students in the class born?*
8. Is the following question statistical? Explain.  
*How many hours did your friend spend online last night?*



In 9–11, use the bar graph at the right.

**9. Make Sense and Persevere** What statistical question might Tessa have asked her classmates to gather the data displayed in the bar graph? © MP.1



**10. Higher Order Thinking** People with *heterochromia* have two different-colored eyes. A new student in Tessa's class has heterochromia. How might you show that the student has one blue eye and one brown eye on the bar graph? Explain.

**11. Be Precise** Could Tessa represent these data using a dot plot? Explain. © MP.6

## © Assessment Practice

**12.** Charles asked each member of the basketball team these two questions:

- *How many inches tall are you?*
- *How many points were scored in the last game?*

### PART A

Which of the questions that Charles asked is a statistical question? Explain.

### PART B

The results of the statistical question that Charles asked are shown below. Make a dot plot to display the data.

68 70 73 74 72 74 75 76  
70 71 73 72 73 70 73 74

Name \_\_\_\_\_

**Use the vocabulary terms from the list to complete the sentences.  
Terms may be used more than once.**

range	median	divided
average	mode	variability
center	ordered	mean

1. Mean, median, and mode are measures of \_\_\_\_\_.
2. Range is a measure of \_\_\_\_\_.
3. Another word for mean is \_\_\_\_\_.
4. The middle data value when values are \_\_\_\_\_ from least to greatest is the \_\_\_\_\_.
5. The sum of all values of a data set \_\_\_\_\_ by the total number of data values is the \_\_\_\_\_.
6. The \_\_\_\_\_ is the difference between the greatest and least data values.
7. The value that occurs most often in a data set is the \_\_\_\_\_.
8. A data set consists of 2, 2, 3, 4, 5, 5, and 7. Then, 20 is added to the data set. The new value will have little effect on the \_\_\_\_\_, but it will raise the \_\_\_\_\_ significantly.

## KEY CONCEPT



KEY  
CONCEPT

You can summarize a set of data using a measure of center, such as the mean, median, or mode, or a measure of variability, such as the range.

### Mean

$$(7 + 10 + 16 + 9 + 12 + 21 + 14 + 8 + 13 + 15) \div 10 = 12.5$$

### Median

7, 8, 9, 10, 12, 13, 14, 15, 16, 21

$$(12 + 13) \div 2 = 12.5$$

### Mode

7, 8, 9, 10, 12, 13, 14, 15, 16, 21

There is no mode.

### Range

⑦8, 9, 10, 12, 13, 14, 15, 16, ②1

$$21 - 7 = 14$$

The average number of hours of TV watched each week is 12.5 hours.  
The range of hours watched is 14 hours.

**Number of Hours of TV  
Watched in a Week**

Juan	7
Tyrone	10
Abigail	16
Lateisha	9
Helen	12
Albert	21
Tim	14
Josh	8
Anita	13
Henry	15

## Do You Understand?

- Essential Question** How can you use a single measure to describe a data set?
- Maddie scored 3 goals, 2 goals, and 4 goals during her last three soccer games. How can you find the mean, or average, number of goals Maddie scored?
- Use Structure** Why is it important to order the data when finding the median? © MP.7

## Do You Know How?

The table shows data about the students in three classes.

Teacher	Boys	Girls
Ms. Green	15	14
Mr. Nesbit	12	12
Ms. Jackson	12	16

- What is the mean number of boys in the three classes? What is the mean number of girls in the three classes?
- What is the mode of the number of girls in the three classes?
- What is the median number of students in the three classes?



Name: \_\_\_\_\_



PRACTICE



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## 8-2 Additional Practice

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In 1 and 2, find the mean of the data given.

1. Number of pets in six families: 3, 0, 2, 4, 2, 1

2. Number of apps on five friends' smart phones: 42, 42, 23, 75, 64

In 3–7, use the data table.

3. Order the data from least to greatest.

4. What are the median and the mode of the data?

5. How do you find the range of the data?  
What is the range of this data set?

6. **Use Structure** A newspaper wanted to summarize the data without including Alaska and Hawaii. How does this affect the median? ©MP.7

7. **Look for Relationships** How does deleting the data for Alaska and Hawaii affect the mode and the range? ©MP.7

National Parks in Western States	
Alaska	23
Arizona	22
California	26
Colorado	13
Hawaii	7
Idaho	6
Montana	8
Nevada	3
New Mexico	13
Oregon	6
Utah	13
Washington	13
Wyoming	7

In 8 and 9, use the data about the weekly salaries of employees at two small companies.

Company A: \$500, \$510, \$530, \$510, \$550

Company B: \$450, \$440, \$440, \$470, \$800

8. What is the mean weekly salary at each company?

9. **Generalize** Four of the five employees at Company B each received a raise of \$40. After the raises, how much greater is the mean of the salaries for Company B than for Company A? Explain how you solved the problem. ©MP.8





In 10–12, use the data listed at the right.

10. What is the median? How do you find the median of this set of data?

**Long Jump Distances at Parker Middle School Track Meet (m)**

5.46, 5.92, 2.95, 5.06, 4.1,  
5.45, 5.07, 5.06, 5.9

11. What are the mode and the range of the data?

12. **Look for Relationships** If a tenth competitor were to jump 1.01 meters, which measure would change the most: the median, the mode, or the range? Explain. © MP.7

In 13–15, use the data listed at the right.

13. Some band members have raised much more money than others. Which measure can be used to show this? Explain.

**Money Each Student Has Raised for a Band Trip**

\$24.50, \$18.25, \$5.75, \$48.00, \$32.50,  
\$12.80, \$22.90, \$35.00, \$18.75, \$16.25

14. What is the mean amount raised by the students?

15. **Higher Order Thinking** How much more money do the 10 students need to raise to increase the mean to \$25.00? Explain.

**© Assessment Practice**

16. Use the data table to find the statistical measures. Draw a line to match each measure on the left to its value on the right.

mean	
median	
mode	
range	

23
30
39
40

**National Historic Landmarks in Southern States**

Alabama	37
Florida	43
Georgia	48
Kentucky	30
Louisiana	53
Mississippi	39
Tennessee	30



Name \_\_\_\_\_

**Students in Mr. Brenner's reading class have to keep a log of the number of pages they read in 1 week.**

1. Summarize the data using the different measures of center.

Number of Pages Read in 1 Week			
Brooke	154	Kurt	560
Charlie	217	Liam	195
Chleo	329	Malaika	312
Deshawn	308	Noelle	196
Desiree	225	Pete	257
Dionne	410	Ricky	333
Faith	150	Rosa	486
Gavin	372	Sally	318
Hugh	264	Tyler	225
Jorge	383	Zoe	428

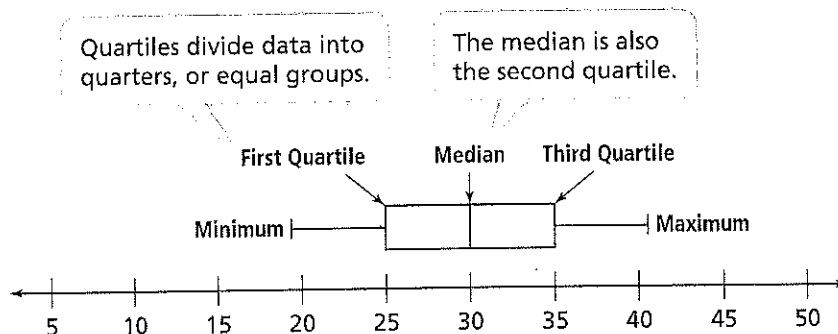
- Find the mean.
  - Find the median.
  - Find the mode.
2. Faith only read 60% of her goal for 1 week. How would the mean, median, and mode have changed if Faith had met her goal? Explain.
3. Deshawn realized that he recorded the wrong number of pages read. When he corrected his number, the mean increased by 4 and the median increased by 5. How many pages did Deshawn read?

