Chapter 11
Statistical Displays

Doug Armand/Stone/Getty Images

Essential Question

WHY is it important to carefully evaluate graphs?

Common Core GPS

Content Standards
MCC6.SP.2, MCC6.SP.4, MCC6.SP.5, MCC6.SP.5a, MCC6.SP.5b, MCC6.SP.5c, MCC6.SP.5d

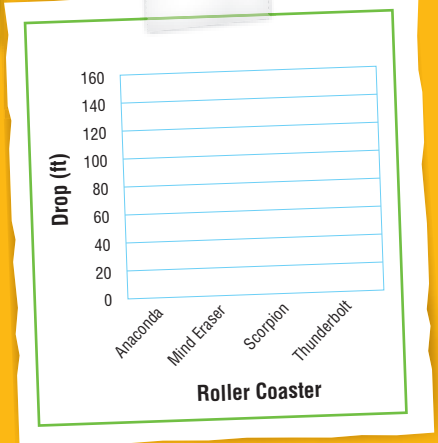
Mathematical Practices
1, 2, 3, 4, 5, 6, 7

Math in the Real World

Roller Coaster The table shows the drop of several different roller coasters.

Roller Coaster	Drop (ft)
Anaconda	144
Mind Eraser	95
Scorpion	60
Thunderbolt	70

Draw bars to represent the drop of each roller coaster.



FOLDABLES® Study Organizer

1. Cut out the correct Foldable from the FL pages in the back of this book.
2. Place your Foldable on the Key Concept page toward the end of this chapter.
3. Use the Foldable throughout this chapter to help you learn about statistical displays.

What Tools Do You Need?

Vocabulary

box plot	gap	symmetric
cluster	histogram	
distribution	line graph	
dot plot	line plot	
frequency distribution	peak	

Review Vocabulary

Using a graphic organizer can help you remember important vocabulary terms. Fill in the graphic organizer for the word *graph*.

graph

Definition

Example

Picture

When Will You Use This?

Watch Play it online!

Your Turn! You will solve this problem in the chapter.

Are You Ready?

Try the Quick Check below.
Or, take the Online Readiness Quiz.

Quick Review

Common Core Review MCC6.SP.4c

Example 1

Find the mean of the data set.

{15, 30, 20, 25, 30}

$15 + 30 + 20 + 25 + 30 = 120$ Add.

$\frac{120}{5} = 24$ Divide.

The mean is 24.

Example 2

Find the median of the data set.

{65, 57, 33, 41, 49}

33 41 (49) 57 65 Order the numbers.

The number in the middle is 49, so 49 is the median.

Quick Check

Mean **Find the mean of each data set.**

1. {8, 13, 21, 12, 29, 13}

2. {52, 76, 61, 58, 68}

3. {35, 18, 22, 20, 36, 31}

Show your work.

4. Jackson's social studies grades during one quarter are shown in the table. What is his mean score for the quarter?

Social Studies Grades (%)					
94	89	96	93	90	99
87	97	95	93	98	97

Median **Find the median of each data set.**

5. {56, 61, 54, 54, 58, 59}

6. {124, 131, 114, 148, 126}

7. {85, 79, 82, 90, 84, 87}

8. The table shows the high temperatures in a certain city for a week. What is the median temperature?

High Temperature (°F)						
71	64	56	52	62	62	66

How Did You Do?

Which problems did you answer correctly in the Quick Check?
Shade those exercise numbers below.

1 2 3 4 5 6 7 8

Lesson 1

Line Plots

What You'll Learn

Scan the lesson. List two headings you would use to make an outline of the lesson.

- _____
- _____

Essential Question

WHY is it important to carefully evaluate graphs?

Vocabulary

line plot
dot plot

Common Core GPS

Content Standards
MCC6.SP.4, MCC6.SP.5, MCC6.SP.5a, MCC6.SP.5b, MCC6.SP.5c

Mathematical Practices
1, 3, 4

Real-World Link

Activities Students in Mr. Cotter's class were asked how many after-school activities they have. Their responses are shown in the table.

Step 1 Use the data to fill in the frequency table.

Number of Activities			
0	2	1	3
1	1	3	4
2	1	0	1
2	3	2	1

→

Number of Activities	
Number	Tally
0	
1	
2	
3	
4	

Step 2 Turn the table so the number of activities is along the bottom on a number line. Instead of tally marks, place Xs above the number line. The Xs for 0 activities have been placed for you.

The data is now represented in a *line plot*.

Work Zone

Make a Line Plot

One way to give a picture of data is to make a line plot. A **line plot** is a visual display of a distribution of data values where each data value is shown as a dot or other mark, usually an X, above a number line. A line plot is also known as a **dot plot**.

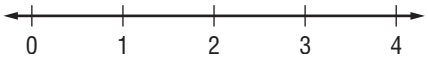
Example

Tutor

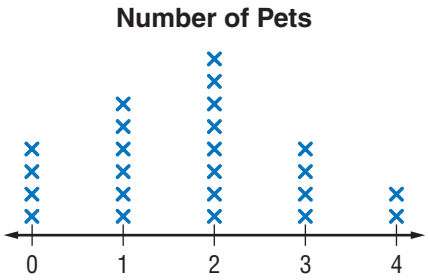
1. **Jasmine asked her class how many pets they had. The results are shown in the table. Make a line plot of the data. Then describe the data presented in the graph.**

Number of Pets					
3	2	2	1	3	1
0	1	0	2	3	4
0	1	1	4	2	2
1	2	2	3	0	2

Step 1 Draw and label a number line.



Step 2 Place as many Xs above each number as there are responses for that number. Include a title.



Step 3 Describe the data. 24 students responded to the question. No one has more than 4 pets. Four students have no pets. Include a title. The response given most is 2 pets. This represents the mode.

Show your work.

Got It? **Do this problem to find out.**

a. _____

a. Javier asked the members of his 4-H club how many projects they were taking. The results are shown in the table. Make a line plot of the data. Then describe the data in the graph.

Number of Projects				
2	4	3	3	1
0	5	4	2	2
1	3	2	1	2

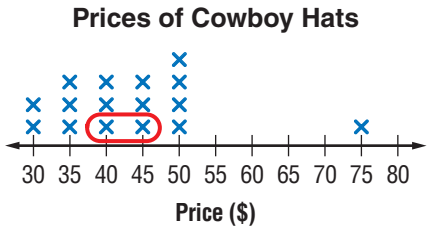
Analyze Line Plots

You can describe a set of data using measures of center as well as measures of variability. The range of the data and any outliers are also useful in describing the data.

Examples

Tutor

The line plot shows the prices of cowboy hats.



2. Find the median and mode of the data. Then describe the data using them.

There are 16 hat prices, in dollars, represented in the line plot. The median is between the 8th and 9th pieces of data.

The two middle numbers, shown on the line plot, are 40 and 45. So, the median is $42.50. This means that half of the cowboy hats cost more than $42.50 and half cost less than $42.50.

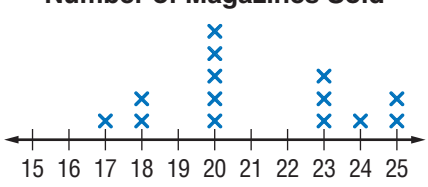
The number that appears most often is 50. So, the mode of the data is 50. This means that more cowboy hats cost $50 than any other price.

3. Find the range and any outliers of the data. Then describe the data using them.

The range of the prices is $75 − $30 or $45. The limits for the outlier are $12.50 and $72.50. So, $75 is an outlier.

Got It? Do this problem to find out.

b. The line plot shows the number of magazines each member of the student council sold. Find the median, mode, range, and any outliers of the data. Then describe the data using them.



STOP and Reflect

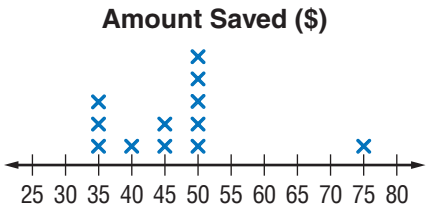
Suppose two sets of data have the same median but different ranges. What can you conclude about the sets? Explain below.

Show your work.

b. _____

Example

4. **The line plot shows the amount James deposited in his savings account each month. Describe the data. Include measures of center and variability.**



Show your work.

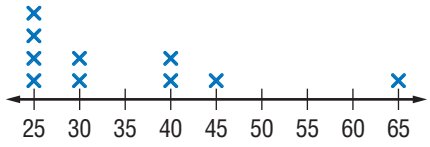
The mean is \$46.67. The median is \$47.50, and the mode is \$50. So, the majority of the data are close to the measures of center.

The range of the data is \$75 − \$35 or \$40. The interquartile range is $Q_3 - Q_1$, or \$50 − \$37.50 = \$12.50. So, half of the amounts are between \$37.50 and \$50. There is one outlier at \$75.

Got It? **Do this problem to find out.**

c. _____

c. The line plot shows the prices of sweaters in a store. Describe the data. Include measures of center and variability.



Guided Practice

1. Make a line plot for the set of data. Describe the data. Include measures of center and variability. (Examples 1–4)

Calories in Serving of Peanut Butter			
190	160	210	210
200	185	190	190
185	200	190	210
190	185	200	200

Show your work.

2. **Building on the Essential Question** How is using a line plot useful to analyze data? _____

Rate Yourself!

How confident are you about line plots? Check the box that applies.

For more help, go online to access a Personal Tutor.

FOLDABLES Time to update your Foldable!

Name _____ My Homework _____

Independent Practice

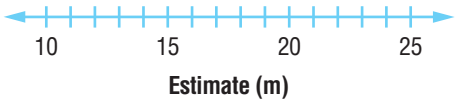
Go online for Step-by-Step Solutions eHelp

Make a line plot for each set of data. Find the median, mode, range, and any outliers of the data shown in the line plot. Then describe the data using them. (Examples 1–3)

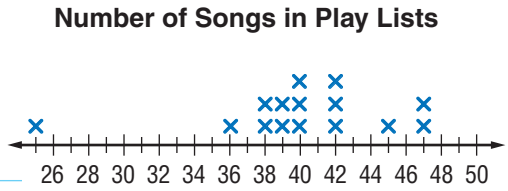
1 Length of summer camps in days:
7, 7, 12, 10, 5, 10, 5, 7, 10, 9, 7, 9, 6, 10, 5, 8, 7, and 8

2.

Students' Estimates of Room Length (m)				
10	11	12	12	13
13	13	14	14	14
15	15	15	15	15
16	16	16	17	17
17	17	18	18	25



3 The line plot shows the number of songs in play lists. Describe the data. Include measures of center and variability. (Example 4)

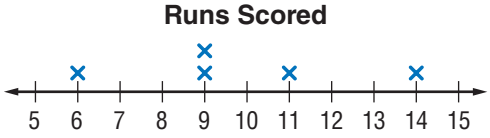


CCSS Inductive Reasoning **The number of runs a softball team scored in their last five games is shown in the line plot. How many runs would the team need to score in the next game so that each statement is true?**

4. The range is 10. _____

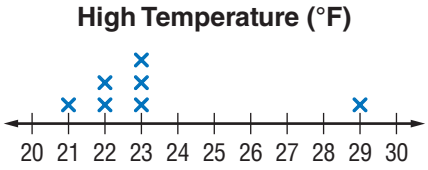
5. Another mode is 11. _____

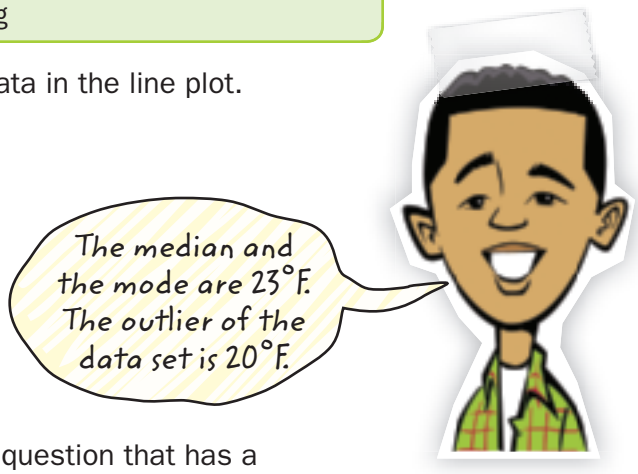
6. The median is 9.5. _____



H.O.T. Problems Higher Order Thinking

7. Find the Error Dwayne is analyzing the data in the line plot. Find his mistake and correct it.





8. Model with Mathematics Write a survey question that has a numerical answer. Some examples are "How many CDs do you have?" or "How many feet long is your bedroom?" Ask your friends and family the question. Record the results and organize the data in a line plot. Use the line plot to make conclusions about your data. For example, describe the data using the measures of center and variability.