## KEY CONCEPT



KEY  
CONCEPT

A box plot shows a distribution of data values on a number line. A box plot visually represents a data set divided into four equal parts.

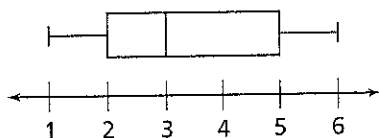


## Do You Understand?

1. **Essential Question** Why is a box plot useful for representing certain types of data?

2. What values are included inside the box of a box plot?

3. **Critique Reasoning** A box plot shows the distribution of the costs of used books. The box of the box plot starts at \$2 and ends at \$5. Alex says this means that about one-quarter of the books cost between \$2 and \$5. Is Alex correct? Explain. © MP.3



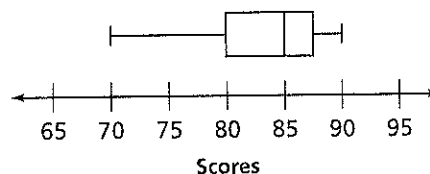
## Do You Know How?

Sarah's scores on tests were 79, 75, 82, 90, 73, 82, 78, 85, and 78. In 4–8, use the data.

4. What are the minimum and maximum test scores?
5. Find the median.
6. Find the first and the third quartiles.
7. Draw a box plot that shows the distribution of Sarah's test scores.

8. Eric is in Sarah's class. This box plot shows his scores on the same nine tests. How do Eric's scores compare to Sarah's?

Eric's Tests



Name: \_\_\_\_\_



PRACTICE



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## 8-3 Additional Practice

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1. In a bowling tournament, Sofia got the following scores:  
167, 178, 193, 196, 199, 199, 203, 209, 217, 220, 221.
  - a. What is the median?
  - b. What is the first quartile?
  - c. What is the third quartile?
  - d. Draw a box plot of the data.
  - e. Write two conclusions about the data shown in the box plot.

- 
2. Sabrina grows flowers. In a competition with other flower growers, she earned the following scores: 7, 10, 10, 6, 7, 8, 8, 7, 9.
    - a. What is the median?
    - b. What is the first quartile?
    - c. What is the third quartile?
    - d. Draw a box plot of the data.
    - e. Write two conclusions about the data shown in the box plot.

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In 3 and 4, use this data set, which shows how many miles Tisha ran each week for 10 weeks.  
4, 9, 8, 6, 14, 11, 14, 8, 16, 12

3. Find the statistical measures that you need to make a box plot of Tisha's running distances.
  4. Make a box plot to represent Tisha's running distances.
- 
- In 5 and 6, use this data set, which shows the prices, in dollars, of 10 coats.  
55, 75, 45, 80, 50, 70, 45, 85, 60, 70
5. Find the statistical measures you need to make a box plot of the coat prices.
  6. Make a box plot to display the coat prices.



In 7 and 8, draw box plots using the data provided.

7. The sizes of different computer files, in megabytes:

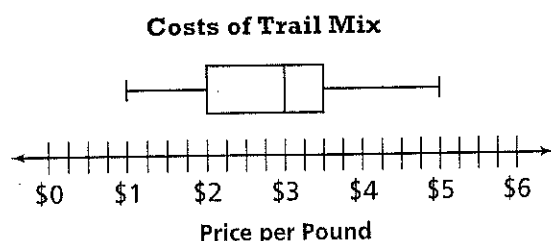
114, 134, 191, 216, 255, 181, 189

8. The rainfall, in inches per year, for seven different states:

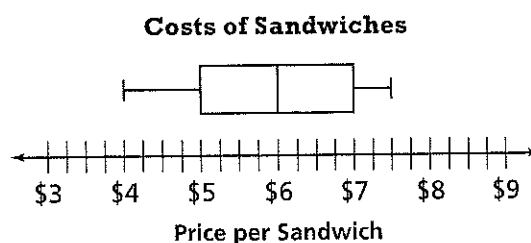
83, 57, 48, 97, 20, 36, 31

In 9 and 10, use the box plot to answer the question.

9. How much does the less expensive 50% of trail mix cost?

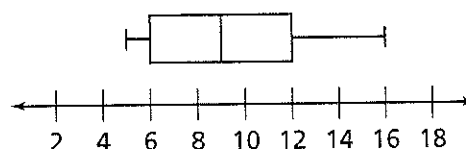


10. How much does the most expensive sandwich cost?



11. **Higher Order Thinking** Terence made a box plot showing the number of points scored at football games. Without seeing the values, what part of the scores fall in the range represented by the box? Explain.

12. **Critique Reasoning** Casey recorded the weights, in pounds, of 10 cats at the vet's office: 5, 8, 6, 13, 16, 12, 5, 8, 10, 15. Casey then drew a box plot using the weights. What error did Casey make? © MP.3



## © Assessment Practice

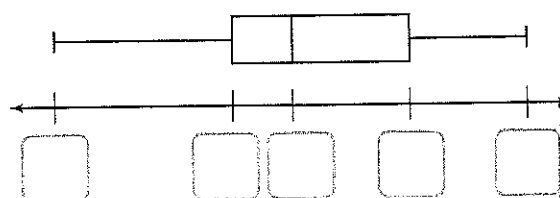
13. Use the given data to complete the box plot.

Shantay tossed a pair of number cubes numbered 1–6 a total of 10 times. The sums of the numbers on her cubes for each of her tosses are shown in the table.

### Sum of Pair of Tossed Number Cubes

11 3 9 5 10 7 7 6 7 6

Complete the box plot to show the distribution of the sums.



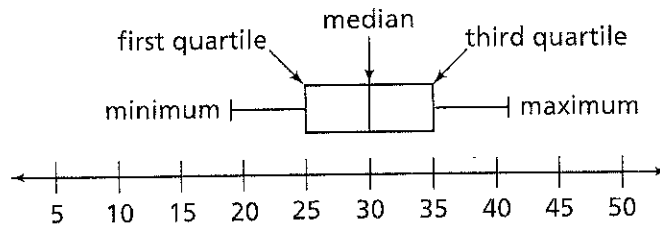
Name \_\_\_\_\_

Reteach to Build  
Understanding

**8-3**

12

A **box plot** shows a distribution of data values on a number line. The median divides the data in half. **Quartiles** divide the data into four equal parts. To create a box plot, you need 5 values: the minimum, the maximum, the median, the first quartile, and the third quartile.



- The data set below represents the heights, in inches, of 11 professional basketball players.

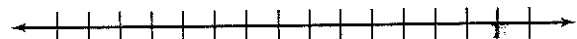
80, 74, 83, 81, 84, 83, 71, 73, 76, 81, 76

Fill in the blanks to order the data values from least to greatest. Then circle the minimum and maximum heights and label the median and the quartiles.

71, \_\_\_\_\_, 74, 76, \_\_\_\_\_, 80, 81, \_\_\_\_\_, 83, \_\_\_\_\_, 84

- Make a box plot.

**Step 1** Label the number line with an appropriate scale for the data set.



Heights (in.)

**Step 2** Plot the minimum, maximum, median, first quartile, and third quartile.

**Step 3** Draw a box between the first and third quartiles, and draw a vertical line segment at the median.

**Step 4** Draw horizontal segments that extend from the box to the minimum and to the maximum.

## On the Back!

- The data set below represents the weights, in pounds, of several pumpkins in a contest. Make a box plot for the data.

13, 14, 29, 22, 18, 16, 33, 35, 41, 27

Name \_\_\_\_\_

Enrichment

**8-3**

13

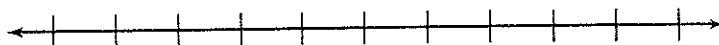
Four data sets are shown below.

<b>Set A</b> 57, 48, 52, 44, 49, 48, 61, 51, 47	<b>Set B</b> 45, 49, 46, 57, 45, 52, 44, 61, 45, 52
<b>Set C</b> 50, 46, 51, 59, 46, 51, 45, 61, 56, 44, 48	<b>Set D</b> 55, 49, 47, 47, 54, 46, 60, 57, 44, 51, 47, 61

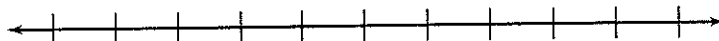
1. What would be a good scale to use for the number lines for box plots of the data sets?

2. Create a box plot for each data set.

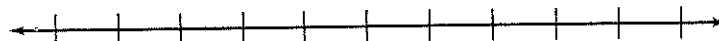
A.



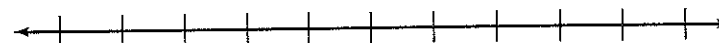
B.



C.



D.



3. What do the box plots have in common?

4. Which two data sets are most similar? What is different about them?

5. What is the mean of the medians?

Name \_\_\_\_\_

Reteach to Build Understanding

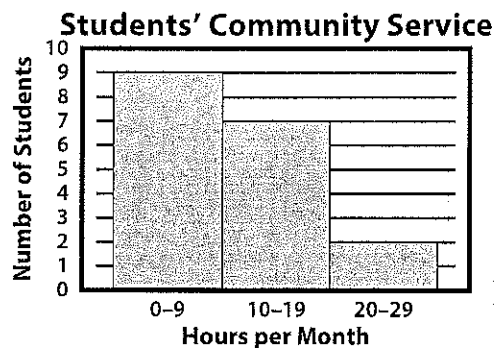
8-4

14

A **frequency table** shows the number of times that data values occur in a data set. You can use tally marks to keep track of the number of times a data value occurs.

Students' Community Service		
Hours per Month	Tally	Frequency
0-9		9
10-19		7
20-29		2

A **histogram** is a graph that uses bars to show the frequency of equal ranges or groups of data. The data from the table is displayed in the histogram.

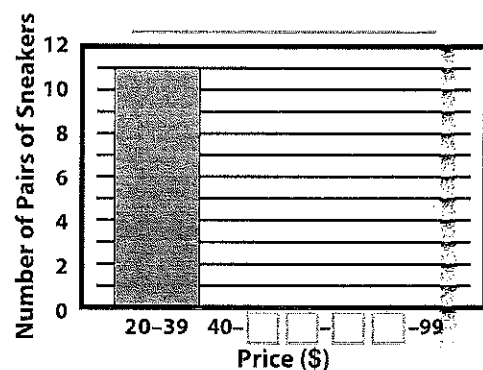


1. Luke recorded the prices of different pairs of sneakers at a store.

\$50, \$45, \$36, \$30, \$80, \$35, \$35, \$45, \$32, \$40, \$24, \$50, \$35, \$50, \$50, \$35, \$65, \$30, \$32, \$90, \$45, \$30, \$42, \$50

Complete the frequency table and the histogram.

Prices of Sneakers		
Price (\$)	Tally	Frequency
20-39		11
40-		
-79		1



## On the Back!

2. Ms. Lin recorded her students' test scores. Represent the data in a frequency table and a histogram. Use intervals such as 60-69 and 70-79.

71, 99, 95, 96, 77, 79, 78, 81, 75, 90, 84, 99, 87, 68, 67, 99, 82, 71, 84, 88, 89, 67, 83, 76, 74, 93, 65, 99



## KEY CONCEPT



KEY  
CONCEPT

15

Data displays can be used to help make sense of data.

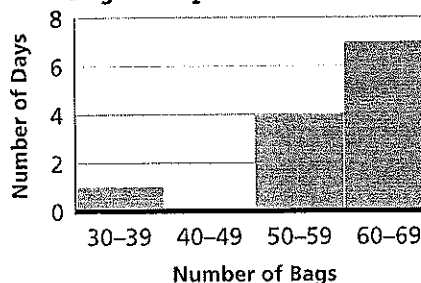
### Bags of Popcorn Sold Each Day

62, 65, 58, 31, 64, 58, 66, 68, 56, 67, 68, 51

You can organize data in a frequency table.

Bags	Tally	Frequency
30–39		1
40–49		0
50–59		4
60–69		7

### Bags of Popcorn Sold Each Day



You can use a frequency table to make a histogram.

## Do You Understand?

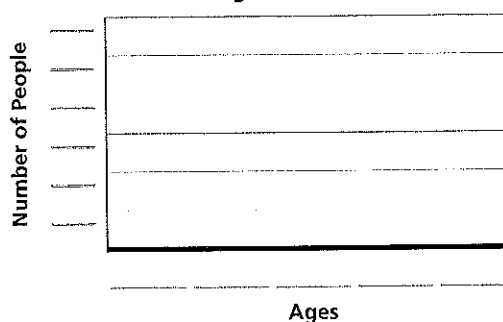
- Essential Question** How can a frequency table or histogram help you organize and analyze data?
- How is a histogram different from a bar graph?
- What types of numerical data sets are easier to display using a histogram instead of a dot plot? Explain.
- Reasoning** How are frequency tables and histograms alike and how are they different? © MP.2

## Do You Know How?

- A data set contains ages ranging from 6 to 27.  
6, 11, 9, 13, 18, 15, 21, 15, 17, 24, 27, 12  
Complete the frequency table and histogram.

Ages	Tally	Frequency
6–10		
11–15		
16–20		
21–25		
26–30		

### Ages in Data Set



Name: \_\_\_\_\_



PRACTICE



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## 8-4 Additional Practice

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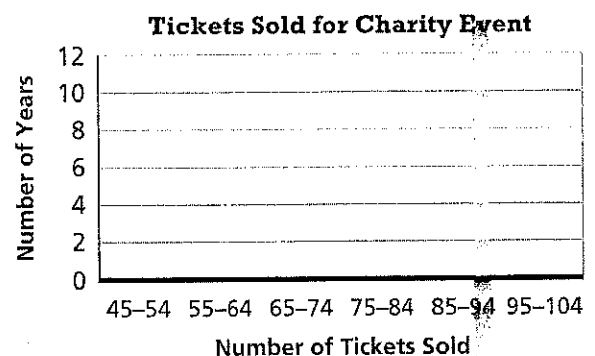
In 1 and 2, use the data in the chart.