Show your work.

9. Persevere with Problems There are several sizes of flying disks in a collection. The range is 8 centimeters. The median is 22 centimeters. The smallest size is 16 centimeters. What is the largest disk in the collection?

10. Construct an Argument Determine whether the statement is *true* or *false*. Explain.

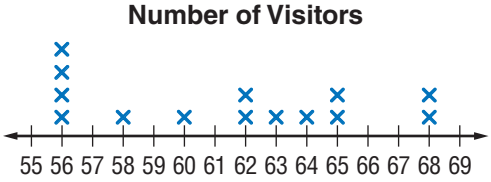
Line plots display individual data.

Georgia Test Practice

11. The line plot shows the number of student visitors to the National Wildlife Refuge each day for two weeks. Which is the median of the data?

Ⓐ 56 Ⓒ 62

Ⓑ 61.4 Ⓓ 65



Name _____ My Homework _____

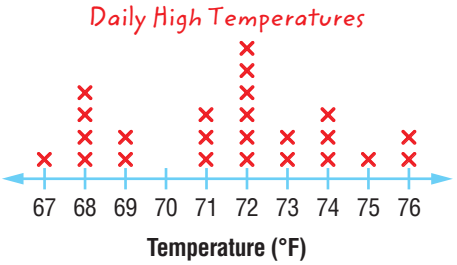
Extra Practice

Make a line plot for each set of data. Find the median, mode, range, and any outliers of the data shown in the line plot. Then describe the data using them.

12. Daily high temperatures in degrees Fahrenheit:
71, 72, 74, 72, 72, 68, 71, 67, 68, 71, 68, 72, 76, 75, 72, 73, 68, 69, 69, 73, 74, 76, 72, and 74

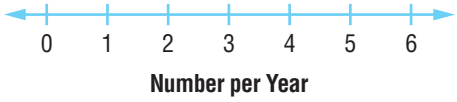
Homework Help

median: 72°F; mode: 72°F; range: 9°F; no outliers; The number of temperatures, in °F, represented is 24. The median means half the daily high temperatures are greater than 72°F and half are less. More days had a high of 72°F than any other temperature.



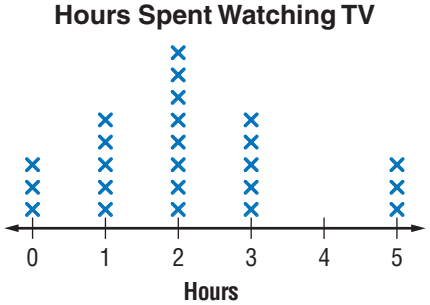
13.

Number of Tornadoes				
0	1	1	1	6
0	0	0	0	0
2	1	2	0	0

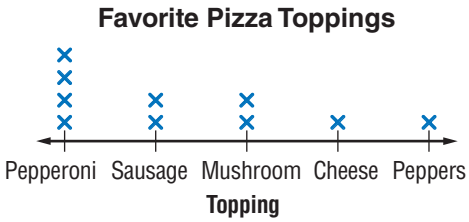


Copy and Solve **Describe the data in the line plots. Show your work on a separate piece of paper.**

14. The line plot shows the number of hours students spend watching TV each night. Describe the data. Include measures of center and variability. Round to the nearest tenth if necessary.



15. CCSS **Justify Conclusions** The line plot shows students' favorite pizza toppings. Which can you find using the line plot: the median, mode, range, or outlier(s)? Explain. Then write a sentence or two to describe the data set. Explain your reasoning to a classmate.



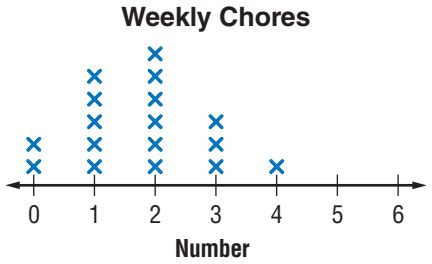
Georgia Test Practice

16. The table shows the speeds of the world's fastest roller coasters. Which roller coaster in the table represents the median speed?

Roller coaster	Speed (mi per h)
Dodonpa, Japan	107
Kingda Ka, USA	128
Superman the Escape, USA	100
Top Thrill Dragster, USA	120
Tower of Terror, Australia	100

Ⓐ Dodonpa
Ⓑ Kingda
Ⓒ Top Thrill Dragster
Ⓓ Tower of Terror

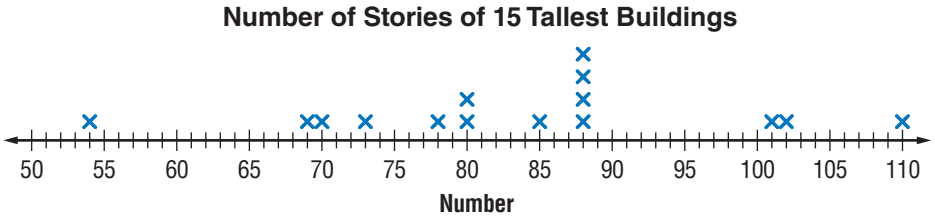
17. The line plot shows the number of weekly chores that fifth graders have.



Which represents the interquartile range of the data?

Ⓕ 0
Ⓖ 1.5
Ⓗ 2
Ⓘ 4

18. Short Response The line plot shows the number of stories of the tallest buildings.



What is the median, first quartile, third quartile, and interquartile range of the data?

_____

Common Core Review

Fill in each ◯ with >, <, or = to make a true statement. MCC4.NBT.2, MCC5.NBT.3b

19. 26 ◯ 19

20. 89 ◯ 92

21. 5.6 ◯ 6.5

22. 11.5 ◯ 105

23. 47 ◯ 44

24. 1.52 ◯ 14.8

25. The table shows the number of days several students attended an exercise class during a month. How many students attended a class less than 15 days? MCC4.NBT.2 _____

Number of Days			
16	21	18	6
19	15	8	11
16	4	20	22
12	19	21	9

26. Seven friends compared their test scores. The scores they received were 89, 97, 93, 95, 90, 88, 91. How many people had scores greater than 90? MCC4.NBT.2 _____

Histograms

What You'll Learn

Scan the lesson. List two headings you would use to make an outline of the lesson.

- _____
- _____

Essential Question

WHY is it important to carefully evaluate graphs?

Vocabulary

histogram
frequency distribution

Common Core GPS

Content Standards
MCC6.SP.4, MCC6.SP.5, MCC6.SP.5a, MCC6.SP.5b

Mathematical Practices
1, 3, 4, 5, 6

Real-World Link

Concerts Alicia researched the average price of concert tickets. The table shows the results.

Average Ticket Prices of Top 10 Money Earning Concerts				
$83.87	$68.54	$51.53	$62.10	$59.58
$47.22	$66.58	$88.49	$50.63	$68.98

1. Fill in the tally column and frequency column on the frequency table.

Average Ticket Prices of Top 10 Money Earning Concerts		
Price	**Tally**	**Frequency**
$25.00–$49.99		
$50.00–$74.99		
$75.00–$99.99		

2. What does each tally mark represent? _____

3. What is one advantage of using the frequency table?

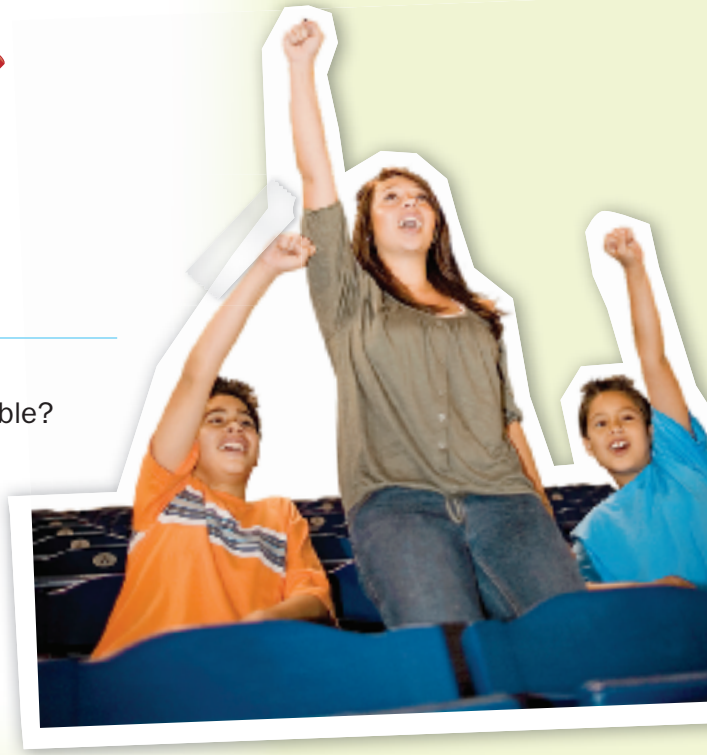
_____

_____

4. What is one advantage of using the first table?

_____

_____

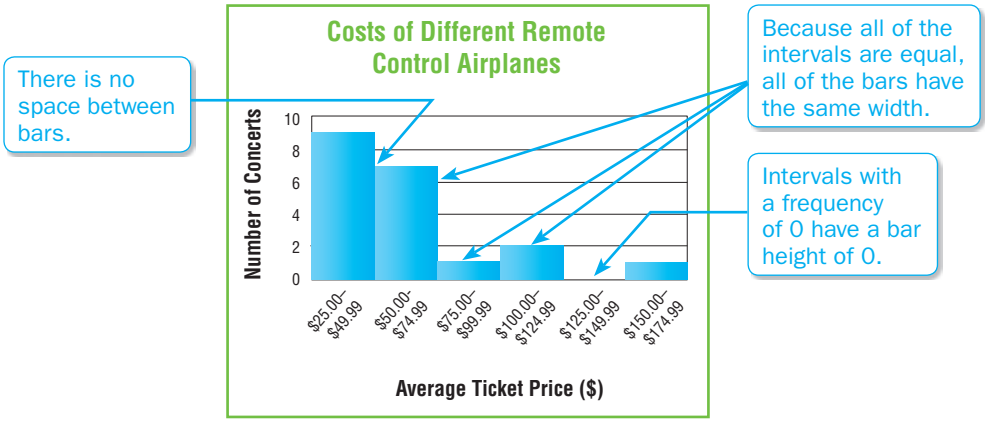


Seth Joel/Photographer's Choice RF/Getty Images

Work Zone

Interpret Data

Data from a frequency table can be displayed as a histogram. A **histogram** is a type of bar graph used to display numerical data that have been organized into equal intervals. These intervals allow you to see the **frequency distribution** of the data, or how many pieces of data are in each interval.



Example

Tutor

1. **Refer to the histogram above. Describe the histogram. How many remote control airplanes cost at least $100?**

There are 9 + 7 + 1 + 2 + 1 or 20 prices, in dollars, recorded. More remote control airplanes had prices between $25.00 and $49.99 than any other range. There were no airplanes recorded with a price between $125.00 and $149.99.

Two remote control airplanes had prices between $100.00–$124.99 and one remote control airplane had a price between $150.00–$174.99. So, 2 + 1, or 3 remote control airplanes had prices that were at least $100.

Show your work.

Got It? **Do this problem to find out.**

a. Refer to the histogram above. How many remote control airplanes cost less than $75?

a. _____

Construct a Histogram

You can use data from a table to construct a histogram.