Annual Ticket Sales for Charity Ice-Skating Event							
72	81	88	51	90	89	85	74
87	100	80	99	87	96	99	84
84	86	94	88	91	85	78	90

1. Complete the frequency table below for the number of tickets sold each year for the charity event.

Tickets Sold	Tallies	Frequency
45–54		
55–64		
65–74		
75–84		
85–94		
95–104		

2. Use your frequency table to complete the histogram.



In 3–6, use the data in the frequency table. The frequency table shows the time it took students in a P.E. class to run 1 mile.

3. How many students are in the P.E. class?
4. How many students ran 1 mile in under 9 minutes?
5. How many fewer students ran 1 mile in under 10 minutes than students who took 11 or more minutes to run that distance?

Time in Minutes	Tally	Frequency
8:00–8:59		6
9:00–9:59		2
10:00–10:59		8
11:00–11:59		6
12:00–12:59		9

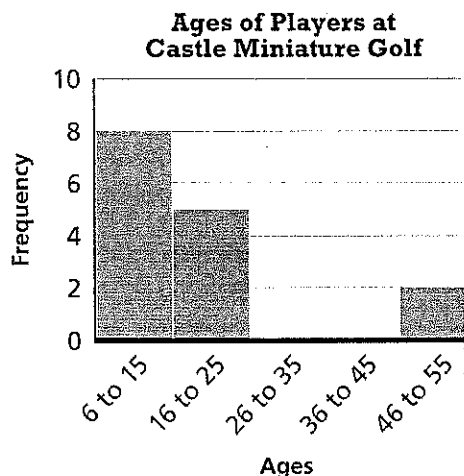
6. **Be Precise** Can you tell from the frequency table how many students, if any, ran a mile in exactly 12 minutes? Explain. © MP.6



In 7–9, use the chart below and the histogram at the right.

**Ages of Players at Castle Miniature Golf**

14	7	6	24	15
9	19	25	10	17
51	8	21	48	12



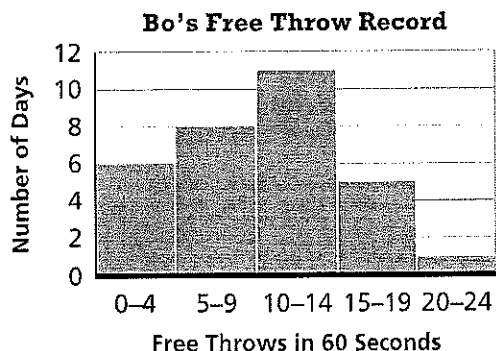
7. Just as Lilah finished making her histogram, a group of five people started playing. She wants to include their ages, which are 12, 12, 16, 26, and 48. How should Lilah change her histogram to include these ages?

8. **Reasoning** Lilah recorded the ages of the miniature golf players at 3:00 P.M. How might her data change if she recorded the ages of players at 7:00 P.M.? © MP.2

9. **Higher Order Thinking** Suppose a 65-year-old brings her two granddaughters to play miniature golf. The granddaughters are both 5 years old. How can Lilah adjust the intervals to include these ages?

## © Assessment Practice

10. Each day for a month, Bo timed himself to see how many free throws he could make in 60 seconds.



Using the histogram, select all of the true statements that describe Bo's data.

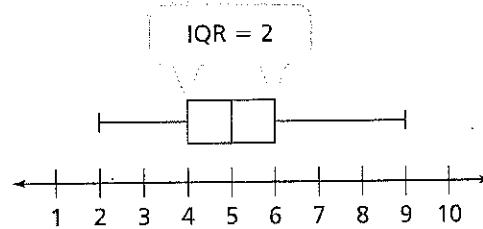
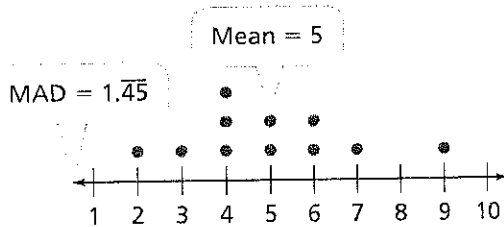
- ☐ There were 31 days in that month.
- ☐ Bo made 15–19 free throws 6 times.
- ☐ More than half of the days in the month, Bo made at least 10 shots.
- ☐ The greatest number of shots made in 60 seconds was between 10 and 14.
- ☐ Bo made fewer than 10 shots more often than he made more than 14 shots.

## KEY CONCEPT



KEY  
CONCEPT

The mean absolute deviation and the interquartile range each use a single number to describe the variability, or spread, of a data set. The **mean absolute deviation (MAD)** tells you how far the data are spread out from the mean. The **interquartile range (IQR)** tells you how far the middle of the data is spread out from the median.



## Do You Understand?

1. **Essential Question** How can the variability of data be described using a single number?

2. What does the IQR show that the range does not show?

3. **Reasoning** Two data sets have the same mean, 8. However, the MAD of Data Set A is 2 and the MAD of Data Set B is 4. What does this indicate about the variability of the data sets? © MP.2

## Do You Know How?

In 4–7, use these data.

Davita works at a shoe store. She measured the feet of nine customers and found that their shoe sizes were 4, 5, 5, 6, 7, 8, 8, 10, and 10.

4. Find the mean.
5. Find the sum of the absolute deviations from the mean.
6. Find the mean absolute deviation. Explain how you found the MAD.
7. Find the range and IQR. How is each calculated?



Name: \_\_\_\_\_



PRACTICE



TUTORIAL

## 8-5 Additional Practice

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19

In 1 and 2, complete the tables to find the MAD of each data set.

1.

Data Value	Absolute Deviation
10	$ 25 - 10  =$
15	
20	
30	
50	
MAD =	

2.

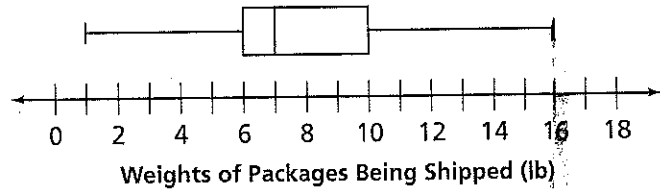
Data Value	Absolute Deviation
126	
138	
276	
178	
236	
90	
MAD =	

In 3 and 4, find the range and the IQR for the data in each table.

3. Find the range and the IQR for the data in Exercise 1.

4. Find the range and the IQR for the data in Exercise 2.

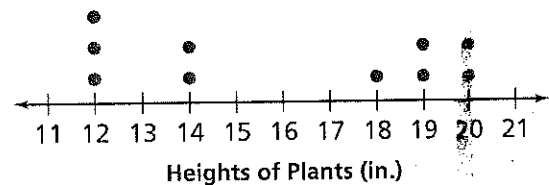
In 5 and 6, use the data shown in the box plot.



5. What are the range and the IQR?

6. Describe the variability of the data.

In 7 and 8, use the data shown in the dot plot.



7. What are the mean and the MAD?

8. Describe the variability of the data.



In 9–13, use the data in the table.

9. At a carnival booth, people pay \$1 to take 5 free throws. They win a prize based on the number of baskets they make. Vera recorded the number of baskets 20 people made out of 5 shots in the table. Complete the frequency table.

Number of Baskets Made	Tallies	Frequency
0		
1		
2		
3		
4		
5		

10. **Higher Order Thinking** Without making the calculations, what do you expect the MAD to be? Explain.

11. **Reasoning** Vera needs to find the mean number of baskets made to find the MAD. How can you find the mean of the tallied data? © MP.2

12. What is the MAD of Vera's data? What is the IQR?

13. **Construct Arguments** Which measurement, the MAD or the IQR, describes how close each person's number of baskets made was to any other person's number of baskets made? Construct an argument to support your answer. © MP.3

## © Assessment Practice

14. Jason recorded the number of hours of sunshine each day for 7 days as shown below.

### Hours of Sunshine

12, 10, 3, 8, 13, 11, 5

#### PART A

What is the IQR of Jason's data? Show your work.

#### PART B

Make one true statement about the IQR and how it relates to Jason's data.

Name \_\_\_\_\_

Enrichment

**8-5**

21

**In one week, 8 dogs were brought to the city animal shelter. The vet's assistant recorded the weights, in pounds, of the dogs.**

Weight of Dogs (pounds)			
23	12	26	51
34	47	34	15

1. What are the mean and the MAD of the data? Use a dot plot to help describe the variability of the data.
2. What are the range and the IQR of the data? Use a box plot to help describe the variability of the data.
3. The following week, 3 dogs were brought to the city animal shelter, and they weighed 19, 24, and 63 lb. The vet's assistant found the MAD of the weights of the 3 new dogs and averaged it with the MAD of the 8 dogs from the week before and claimed that was the MAD of all 11 dogs. Is the vet's assistant correct? Explain.

Name \_\_\_\_\_

22

**Choose the term or phrase from the list that best matches the description. Terms may be used more than once.**

mean	range	mean absolute deviation (MAD)	measure of variability
median	mode	interquartile range (IQR)	absolute deviation

1. The average of the distances between each data value and the mean of a data set
2. This measure of variability tells how far the middle of the data is spread out from the median.
3. A single number that shows how data are spread or clustered
4. The difference between the greatest data value and the least data value of a data set
5. This measure of center is the value that occurs most often in a data set.
6. The difference between the third quartile and the first quartile
7. The distance between each data value and the mean
8. This measure of center is the middle data value.
9. This measure of variability tells how far the data are spread out from the mean.
10. This measure of center is the sum of all values in a data set divided by the total number of data values in the set.



## KEY CONCEPT



KEY  
CONCEPT

23

The statistical measure that is most appropriate to describe the center and variability of a data set should be chosen based on an analysis of the spread, clustering, and outliers in the data set.

The **mean** is a good choice to describe the center of a data set when the data are clustered together.

When the mean is used, the **mean absolute deviation (MAD)** is a good choice to describe the variability.

The **median** is a good choice to describe the center of a data set when the data contain an outlier.

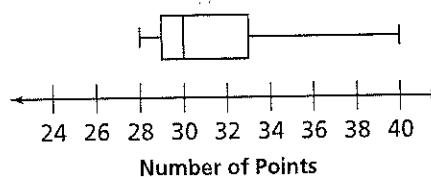
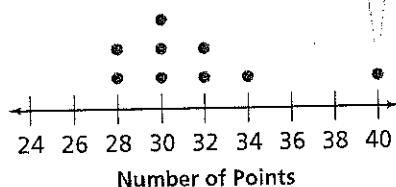
When the median is used, the **interquartile range (IQR)** is a good choice to describe the variability.

The **mode** is sometimes a good choice to describe the center of a data set if the data is not numeric or does not fall in intervals.

The median and mode are the same, 30. Both describe the center of the data set.

The outlier will increase the mean. The mean and MAD are *not* the best choices.

The middle half of the data is clustered together. The IQR is a good measure of the variability of the data set because it uses the median.



## Do You Understand?

1. **Essential Question** Why is one statistical measure more useful than another to describe a given situation?

2. **Reasoning** You cannot find a good measure of center for a data set. What is probably true of the data set? © MP.2

## Do You Know How?

In 3–5, use the basketball team's scores for one season: 44, 43, 42, 40, 42, 45, 39, 38, 18.

3. Find the mean, median, and mode of the scores.
4. Is the median or mean the best measure of center for these data? Explain.
5. Find the measure of variability that best describes the data set.



Name: \_\_\_\_\_



PRACTICE



TUTORIAL

## 8-6 Additional Practice

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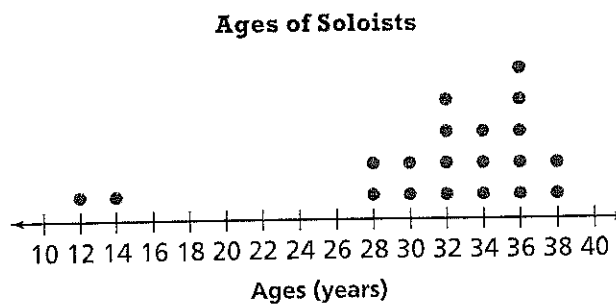
24

In 1–4, use the data table.

Cost of Kick Scooters at Ted's Sports							
\$125	\$135	\$130	\$140	\$135	\$154	\$135	\$130

1. Make a dot plot of these data.
2. What are the mean, median, and mode of these prices? Which measure best describes the center of these data? Explain.
3. Which measure would you use to describe the variability of these data? Explain.
4. Describe the center and variability of these prices.

In 5–7, use the dot plot. The dot plot shows the ages of soloists in an orchestra.



5. a. Is the mean, median, or mode the best measure of center for these data? Explain.
6. Identify a good measure of variability for these data. Find the value.
- b. Find that measure of center.
7. Write a sentence describing the variability of the ages of the soloists.



In 8–10, use the data below.

8. **Model with Math** Make a dot plot for the data. © MP.4

9 Game Scores		
50	60	80
65	50	55
65	70	50

9. What are the mean, median, and mode of the data, rounded to the nearest whole number? Are there any outliers?

10. **Generalize** Use what you know about statistical measures to explain which measure of center best describes the data set. © MP.8

In 11 and 12, use the data table.

Cost of 6 Brands of Shampoo					
\$1	\$2	\$4	\$6	\$7	\$20

11. What is the outlier in this data set?

12. **Reasoning** Does an outlier affect the IQR? Does an outlier affect the MAD? Explain. © MP.2

## © Assessment Practice

13. The table shows the number of home runs hit by eight baseball players last season. Choose Yes or No to answer the questions about the data.

Home Runs Hit			
42	31	35	17
43	42	53	57

- Are there outliers in the data?
- Does the mean best describe the center?
- Does the MAD, 9.25 home runs, best describe the variability?
- Does the IQR, 15 home runs, best describe the spread?