Example

Watch Tutor

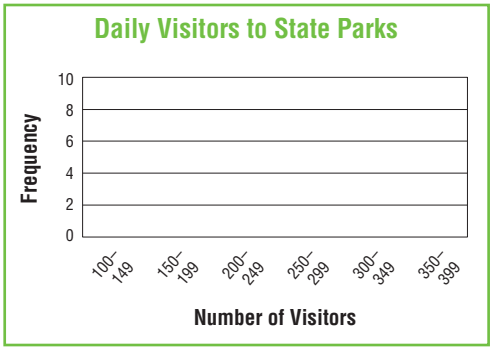
2. **The table shows the number of daily visitors to selected state parks. Draw a histogram to represent the data.**

Daily Visitors to Selected State Parks				
108	209	171	152	236
165	244	263	212	161
327	185	192	226	137
193	235	207	382	241

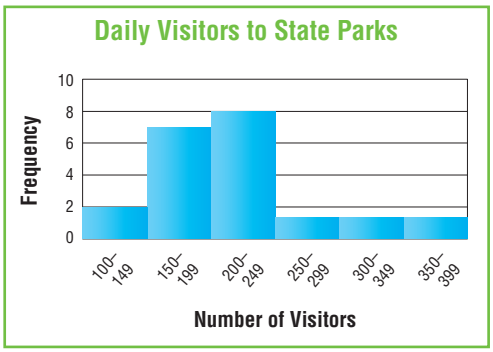
Step 1 Make a frequency table to organize the data. Use a scale from 100 through 399 with an interval of 50.

Daily Visitors to Selected State Parks		
Visitors	**Tally**	**Frequency**
100–149	||	2
150–199	𝍸 ||	7
200–249	𝍸 |||	8
250–299	|	1
300–349	|	1
350–399	|	1

Step 2 Draw and label a horizontal and vertical axis. Include a title. Show the intervals from the frequency table on the horizontal axis. Label the vertical axis to show the frequencies.



Step 3 For each interval, draw a bar whose height is given by the frequencies.



Scales and Intervals

It is important to choose a scale that includes all of the numbers in the data set. The interval should organize the data to make it easy to compare.

STOP and Reflect

When is a histogram more useful than a table with individual data? Explain below.

Got It? Do this problem to find out.

b. The list at the right shows a set of test scores. Choose intervals, make a frequency table, and construct a histogram to represent the data.

Test Scores						
72	97	80	86	92	98	88
76	79	82	91	83	90	76
81	94	96	92	72	83	85
65	91	92	68	86	89	97

Test Scores		
Score	Tally	Frequency

Guided Practice

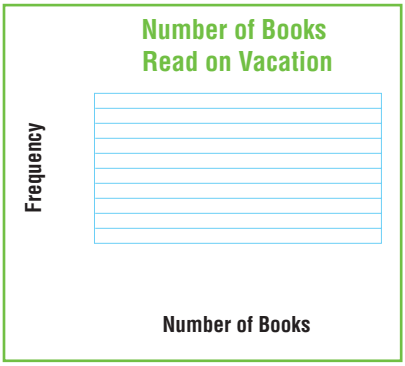
1. The frequency table shows the number of books read on vacation by the students in Mrs. Angello's class. (Examples 1 and 2)

a. Draw a histogram to represent the data.

b. Describe the histogram. _____

_____

c. How many students read six or more books? _____



Number of Books Read		
Books	Tally	Frequency
0–2	𝍸 |	6
3–5	𝍸 𝍸	10
6–8	𝍸 ||	7
9–11	|||	3
12–14	||||	4

2. **Building on the Essential Question** Why would you create a frequency table before creating a histogram?

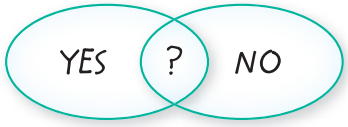
_____

_____

_____

Rate Yourself!

Are you ready to move on? Shade the section that applies.



For more help, go online to access a Personal Tutor.

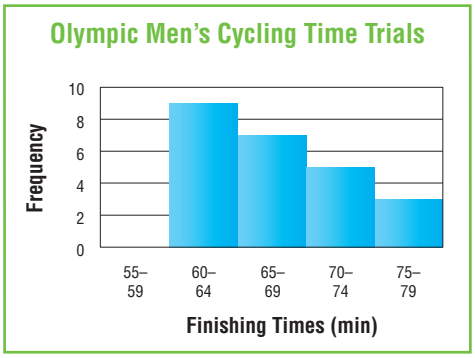
FOLDABLES Time to update your Foldable!

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

For Exercises 1–4, use the histogram at the right. (Example 1)



1. Describe the histogram. _____

2. Which interval has 7 cyclists? _____

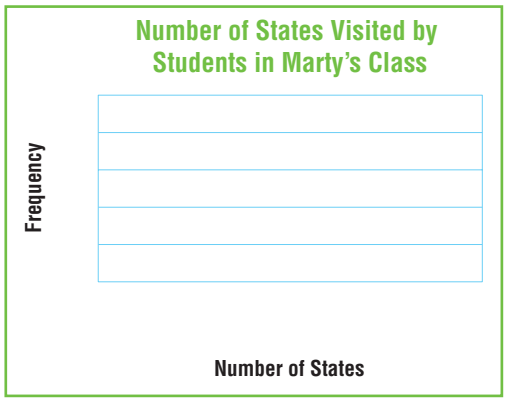
3 Which interval represents the greatest number of cyclists?

4. How many cyclists had a time less than 70 minutes?

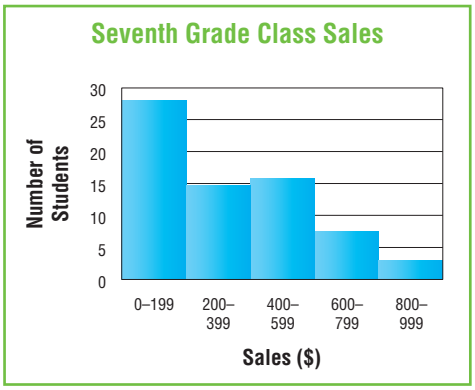
Draw a histogram to represent the set of data. (Example 2)

5.

Number of States Visited by Students in Marty's Class		
Number of States	**Tally**	**Frequency**
0–4	𝍸 ||||	9
5–9	|||	3
10–14	𝍸	5
15–19	|||	3
20–24	𝍸	6
25–29	|	1



Use Math Tools **For Exercises 6 and 7, refer to the histograms below.**



6. About how many students from both grades earned $600 or more?

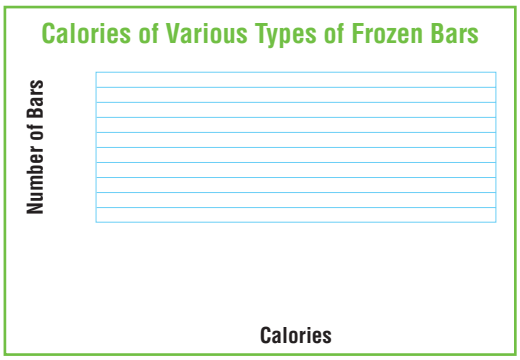
7 Which grade had more students earn between $400 and $599?

8. **Be Precise** The following data provides the number of Calories of various types of frozen bars. {25, 35, 200, 280, 80, 80, 90, 40, 45, 50, 50, 60, 90, 100, 120, 40, 45, 60, 70, 350}

a. Draw a histogram to represent the data.

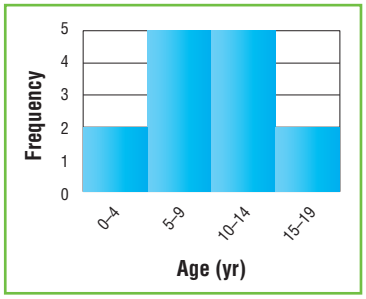
b. Find the measures of center.

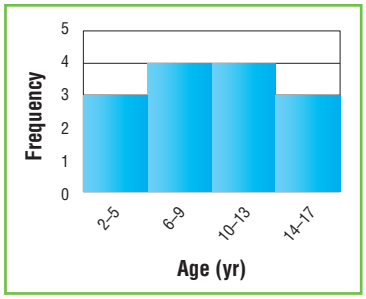
c. Can you find the measures of center only from the histogram? Explain.



H.O.T. Problems Higher Order Thinking

9. **Persevere with Problems** Give a set of data that could be represented by both histograms below.





10. **Justify Conclusions** Identify the interval that is not equal to the other three. Explain your reasoning.

15–19	30–34	40–45	45–49

Georgia Test Practice

11. The table shows a set of plant heights. What would be an appropriate scale to use if you were making a histogram from the list?

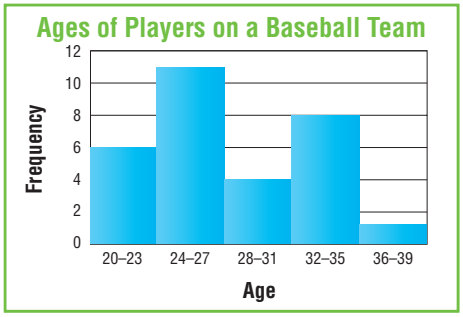
Ⓐ 0 to 30
Ⓑ 20 to 50
Ⓒ 10 to 45
Ⓓ 0 to 45

Plant Heights (in.)		
12	7	15
8	24	41
16	18	27
43	33	11
24	10	22

Name _____ My Homework _____

Extra Practice

For Exercises 12–16, use the histogram.



12. Describe the histogram. The ages of 30 players were collected. One player is older than 35, the rest are 35 or younger.

Homework Help

Add each of the frequencies to find the total players.
$6 + 11 + 4 + 8 + 1 = 30$

13. Which interval represents the greatest number of players?

_____

14. Which interval has 4 players? _____

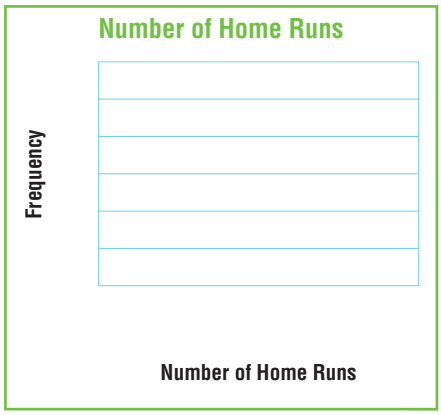
15. How many players are younger than 28? _____

16. How many players have ages in the interval 32–35? _____

Model with Mathematics **Draw a histogram to represent the set of data.**

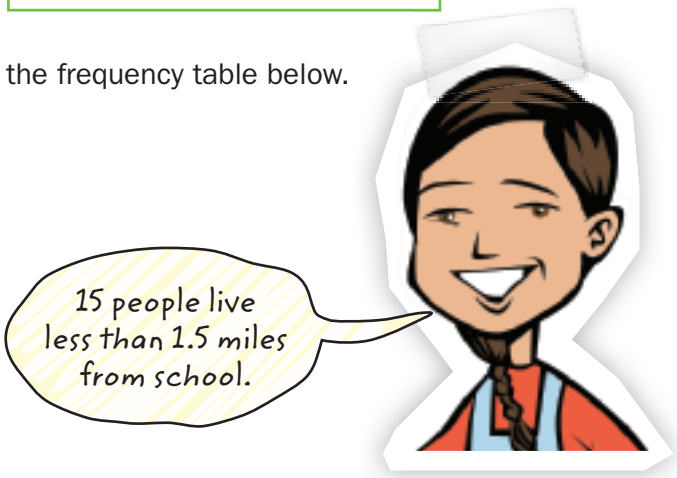
17.

Number of Homeruns in a Season		
Homeruns	**Tally**	**Frequency**
0–9	𝍸 𝍸 ||	12
10–19	𝍸 𝍸	10
20–29	𝍸 ||||	9
30–39	𝍸 ||||	9
40–49	𝍸 |	6



18. **Find the Error** Pilar is analyzing the frequency table below. Find her mistake and correct it.