- |                           |                          |
|---------------------------|--------------------------|
| <input type="radio"/> Yes | <input type="radio"/> No |
| <input type="radio"/> Yes | <input type="radio"/> No |
| <input type="radio"/> Yes | <input type="radio"/> No |
| <input type="radio"/> Yes | <input type="radio"/> No |



Name \_\_\_\_\_

**Choose the best term for each blank.**

1. Mean, median, and mode are all measures of \_\_\_\_\_.  
Ⓐ variability      Ⓑ center      Ⓒ gap      Ⓓ spread
2. \_\_\_\_\_ are data values far away from most of the other data in a set.  
Ⓐ Gaps      Ⓑ Averages      Ⓒ Outliers      Ⓓ Clusters
3. The spread and clustering of data in a set is the \_\_\_\_\_ of the data set.  
Ⓐ variability      Ⓑ median      Ⓒ mean      Ⓓ outlier
4. The \_\_\_\_\_ is the most appropriate measure of variability to use when the mean is the best measure of center.  
Ⓐ interquartile range      Ⓑ range      Ⓒ mean absolute deviation      Ⓓ mode
5. An outlier distorts the \_\_\_\_\_.  
Ⓐ median      Ⓑ mode      Ⓒ interquartile range      Ⓓ mean
6. The \_\_\_\_\_ is the most appropriate measure of variability to use when the median is the best measure of center.  
Ⓐ range      Ⓑ mean absolute deviation      Ⓒ interquartile range      Ⓓ spread
7. When data values are close together, they are \_\_\_\_\_ together.  
Ⓐ clustered      Ⓑ spread      Ⓒ gapped      Ⓓ ranged
8. A measure of center may not reflect the data well when there is a \_\_\_\_\_ in the center.  
Ⓐ mode      Ⓑ cluster      Ⓒ median      Ⓓ gap

## KEY CONCEPT

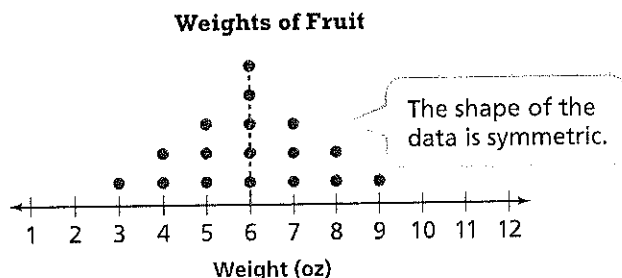


KEY  
CONCEPT

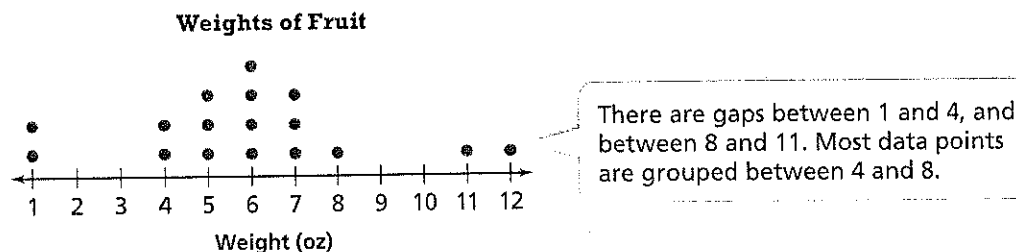
21

To describe a set of data, look at the shape and observe how the data are clustered or spread out.

A distribution can be symmetric and clustered in the center. When the data are symmetric, use the mean and mean absolute deviation (MAD) to describe the data.



A distribution can show gaps, clusters, or outliers. It may spread out more to one side. When the data are not symmetric, use the median and interquartile range (IQR) to describe the data.



## Do You Understand?

- 1. Essential Question** How can you summarize a data distribution?

- 2. Reasoning** This data set has an outlier.

0, 40, 50, 60, 60, 70, 80, 80

How would the median and the mean be affected if the outlier was removed? © MP.2

## Do You Know How?

- 3.** Five different students measured the length of a shadow in inches as follows:  $38$ ,  $38\frac{1}{2}$ ,  $37\frac{3}{4}$ ,  $38$ ,  $38\frac{1}{4}$ . Make a generalization about the data distribution of the shadow measurements.

- 4.** What are the mean, the median, and the interquartile range of the data set in Exercise 3?



Name: \_\_\_\_\_



PRACTICE



TUTORIAL

## 8-7 Additional Practice

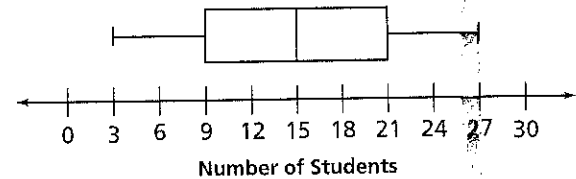
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In 1–4, use the data in the box plot.

- Find the median for the data. What does the median indicate about the data in this problem?

**Students with Dogs in Each Classroom at Brookdale Elementary**



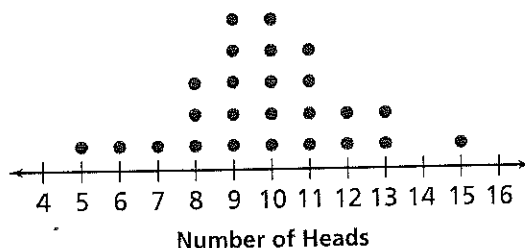
- What is the interquartile range?

- Describe the shape of the data distribution.

- If a dot plot were used to display the same data, what would it look like?

- Be Precise** The 25 students in a math class took turns flipping a coin 20 times. The dot plot shows the number of times the result was heads. © MP.6

**Results of Coin Tosses**

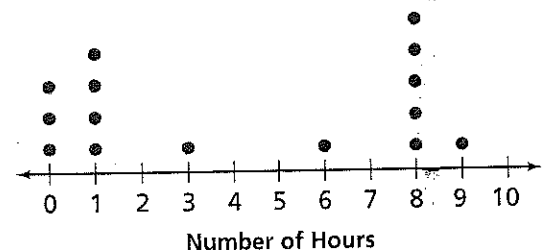


- What do any clusters and gaps in the dot plot tell you about the likelihood of the coin landing on heads?

- Which measures, if any, would be best to summarize the data?

- Use Structure** The school nurse asked 15 parents how many hours they spend exercising each week. The dot plot displays the data. © MP.7

**Hours Exercising per Week**



- What do any clusters and gaps in the dot plot tell you about the exercise habits of the parents?

- Which measures, if any, would be best to summarize the data?



In 7–11, use the data to answer the questions.

**Lengths of Long Jumps in Mr. Hansen's Physical Education Class (in inches)**

91, 72, 76, 77, 79, 79, 76, 72, 80, 83, 85, 89, 76, 80, 79, 82, 84, 80

**7. Be Precise** Find the median and the mean for the data set. Then find the interquartile range. © MP.6

**8.** What would be the preferable measure of center, the median or the mean? Explain your reasoning.

**9. Model with Math** Complete a box plot and a dot plot for the data. © MP.4



**10. Higher Order Thinking** Describe the shape of the data distributions. Explain how the dot plot and the box plot are similar and different.

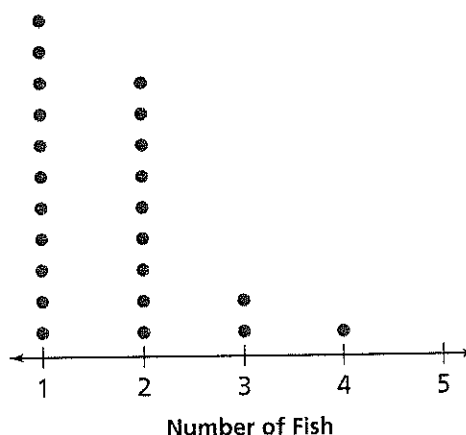
**11. Use Structure** Matt says that the mean would be more affected than the median if a long jump of 110 inches were added to the data. Do you agree? Explain how you know. © MP.7

**© Assessment Practice**

**12.** Which statement about the pet fish data is true?

- Ⓐ The median and the mean are the same.
- Ⓑ A good representation for the center of the data is 2.
- Ⓒ The data are symmetrical.
- Ⓓ The data show that most students have 3 or more fish.