Distances from Home to School (mi)	Tally	Frequency
0.1–0.5	𝍸 ||	7
0.6–1.0	|||	3
1.1–1.5	𝍸	5
1.6–2.0	|||	3

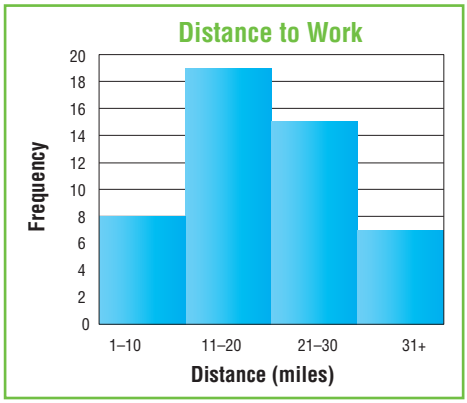


_____

_____

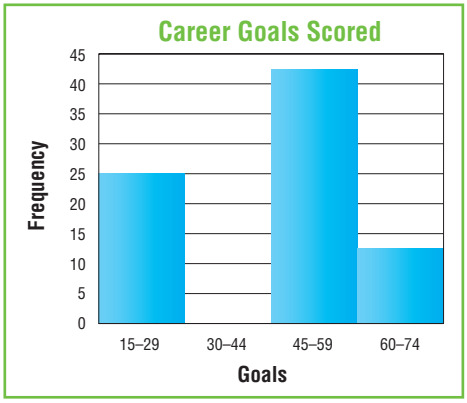
Georgia Test Practice

19. How many more people travel 11–20 miles than 1–10 miles to get to work?



Ⓐ 11
Ⓒ 7
Ⓑ 12
Ⓓ 4

20. **Short Response** Explain why there is not a bar for the interval of 30–44 goals.



21. The table shows the number of sit-ups each member of a gym class completed in one minute. What would be an appropriate scale to use if you were making a histogram from the list?

Ⓕ 0 to 30
Ⓗ 0 to 40
Ⓖ 20 to 40
Ⓘ 10 to 30

Number of Sit-Ups in One Minute				
30	15	34	22	28
20	25	26	31	29
27	30	19	22	28
32	31	27	23	26

Common Core Review

Divide. MCC4.NBT.6

22. 126 ÷ 3 = _____

23. 477 ÷ 9 = _____

24. 162 ÷ 6 = _____

25. 327 ÷ 5 = _____

26. 195 ÷ 2 = _____

27. 842 ÷ 4 = _____

28. Jamie, Tucker, and Lucinda bought a bag of apples. Jamie kept 0.25 of the apples, and Lucinda kept 0.5 of the apples.

Who kept more of the apples? MCC5.NBT.3b _____

Lesson 3

Box Plots

What You'll Learn

Scan the lesson. Predict two things you will learn about box plots.

- _____

_____

- _____

_____

Essential Question

WHY is it important to carefully evaluate graphs?

Vocabulary

box plot

Common Core GPS

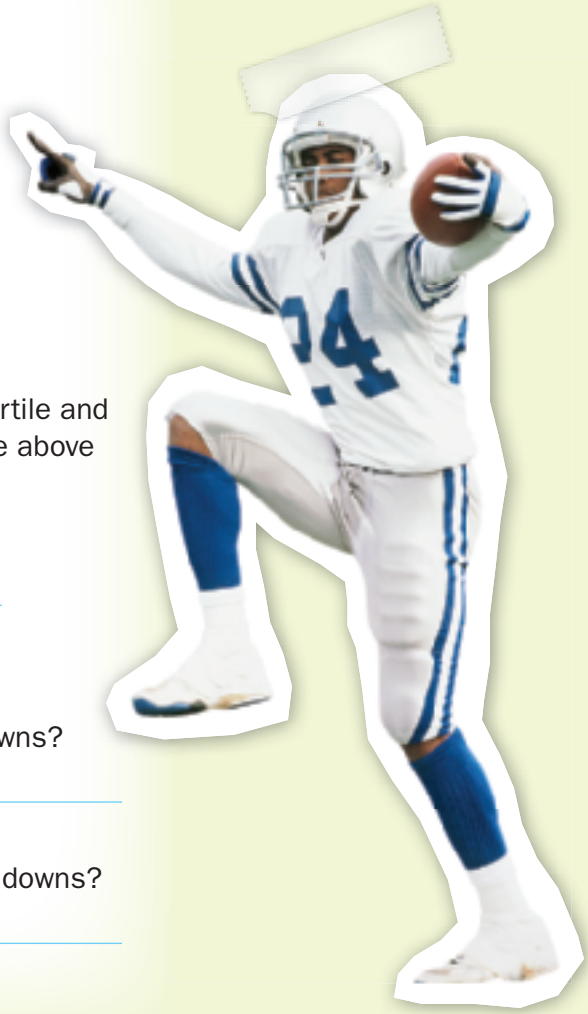
Content Standards
MCC6.SP.2, MCC6.SP.4, MCC6.SP.5, MCC6.SP.5b, MCC6.SP.5c

Mathematical Practices
1, 2, 3, 4, 7

Real-World Link

Football The table shows the number of touchdowns scored by each of the 16 teams in the National Football Conference in a recent year.

47	41	35	38	28	54	49	24
49	44	27	34	37	44	26	36



1. Plot the scores on a line plot.

2. Find the median, lower extreme, upper extreme, first quartile and third quartile of the data. Place a star on the number line above for each value.

median: _____ first quartile: _____

lower extreme: _____ third quartile: _____

upper extreme: _____

3. What percent of the teams scored less than 31 touchdowns?

_____

4. What percent of the teams scored more than 37.5 touchdowns?

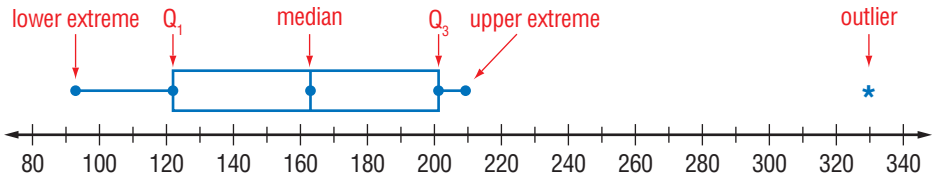
_____

Work Zone

Construct a Box Plot

Watch

A **box plot**, or box-and-whisker plot, uses a number line to show the distribution of a set of data by using the median, quartiles, and extreme values. A *box* is drawn around the quartile values, and the *whiskers* extend from each quartile to the extreme data points that are not outliers. The median is marked with a vertical line. The figure below is a box plot.



Box plots separate data into four parts. Even though the parts may differ in length, each contains 25% of the data. The box shows the middle 50% of the data.

Example

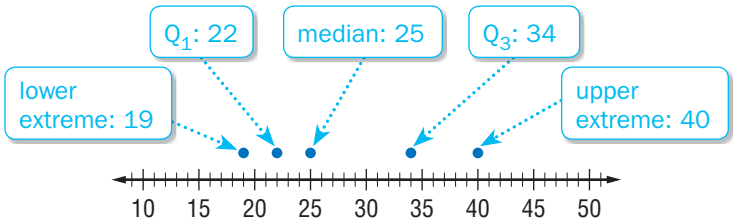
Watch Tutor

1. **Draw a box plot of the car speed data.**

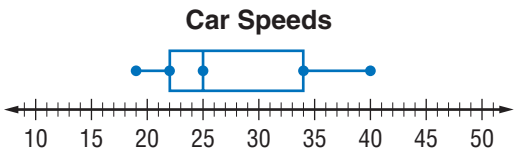
25 35 27 22 34 40 20 19 23 25 30

Step 1 Order the numbers from least to greatest. Then draw a number line that covers the range of the data.

Step 2 Find the median, the extremes, and the first and third quartiles. Mark these points above the number line.



Step 3 Draw the box so that it includes the quartile values. Draw a vertical line through the box at the median value. Extend the whiskers from each quartile to the extreme data points. Include a title.



Common Misconception

You may think that the median always divides the box in half. However, the median may not divide the box in half because the data may be clustered toward one quartile.

Got It? Do this problem to find out.

a. Draw a box plot of the data set below.

{$20, $25, $22, $30, $15, $18, $20, $17, $30, $27, $15}

a. _____

Interpret Data

Show your work.

Though a box plot does not show individual data, you can use it to interpret data.

Examples

Tutor

Refer to the box plot in Example 1.

2. **Half of the drivers were driving faster than what speed?**

Half of the 11 drivers were driving faster than 25 miles per hour.

3. **What does the box plot's length tell about the data?**

The length of the left half of the box plot is short. This means that the speeds of the slowest half of the cars are concentrated. The speeds of the fastest half of the cars are spread out.

Box Plots

- If the length of a whisker or the box is short, the values of the data in that part are concentrated.
- If the length of a whisker or the box is long, the values of the data in that part are spread out.

Got It? Do this problem to find out.

b. What percent were driving faster than 34 miles per hour?

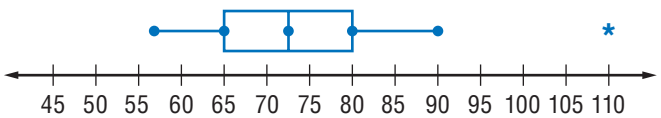
b. _____

Example

Tutor

4. **The box plot below shows the daily attendance at a fitness club. Find the median and the measures of variability. Then describe the data.**

Fitness Club Attendance



The median is 72.5. The first quartile is 65 and the third quartile is 80. The range is 54 and the interquartile range is 15. There is an outlier at 110. Both whiskers are approximately the same size so the data, without the outlier, is spread evenly below and above the quartiles.

Outliers

If the data set includes outliers, then the whiskers will not extend to the outliers, just to the previous data point. Outliers are represented with an asterisk (*) on the box plot.

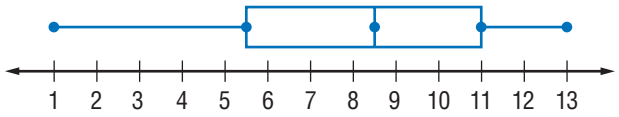
Show your work.

c. _____

Got It? Do this problem to find out.

c. The number of games won in the American Football Conference in a recent year is displayed below. Find the median and the measures of variability. Then describe the data.

American Football Conference Wins



Guided Practice

Check

1. Use the table. (Examples 1–3)

Depth of Recent Earthquakes (km)						
5	15	1	11	2	7	3
9	5	4	9	10	5	7

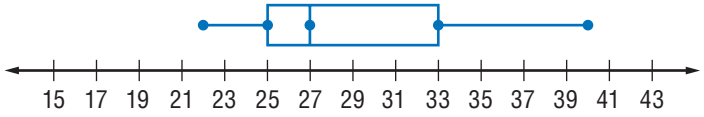
a. Make a box plot of the data.

b. What percent of the earthquakes were between 4 and 9 kilometers deep? _____

c. Write a sentence explaining what the length of the box plot means. _____

2. Find the median and the measures of variability for the box plot shown. Then describe the data. (Example 4)

Average Gas Mileage for Various Sedans



3. **Building on the Essential Question** How is the information you can learn from a box plot different from what you can learn from the same set of data shown in a line plot?

Rate Yourself!

How confident are you about making and interpreting box plots? Check the box that applies.

For more help, go online to access a Personal Tutor.

Tutor

FOLDABLES Time to update your Foldable!

Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

Draw a box plot for each set of data. (Example 1)

1. {65, 92, 74, 61, 55, 35, 88, 99, 97, 100, 96}

2.

Cost of MP3 Players ($)	
95	55
105	100
85	158
122	174
165	162

3. The table shows the length of coastline for the 13 states along the Atlantic Coast. (Examples 1–3)

Length of Coastline (mi)	
28	130
580	127
100	301
228	40
31	187
192	112
13	

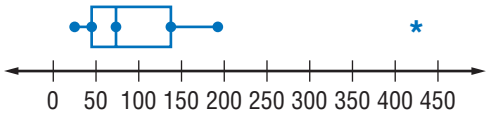
a. Make a box plot of the data.

b. Half of the states have a coastline less than how many miles?