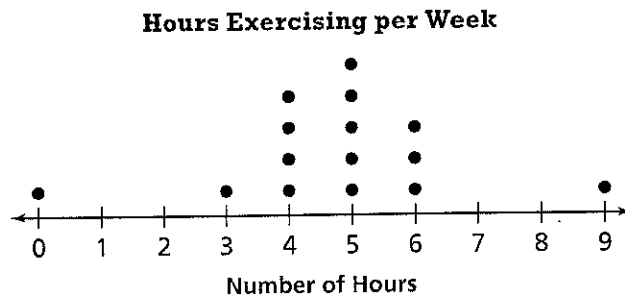
**Number of Pet Fish Students Own**



Name \_\_\_\_\_

**Read the problem below. Answer the questions to help understand the problem.**

A doctor asked 15 people how many hours they spend exercising each week. The dot plot displays the data.



What do any clusters and gaps in the dot plot tell you about the exercise habits of these people?

1. What statistical question was asked to collect this data? Highlight the part of the problem that gives this information.
2. How many people were asked the question? In what two places in the problem can this information be found?
3. What type of display was used to show the data? Explain why it is important to align the data accurately above the number line.
4. What are "clusters"? Circle any clusters in the display.
5. What are "gaps"? Draw arrows to point to any gaps in the display.
6. What are "habits"? How do they relate to the topic of the data?



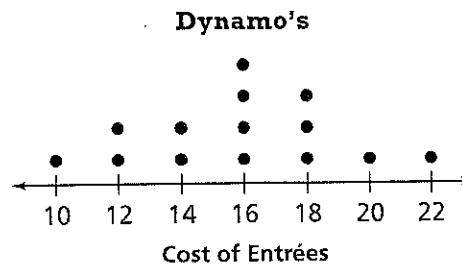
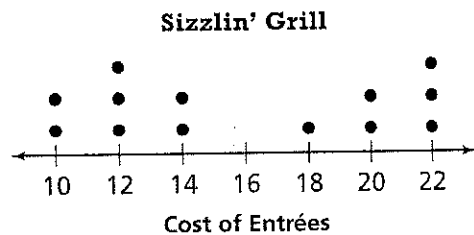
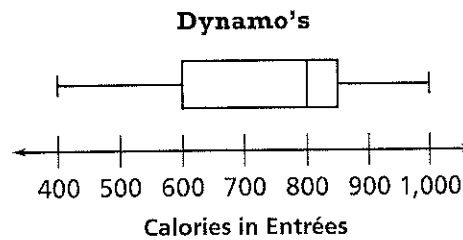
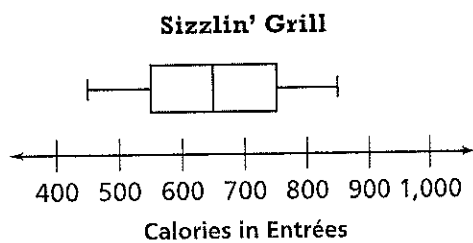
Name \_\_\_\_\_

Enrichment

**8-7**

31

You are a reporter for the *Daily Times* and have been assigned to write an article comparing two new restaurants. Use the information to summarize the main points of the article.



Name \_\_\_\_\_

Additional Vocabulary  
Support

**8-7**

32

Use the terms from the list below to complete the graphic organizer about the study of data distributions. Terms may be used more than once.

mean

gaps

clusters

interquartile range (IQR)

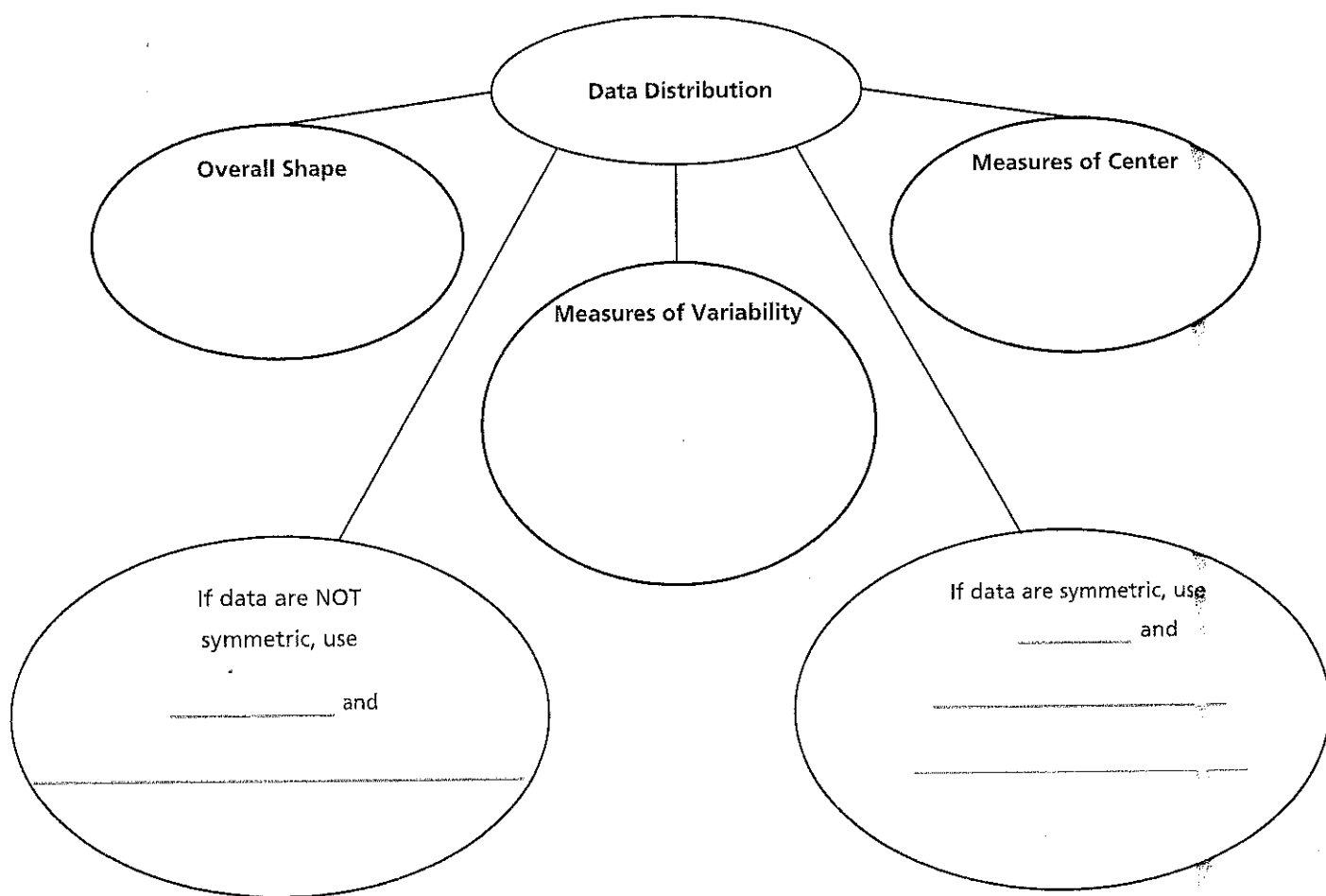
median

mean absolute deviation (MAD)

symmetric

outliers

mode



## ? Topic Essential Question

How can data be described by a single number? How can tables and graphs be used to represent data and answer questions?