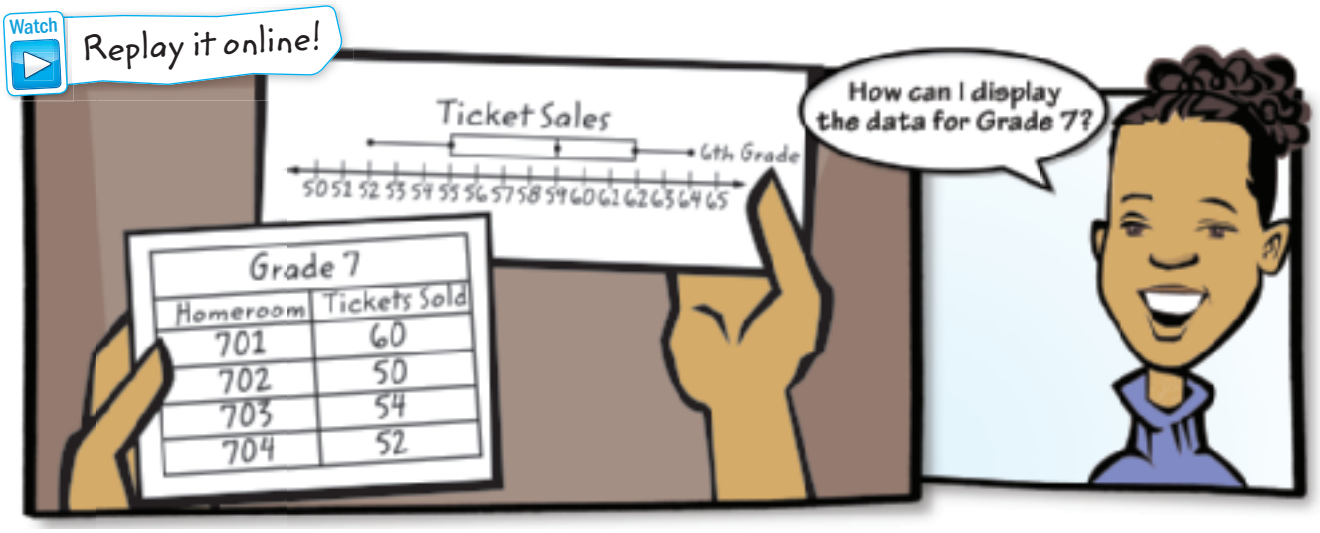
c. Write a sentence describing what the length of the box plot tells about the number of miles of coastline for states along the Atlantic coast.

4. The amount of Calories for a serving of certain fruits is displayed. Find the median and the measures of variability. Then describe the data. (Example 4)

Number of Calories



5. **Model with Mathematics** Refer to the graphic novel frame below for Exercises a–b.



a. Draw a box plot using the data for Grade 7.

b. Compare the box plots. Which grade sold the most tickets? Explain.

H.O.T. Problems Higher Order Thinking

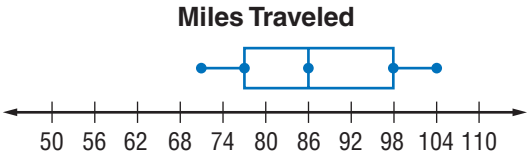
6. **Persevere with Problems** Write a set of data that contains 12 values for which the box plot has no whiskers. State the median, first and third quartiles, and lower and upper extremes.

7. **Reason Abstractly** Write a set of data that, when displayed in a box plot, will result in a long box and short whiskers. Draw the box plot.

Georgia Test Practice

8. The box plot shows distances traveled by vacationers. Half of the drivers traveled farther than what distance?

Ⓐ 68 miles
Ⓑ 75 miles
Ⓒ 86 miles
Ⓓ 99 miles



Name _____ My Homework _____

Extra Practice

Draw a box plot for each set of data.

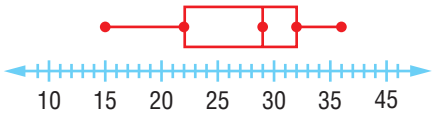
9. {26, 22, 31, 36, 22, 27, 15, 36, 32, 29, 30}

Homework Help

15, 22, 22, 26, 27, 29, 30, 31, 32, 36, 36

median: 29; Q_1: 22; Q_3: 32

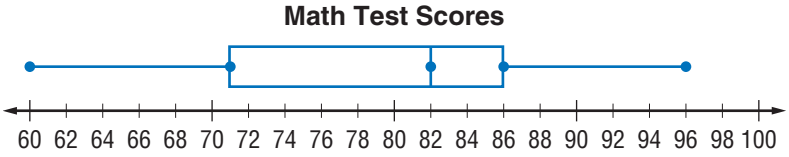
Mark the median, Q_1, Q_3, and extremes above the number line. Draw a box around the quartiles and a line through the center of the median. Connect the extremes to the box with a line.



10.

Height of Waves (in.)		
80	51	77
72	55	65
42	78	67
40	81	68
63	73	59

11. The box plot below summarizes math test scores.



a. What was the greatest test score? _____

b. Explain why the median is not in the middle of the box.

_____

_____

c. What percent of the scores were between 71 and 96? _____

d. Half of the scores were higher than what score? _____

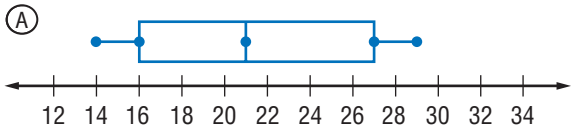
12. CCSPS **Identify Structure** Find the median, first and third quartiles, and the interquartile range for the set of data in the table. Create a box plot of the data.

Words Typed Per Minute		
80	42	65
72	63	81
67	73	40
51	68	59
77	55	78

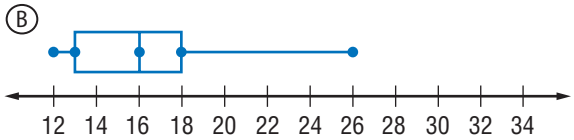
Georgia Test Practice

13. Which box plot represents the data set 14, 18, 21, 24, and 29?

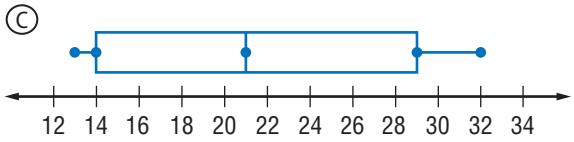
Ⓐ



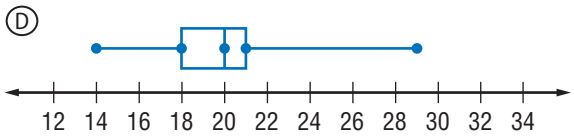
Ⓑ



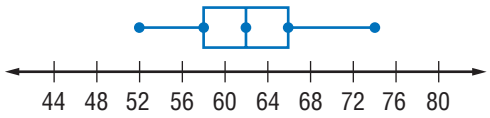
Ⓒ



Ⓓ



14. Which of the following statements is *not* true concerning the box plot below?



Ⓕ The value 74 is an extreme value.

Ⓖ Half of the data are above 62.

Ⓗ Half of the data are in the interval 62–74.

Ⓘ There are more data values in the interval 52–62 than there are in the interval 62–74.

15. **Short Response** Construct a box plot with the data set 35, 42, 44, 47, and 54.

Common Core Review

Find the total of each set of numbers. MCC4.NBT.4

16. {6, 8, 7, 9, 2, 4}

17. {15, 20, 35, 24, 31}

18. {16, 25, 35, 28, 31, 27}

19. {56, 58, 63, 51, 52}

20. {84, 106, 98, 88}

21. {34, 68, 23, 18, 57}

22. The table shows the number of raffle tickets each member of the drama club sold. How many members sold more than 50 raffle tickets? MCC4.NBT.2

Raffle Tickets Sold				
26	32	18	53	28
35	42	29	38	50
49	51	21	34	46
42	52	50	36	20

Use a Graph

Content Standards
MCC6.SP.4, MCC6.SP.5, MCC6.SP.5c

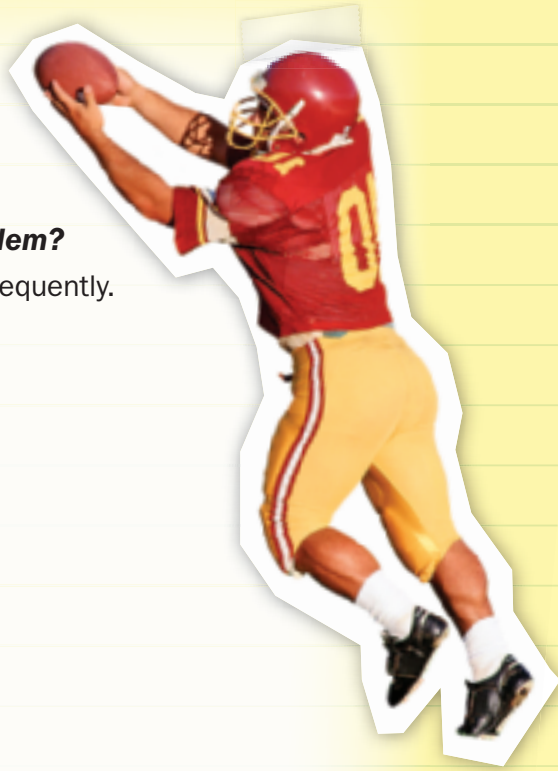
Mathematical Practices
1, 3, 4

Case #1 Football

Finn's brother is on the football team and he is making a display of the number of points the team scored in each game last year. He uses the information in the table to make a line plot.

What score occurred most frequently?

Number of Points Scored			
35	35	43	21
49	35	21	24
34	35	21	



1 Understand *What are the facts?*

The range of the points is 49 – 21, or 28.

2 Plan *What is your strategy to solve this problem?*

Make a line plot to see which score occurs most frequently. Use the range to label the line plot from 20 to 50.

3 Solve *How can you apply the strategy?*

Plot each score on the line plot.

Number of Points Scored

The score occurring most frequently is ____.

4 Check *Does the answer make sense?*

The team scored 35 points four times. No other score occurred four or more times. So, the answer is reasonable.

Analyze the Strategy

Tutor

Reason Inductively How would the results change if the team played a twelfth game and scored 21 points?

Case #2 Life Span

Different animals have different average life spans. The average life spans of several animals are shown in the table.

How many more animals have an average life span between 11 and 15 years than those that have an average life span between 1 and 5 years?

Average Life Span (years)	
Camel	12
Deer	10
Dog	12
Fox	9
Gorilla	20
Horse	20
Kangaroo	7
Lion	15
Lobster	15
Mouse	2
Pig	10
Polar Bear	20
Rabbit	5

1 Understand

Read the problem. What are you being asked to find?

I need to find _____

_____.

What information do you know?

Animals with 11–15 year life span: _____

Animals with 1–5 year life span: _____

2 Plan

Choose a problem-solving strategy.

I will use the _____ strategy.

3 Solve

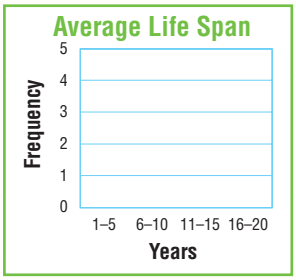
Use your problem-solving strategy to solve the problem.

Make a histogram. Use intervals of

1–5 years, _____ years,

_____ years, and 16–20 years.

So, there are ☐ more animals with an average life span between 11–15 years than with an average life span between 1–5 years.



4 Check

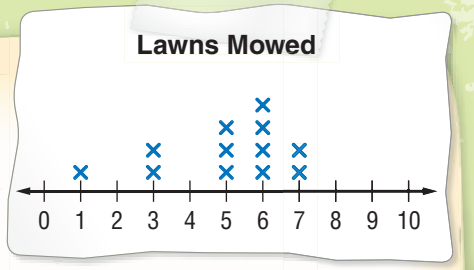
Use information from the problem to check your answer.

There are four animals with an average life span between 11 and 15 years and two animals, mice and rabbits, with an average life span between 1 and 5 years.

Collaborate Work with a small group to solve the following cases. Show your work on a separate piece of paper.

Case #3 Lawn Mowing

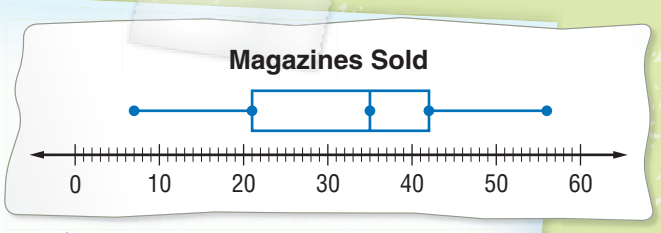
DeShawn mowed lawns over the summer to earn extra money. The number of lawns he mowed each week is shown in the line plot.



What is the mean number of lawns he mowed?

Case #4 Magazines

The box plot shows the number of magazines sold for a club fundraiser.



What is the difference between the median number of magazines sold and the most magazines sold?

Case #5 Quiz Scores

A teacher recorded quiz scores for a class in the table.

89	88	95	100
78	89	92	92
95	85	88	90
100	95	98	88
100	90	76	94

Make a line plot to determine the median quiz score.

Circle a strategy below to solve the problem.

- Guess, check, and revise.
- Solve a simpler problem.
- Act it out.
- Look for a pattern.

Case #6 Exercise

To train for a marathon, Colleen plans to run four miles the first week and 150% the number of miles next week.

How many miles will Colleen run the next week?

Mid-Chapter Check

Vocabulary Check

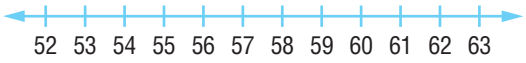
1. **Be Precise** Define *histogram*. Use the data set {26, 37, 35, 49, 54, 53, 30, 36, 31, 28, 29, 33, 38, 47, 54, 50, 37, 26, 35, 51} to make a histogram. (Lesson 2)

Skills Check and Problem Solving

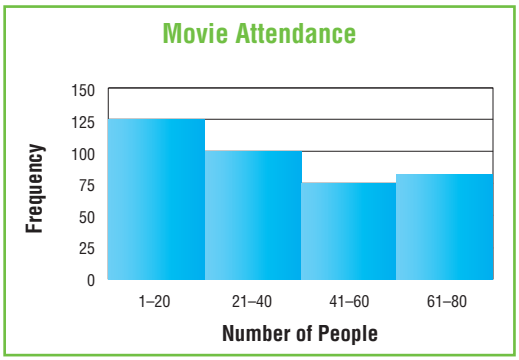
Make a line plot for each set of data. Then describe the data. (Lesson 1)

2. {36, 43, 39, 47, 34, 43, 47, 39, 34, 43}

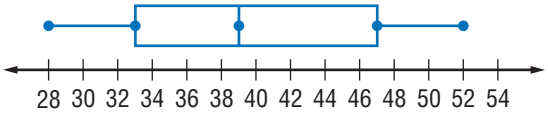
3. {63, 54, 57, 63, 52, 59, 52, 63, 61, 54}



4. The histogram shows a movie theater's attendance each time a move is shown. Describe the data in the histogram. (Lesson 2)



5. **Georgia Test Practice** What is the median in the box plot? (Lesson 3)



Ⓐ 28 Ⓑ 33 Ⓒ 39 Ⓓ 47

Lesson 4

Shape of Data Distributions

What You'll Learn

Scan the lesson. Predict two things you will learn about the shape of data distributions.

- _____
- _____

Essential Question

WHY is it important to carefully evaluate graphs?

Vocabulary

distribution
symmetric distribution
cluster
gap
peak

Common Core GPS

Content Standards
MCC6.SP.2, MCC6.SP.5, MCC6.SP.5d

Mathematical Practices
1, 3, 4, 5, 7

Vocabulary Start-Up

The **distribution** of a set of data shows the arrangement of data values. The words below show some of the ways the distribution of data can be described. Match the words below to their definitions.

cluster	The left side of the distribution looks like the right side.
gap	The numbers that have no data value.
peak	The most frequently occurring values, or mode.
symmetry	Data that grouped closely together.

Real-World Link

Parasailing The line plot shows the costs in dollars for parasailing for different companies on a certain beach.

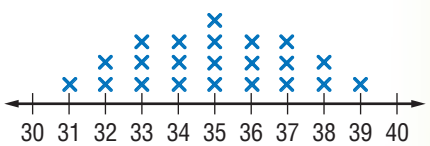
1. Draw a vertical line through the middle of the data. What do you notice?

_____

2. Use one of the words shown above to write a sentence about the data.

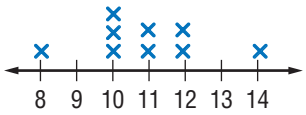
_____

Parasailing Costs ($)



Work Zone

Describe the Shape of a Distribution



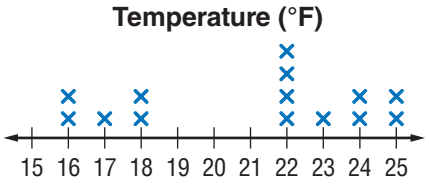
Data that are evenly distributed between the left side and the right side, have a **symmetric distribution**. The distribution shown has a **cluster** of several data values within the interval 10–12. The **gaps** 9 and 13 have no data values. The value 10 is a **peak** because it is the most frequently occurring value.

Examples

Tutor

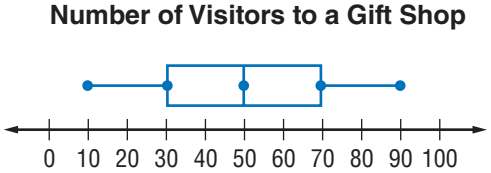
Describe the shape of each distribution.

1. **The line plot shows the temperature in degrees Fahrenheit in a city over several days.**



You can use clusters, gaps, peaks, outliers and symmetry to describe the shape. The shape of the distribution is not symmetric because the left side of the data does not look like the right side of the data. There is a gap from 19–21. There are clusters from 16–18 and 22–25. The distribution has a peak at 22. There are no outliers.

2. **The box plot shows the number of visitors to a gift shop in one month.**



You cannot identify gaps, peaks, and clusters.

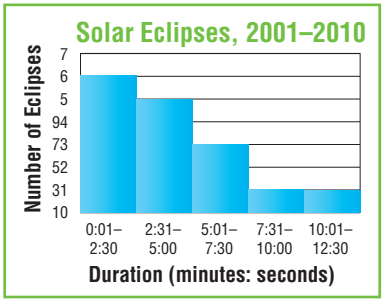
Each box and whisker has the same length. So, the data is evenly distributed. The distribution is symmetric since the left side of the data looks like the right side. There are no outliers.

Show your work.

Got It? Do this problem to find out.

a. _____

a. Use clusters, gaps, peaks, outliers, and symmetry to describe the shape of the distribution at the right.



Measures of Center and Spread

Key Concept

Use the following flow chart to decide which measures of center and spread are most appropriate to describe a data distribution.

Is the data distribution symmetric?

Yes → Use the **mean** to describe the center. Use the **mean absolute deviation** to describe the spread.

No → Use the **median** to describe the center. Use the **interquartile range** to describe the spread.

STOP and Reflect

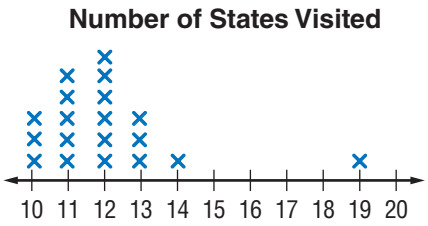
Explain below which measures are most appropriate to describe the center and spread of a symmmetric distribution.

If there is an outlier, the distribution is not usually symmetric.

Example

Tutor

3. **The line plot shows the number of states visited by students in a class.**



a. Choose the appropriate measures to describe the center and spread of the distribution. Justify your response based on the shape of the distribution.

The data are not symmetric and there is an outlier, 19. The median and interquartile range are appropriate measures to use.

b. Write a few sentences describing the center and spread of the distribution using the appropriate measures.

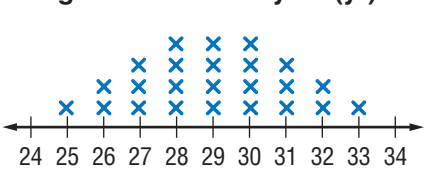
Show your work.

The median is 12 states. The first quartile is 11. The third quartile is 13. The interquartile range is 13–11, or 2 states.

The data are centered around 12 states. The spread of the data around the center is about 2 states.

Got It? Do this problem to find out.

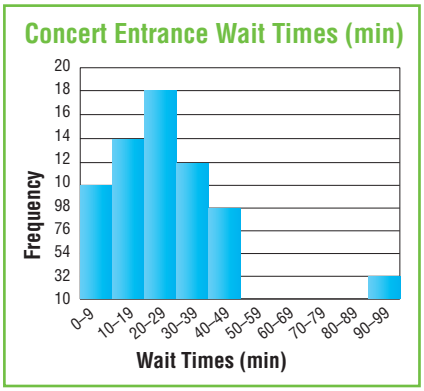
b. Describe the center and spread of the distribution. Justify your response based on the shape of the distribution. Then describe the center and spread.



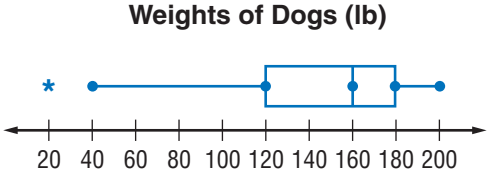
b. _____

Guided Practice

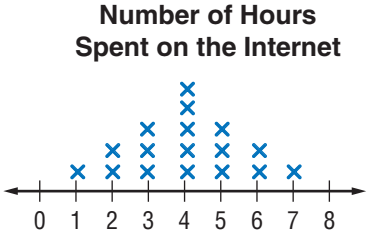
1. The histogram shows the wait times in minutes for entering a concert. Describe the shape of the distribution. (Example 1)



2. The line plot shows the weights in pounds of several dogs. Describe the shape of the distribution. (Example 2)



3. The line plot shows the number of hours several students spent on the Internet during the week. (Example 3)



a. Choose the appropriate measures to describe the center and spread of the distribution. Justify your response based on the shape of the distribution.

b. Write a few sentences describing the center and spread of the distribution using the appropriate measures. Round to the nearest tenth if necessary.

4. **Building on the Essential Question** Why does the choice of measure of center and spread vary based on the type of data display?

Rate Yourself!

How well do you understand how to describe the shape of a distribution? Circle the image that applies.

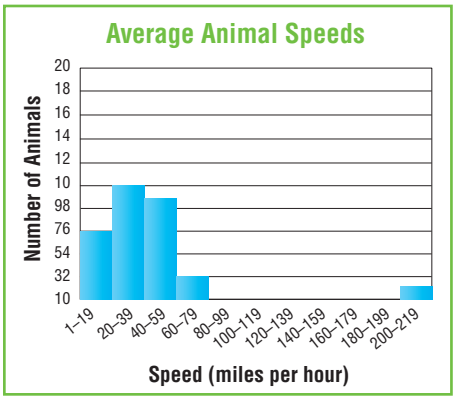
For more help, go online to access a Personal Tutor.

Name _____ My Homework _____

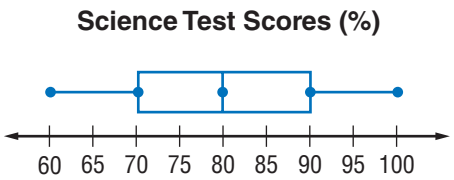
Independent Practice

Go online for Step-by-Step Solutions eHelp

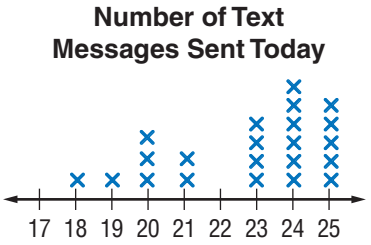
1 The histogram shows the average animal speeds in miles per hour of several animals. Describe the shape of the distribution. (Example 1)



2. The box plot shows the science test scores for Mrs. Everly's students. Describe the shape of the distribution. (Example 2)



3 The line plot shows the number of text messages sent by different students in one day. (Example 3)



a. Choose the appropriate measures to describe the center and spread of the distribution. Justify your response based on the shape of the distribution.

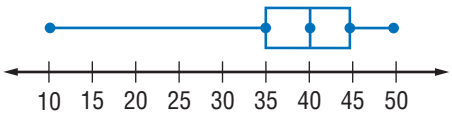
b. Write a few sentences describing the center and spread of the distribution using the appropriate measures.

4. CCSS **Identify Structure** Fill in the graphic organizer to show when to use each measure regarding the shape of the distribution.

Measure	Symmetric or Not Symmetric
mean	
median	
interquartile range	
mean absolute deviation	

5. A distribution that is not symmetric is called *skewed.* A distribution that is *skewed left* shows data that is more spread out on the left side than on the right side. A distribution that is *skewed right* shows data that is more spread out on the right side than on the left side. The box plot shows the heights in feet of several trees.

Height of Trees (ft)



a. Explain how you know the distribution is not symmetric.

b. Is the distribution skewed left or skewed right? Explain.

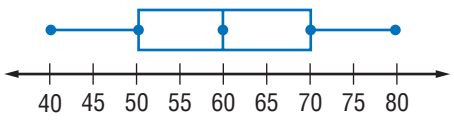
c. Use appropriate measures to describe the center and spread of the distribution. Justify your choice of measure based on the shape of the distribution.