## Vocabulary Review

Write *always*, *sometimes*, or *never* for each statement.

1. Intervals in a *frequency table* go beyond the values in a data set. \_\_\_\_\_
2. You can calculate the *IQR* from a *box plot*. \_\_\_\_\_
3. You can calculate the *mean* from a *histogram*. \_\_\_\_\_
4. The *MAD* is a negative value. \_\_\_\_\_
5. The *range* is a measure of variability. \_\_\_\_\_
6. The *mean*, *median*, and *mode* are the same value. \_\_\_\_\_

## Use Vocabulary in Writing

Describe measures of variability and when you would use them to summarize a data set. Use vocabulary words in your explanation.

# Concepts and Skills Review

## LESSON 8-1 Recognize Statistical Questions

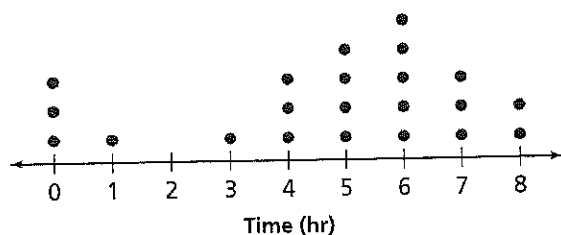
### Quick Review

A statistical question anticipates that there will be a variety of answers.

### Example

Ramon surveyed his classmates to determine the answer to the statistical question "How many hours do my classmates spend online each week?" The question yielded a variety of numerical answers. Ramon made this dot plot to display the data.

Time Spent Online Each Week



### Practice

In 1–4, tell whether each question is statistical.

1. How many stations are there in a subway system?
2. How would passengers of a subway system rate the quality of service on a scale of 1 to 10?
3. How many passengers travel on each of the Green, Blue, Red, and Orange Lines of the subway system each day?
4. How much does it cost for a ticket to ride the subway from Station A to Station B?

## LESSON 8-2 Summarize Data Using Mean, Median, Mode, and Range

### Quick Review

The mean is the sum of all the values in a data set divided by the total number of values in the set. The median is the middle data value in a set arranged in numerical order. The mode is the value that occurs most often in a set. The range is the difference between the highest and lowest values in a set.

### Example

Find the mean, median, mode, and range of the following set of data.

Total Game Points				
129	124	128	120	124

Mean: 125      Median: 124  
Mode: 124      Range: 9

### Practice

In 1–6, find the mean, median, mode, and range of each data set.

1. 2, 5, 5
2. 11, 13, 13, 11, 13
3. 27, 26, 25, 20
4. 100, 200, 500, 300, 500
5. 1.4, 1.3, 1.1, 1.4, 1.9, 1.8, 1.7, 1.4
6. 450, 0, 500, 750, 0

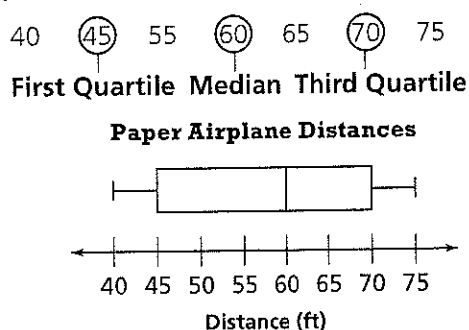
## LESSON 8-3 Display Data in Box Plots

### Quick Review

Quartiles divide a data set into four equal groups. A box plot uses the minimum, first quartile, median, third quartile, and maximum values in a data set to show how the data are distributed.

### Example

Make a box plot of the distances, in feet, that seven paper airplanes flew: 60, 75, 45, 55, 70, 40, 65.



### Practice

In 1 and 2, use the data to create a box plot.

1. 27, 31, 30, 33, 29, 25, 28

2. 3, 1, 3, 7, 5, 2, 3, 6, 3

## LESSON 8-4 Display Data in Frequency Tables and Histograms

### Quick Review

A frequency table shows the number of times a data value or a range of data values occurs in a data set. A histogram is a graph that uses bars to show the frequency of equal ranges or groups of data.

### Example

Organize the ages of the campers listed below in a frequency table.

12, 14, 12, 14, 10, 11, 15, 13, 13, 11, 12, 12, 7, 14, 12

Divide the data into equal intervals and mark the frequency of the data using tally marks. Then write the frequency.

Ages of Campers	6-8	9-11	12-14	15-17
Tally	I	III	IIII IIII	I
Frequency	1	3	10	1

### Practice

1. Represent the data in the frequency table on the left in a histogram.



## LESSON 8-5

## Summarize Data Using Measures of Variability

### Quick Review

The mean absolute deviation (MAD) describes how spread out data values are from the mean. The interquartile range (IQR) describes the difference between the third quartile and the first quartile.

### Example

Find the MAD of the data set.

6, 7, 8, 8, 8, 11

Mean = 8

The absolute deviations from the mean are 2, 1, 0, 0, 0, and 3, and their sum is 6.

So,  $MAD = \frac{6}{6} = 1$ .

### Practice

In 1–3, find the mean and the MAD for each data set.

1. 5, 12, 0, 7

2. 8, 14, 22, 16

3. 1.25, 2.5, 3

In 4 and 5, find the median, first quartile, third quartile, and IQR for each data set.

4. 10, 20, 35, 45, 45, 50

5. 24, 12, 30, 17, 32, 13, 19

## LESSONS 8-6 AND 8-7

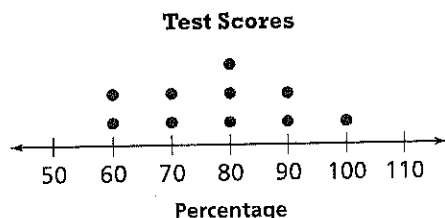
## Choose Appropriate Statistical Measures and Summarize Data Distributions

### Quick Review

You can summarize data by finding the measure of center and the measure of variability. Use the IQR when the median is an appropriate measure of center, and the MAD when the mean is an appropriate measure of center.

### Example

Use statistical measures to summarize the data set shown.



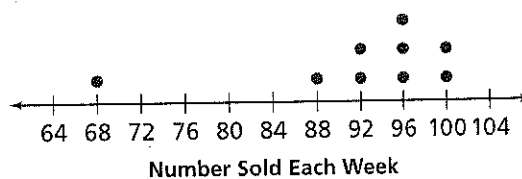
The mean and MAD are good measures to describe this data set.

The mean test score is 78 points. The MAD is 10.4, so most test scores are within 10.4 points of the mean.

### Practice

In 1–3, use the data below.

#### Game Sales



1. Describe the overall shape of the data. Include any outliers.

2. Which measure of center and measure of variability best describe the data set? Explain.

3. Summarize the data set.