H.O.T. Problems Higher Order Thinking

6. **Model with Mathematics** Draw a line plot for which the median is the most appropriate measure to describe the center of the distribution.

7. **Persevere with Problems** Explain why you cannot describe the specific location of the center and spread of the box plot shown using the most appropriate measures.

Calories in Servings of Fruits



Georgia Test Practice

8. The line plot shows the weekly attendance for a dance class. Which of the following statements is true?

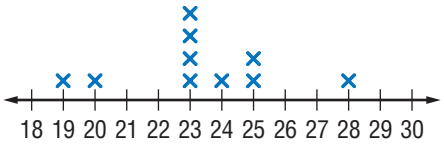
Ⓐ The distribution is symmetric.

Ⓑ The distribution has an outlier.

Ⓒ The distribution has a peak.

Ⓓ There are no clusters.

Dance Class Attendance

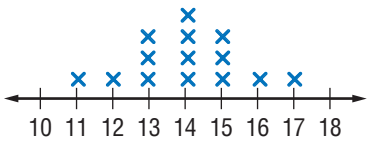


Name _____ My Homework _____

Extra Practice

9. The line plot shows the prices in dollars for several DVDs.

DVD Prices ($)

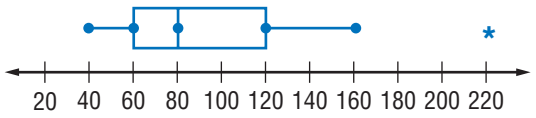


Describe the shape of the distribution. Sample answer: The shape of the distribution is symmetric. The left side of the data looks like the right side. There is a cluster from $13–$15. There are no gaps in the data. The peak of the distribution is $14. There are no outliers.

Homework Help

10. The box plot shows donations in dollars to charity. Describe the shape of the distribution.

Donations to Charity ($)

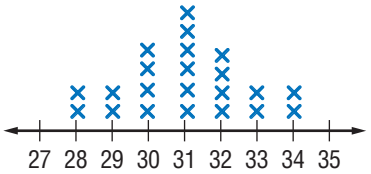


_____

_____

11. The line plot shows the number of miles Elisa ran each week.

Miles Ran Each Week



a. Choose the appropriate measures to describe the center and spread of the distribution. Justify your response based on the shape of the distribution. _____

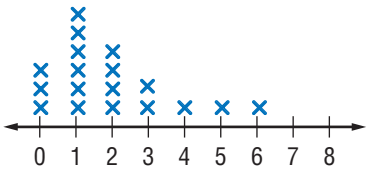
_____

b. Write a few sentences describing the center and spread of the distribution using the appropriate measures. Round to the nearest tenth if necessary. _____

_____

12. CCSPS **Use Math Tools** The line plot shows the number of siblings for 18 students.

Number of Siblings



a. Explain how you know the distribution is not symmetric.

_____

_____

b. Is the distribution skewed left or skewed right? Explain.

_____

_____

c. Use appropriate measures to describe the center and spread of the distribution. Justify your choice of measure based on the shape of the distribution. _____

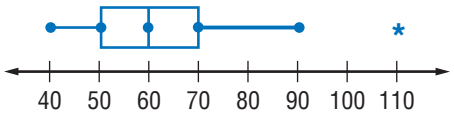
_____

_____

Georgia Test Practice

13. Refer to the box plot below.

Roller Coaster Speeds (mph)



Which of the following statements is false?

Ⓐ The distribution is symmetric.

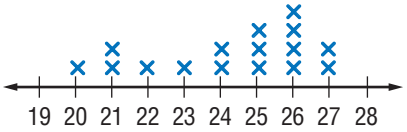
Ⓑ The distribution is not symmetric.

Ⓒ The distribution has an outlier.

Ⓓ The distribution has a gap of data.

14. Refer to the line plot below.

Gas Mileage (miles per gallon)



Which measure is the most appropriate to describe the variation (spread) of the distribution?

Ⓕ interquartile range

Ⓖ mean

Ⓗ mean absolute deviation

Ⓘ median

Common Core Review

Graph the points on the coordinate plane. MCC5.G.2

15. $F(2, 4)$

16. $K(4, 9)$

17. $G(1, 8)$

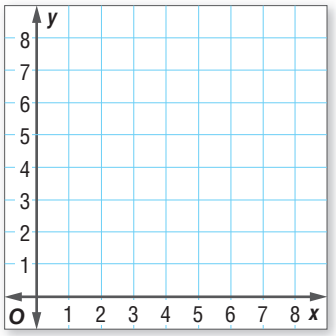
18. $L(5, 2)$

19. $H(2, 1)$

20. $M(9, 7)$

21. $I(8, 6)$

22. $N(5, 6)$



23. Callie is working on a small scrapbook. She completes 3 scrapbook pages each hour. How many pages will she complete in 12 hours? MCC4.NBT.5

_____

24. The table shows how many inches are in several feet. How many inches are in 4 feet? MCC6.RP.3a _____

Feet	Inches
1	12
2	24
3	36

Inquiry Lab
Collect Data

Content Standards
MCC6.SP.4, MCC6.SP.5, MCC6.SP.5a, MCC6.SP.5b, MCC6.SP.5c, MCC6.SP.5d

Mathematical Practices
1, 3, 4

Inquiry **HOW do you answer a statistical question?**

Photos Aribelle surveyed students in the cafeteria lunch line. She asked the statistical question, *How many photos are currently stored in your cell phone?* She wants to organize the data and choose an appropriate way to display the results of her survey.

Investigation

You can collect, organize, display, and interpret data in order to answer a statistical question.

Step 1 Make a data collection plan. Aribelle chose to survey students in the cafeteria.

Step 2 Collect the data. The results of the survey are provided below.

55, 47, 58, 50, 66, 47, 54, 64, 47, 65,
43, 44, 51, 81, 54, 45, 57, 52, 58, 60

Step 3 Organize the data. Place the values in order from least to greatest.

_____

_____

Step 4 Describe the data. There were a total of ☐ responses. The responses measure in the number of _____. The data was collected using a _____. One attribute of the data is the median, which is ☐ photos. Another attribute is the interquartile range, which is ☐ photos. There is an outlier at ☐ photos.

Step 5 Create a display of the data. Explain why a box plot would be an appropriate display of Aribelle's data. _____

_____

_____

Collaborate

Work with a partner. Collect data in order to answer a statistical question.

1. Write a statistical question.

2. Collect the data and record the results in a table.

3. Create a display of the data.

Reflect

4. **Model with Mathematics** Write a few sentences describing the results of your survey. Include the number of responses you recorded, how the responses were measured and/or gathered, and the overall pattern of the responses.

5. **Reason Inductively** Write a few sentences describing the center and spread of the distribution.

6. HOW do you answer a statistical question?

Lesson 5

Interpret Line Graphs

What You'll Learn

Scan the lesson. Predict two things you will learn about line graphs.

- _____
- _____

Essential Question

WHY is it important to carefully evaluate graphs?

Vocabulary

line graph

Common Core GPS

Content Standards
Extension of MCC6.SP.4

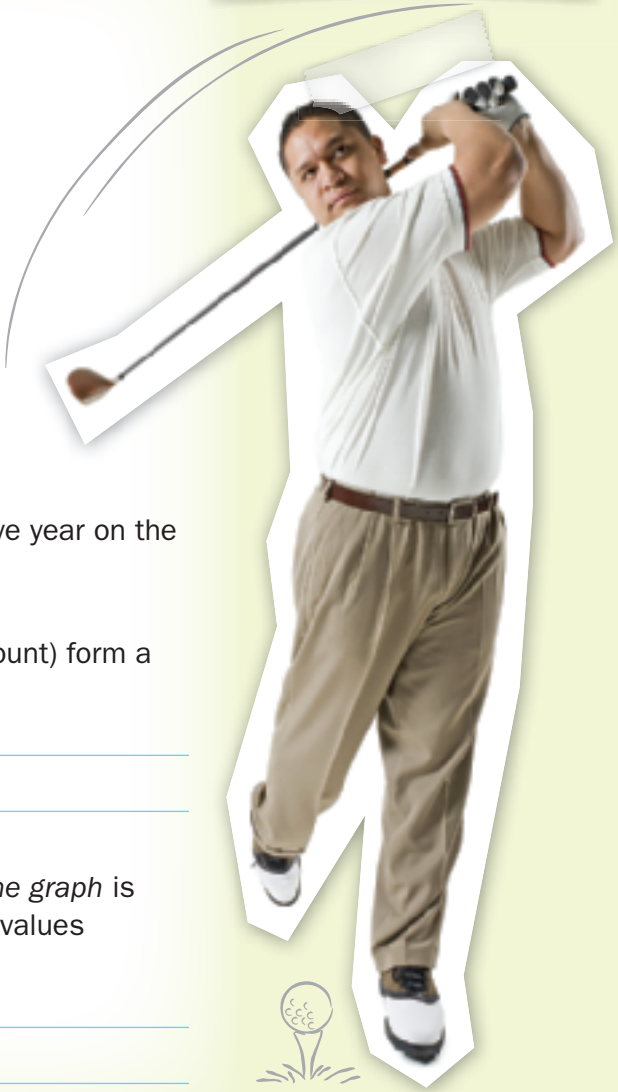
Mathematical Practices
1, 3, 4

Real-World Link

Watch

Golf The table shows the prize money for winners of the Masters Tournament.

Money Won by Masters Tournament Winners	
Year	**Amount ($)**
2005	1,170,000
2006	1,225,000
2007	1,305,000
2008	1,305,000
2009	1,350,000
2010	1,350,000



1. Fill in the dollar difference between each consecutive year on the lines above.

2. If the data were plotted, would the points (year, amount) form a straight line? Explain.

_____

_____

3. The Masters Tournament is held once a year. If a *line graph* is made of these data, will there be any realistic data values between tournament dates? Explain.

_____

_____

Work Zone

Make a Line Graph

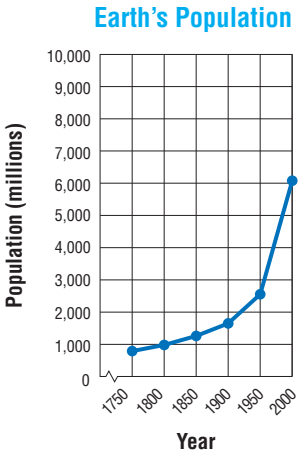
A **line graph** is used to show how a set of data changes over a period of time. To make a line graph, decide on a scale and interval. Then graph pairs of data and draw a line to connect each point.

Example

Tutor

1. **Make a line graph of the data of Earth's Population. Describe the change in Earth's population from 1750 to 2000.**

Earth's Population						
Year	1750	1800	1850	1900	1950	2000
Population (millions)	790	980	1,260	1,650	2,555	6,080



Step 1 The data include numbers from 790 million to 6,080 million. So, a scale from 0 to 10,000 million and an interval of 1,000 million are reasonable.

Step 2 Let the horizontal axis represent the year. Let the vertical axis represent the population. Label the horizontal and vertical axes.

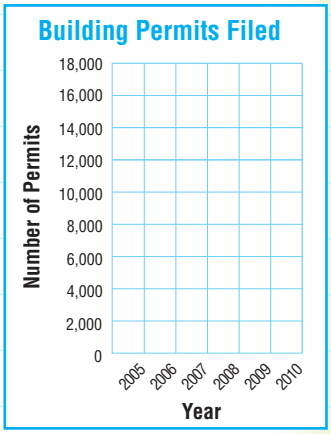
Step 3 Plot and connect the points for each year.

Step 4 Label the graph with a title.

Earth's population has increased drastically from 1750 to 2000.

Broken Line Graphs

Points are connected by a dotted line instead of a soild line when there are no realistic data values between the points.



Got It? Do this problem to find out.

a. Make a line graph of the data. Describe the change in the number of building permits filed from 2005 to 2010.

a. _____

Number of Building Permits Filed in a Major City						
Year	2005	2006	2007	2008	2009	2010
Building Permits Filed	16,000	15,500	13,900	11,000	8,200	5,900

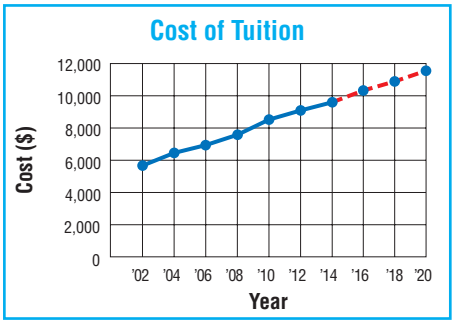
Interpret Line Graphs

By observing the upward or downward slant of the lines connecting the points, you can describe trends in the data and predict future events.

Example

Watch Tutor

2. **The line graph below shows the cost of tuition at a college during several years. Describe the trend. Then predict how much tuition will cost in 2020.**



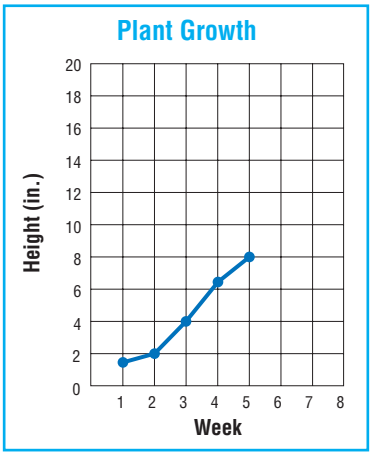
Notice that the increase from 2002 through 2012 is fairly steady. By extending the graph, you can predict that tuition in 2020 will cost a student about $11,500.

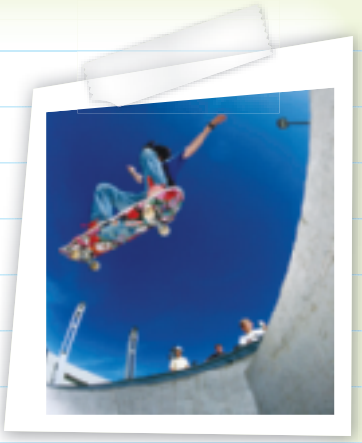
Got It? **Do this problem to find out.**

Show your work.

b. The line graph shows the growth of a plant over several weeks. Describe the trend. Then predict how tall the plant will be at 7 weeks.

b. _____



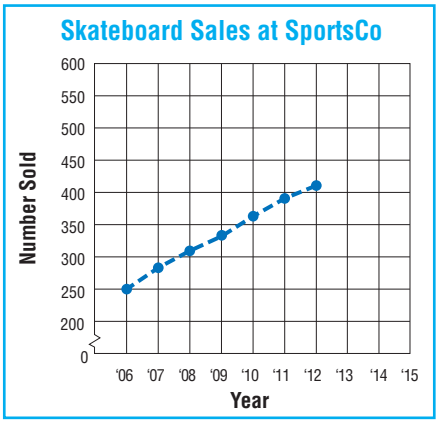


Example

Tutor

3. **What does the graph tell you about the popularity of skateboarding?**

The graph shows that skateboard sales have been increasing each year. You can assume that the popularity of the sport is increasing.

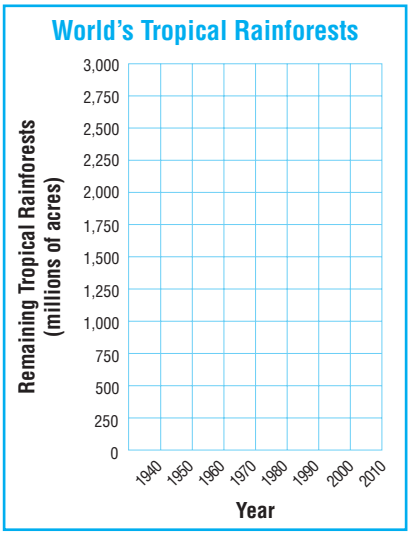


Guided Practice

Check

1. Make a line graph of the data. (Example 1)

World's Tropical Rainforests								
Year	1940	1950	1960	1970	1980	1990	2000	2010
Remaining Tropical Rainforests (millions of acres)	2,875	2,740	2,600	2,375	2,200	1,800	1,450	825



2. Describe the change in the world's remaining rainforests from 1940 to 2010. (Example 1) _____

_____

3. Describe the trend in the remaining tropical rainforests. (Example 2) _____

4. Predict how many millions of acres there will be left in 2020. (Example 2) _____

5. What does the graph tell you about future changes in the remaining rainforests? (Example 3) _____

_____

6. **Building on the Essential Question** How can you use line graphs to predict data?

_____

_____

Rate Yourself!

☐ I understand how to interpret line graphs.

Great! You're ready to move on!

☐ I still have some questions about interpreting line graphs.

No Problem! Go online to access a Personal Tutor. Tutor

FOLDABLES Time to update your Foldable!

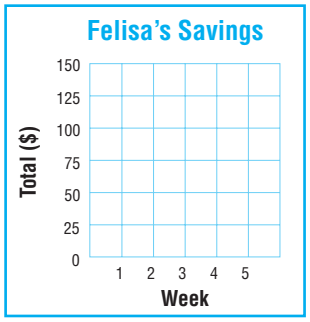
Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

1 Make a line graph of the data. Then describe the change in the total amount Felisa saved from Week 1 to Week 5. (Example 1)

Felisa's Savings	
Week	**Total Amount ($)**
1	50
2	54
3	75
4	98
5	100

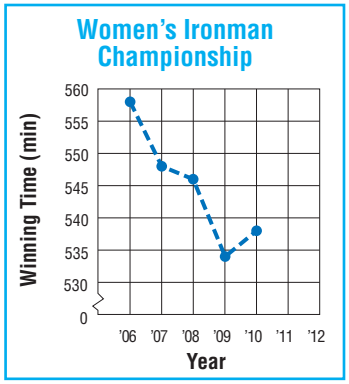


2. Use the graph at the right. (Examples 2–3)

a. Describe the change in the winning times from 2006 to 2010.

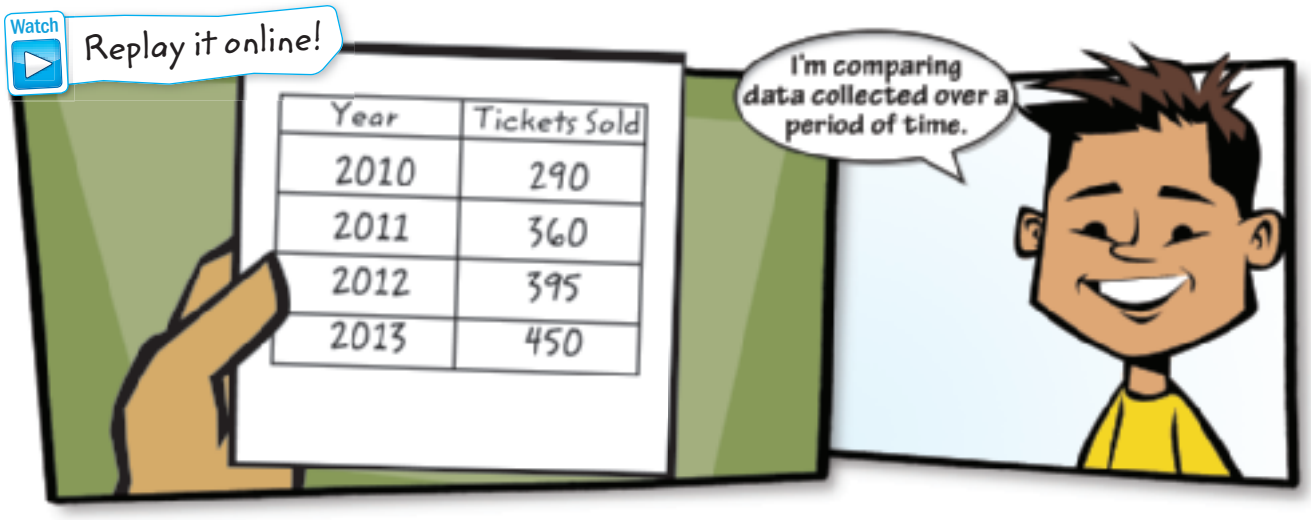
b. Predict the winning time in 2015.

c. Predict when the winning time will be less than 500 minutes.



Copy and Solve **For Exercise 3, show your work on a separate piece of paper.**

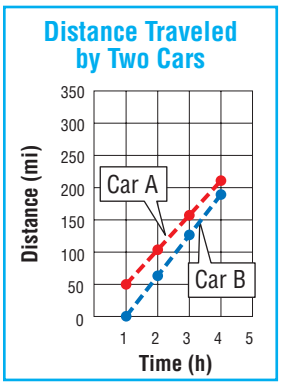
3. CCSPS **Model with Mathematics** Refer to the graphic novel frame below for Exercises a–b.



a. Use the information in the table and draw a line graph to show the changes in ticket sales over the past four years.

b. Predict what the ticket sales will be in 2015.

4. Use the graph that shows the distance traveled by two cars on the same freeway headed in the same direction.



a. Predict the distance traveled by Car A after 5 hours.

b. Predict the distance traveled by Car B after 5 hours.

c. How many miles do you think Car A will have traveled after 8 hours?

d. Based on the graph, after how many hours will Car B have traveled about 360 miles?

e. Based on the graph, which car will reach a distance of 500 miles first? Explain your reasoning.

H.O.T. Problems Higher Order Thinking

5. **Justify Conclusions** Can changes to the vertical scale or interval affect the appearance of a line graph? Justify your reasoning with examples.

6. **Persevere with Problems** Refer to the graph for Exercise 4. What can you conclude about the point at which the red and blue lines cross?

7. **Construct an Argument** Explain why line graphs are often used to make predictions.

Georgia Test Practice

8. What type of data are best represented in a line graph?

Ⓐ data that show frequency

Ⓑ data that change over time

Ⓒ data that are grouped by category

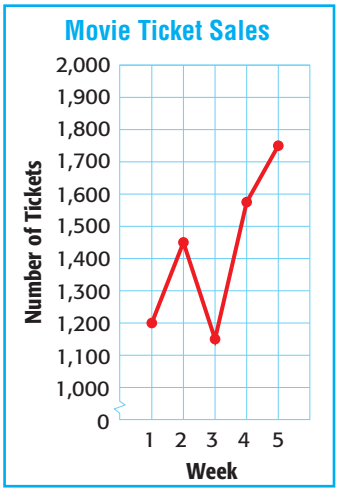
Ⓓ data that compare totals

Name _____ My Homework _____

Extra Practice

9. **Model with Mathematics** Make a line graph of the data. Describe the change in the online sales of movie tickets for Weeks 1 to 5.

Online Sales of Movie Tickets	
Week	**Number of Tickets**
1	1,200
2	1,450
3	1,150
4	1,575
5	1,750



Homework Help

The online sales of movie tickets increased from Week 1 to Week 2, decreased in Week 3 and then increased again for Weeks 4 and 5.

10. Use the graph at the right.

a. Describe the change in depth from 10 minutes to 35 minutes.

_____

_____

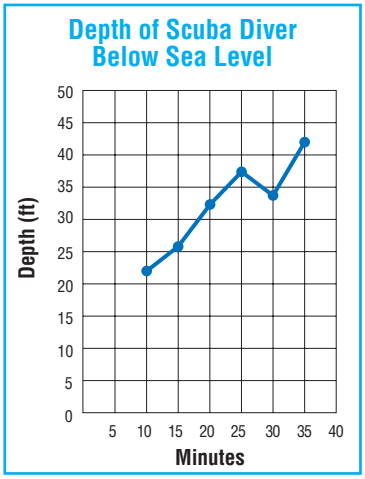
b. Predict the depth at 45 minutes. _____

_____

c. Predict when the depth will be more than 65 feet.

_____

_____



11. Use the line graph at the right.

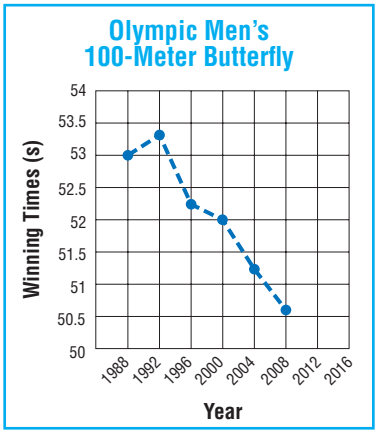
a. Between which years did the winning time change the most? Explain. _____

_____

b. Make a prediction of the winning time in the 2020 Olympics. Explain your reasoning. _____

_____

_____



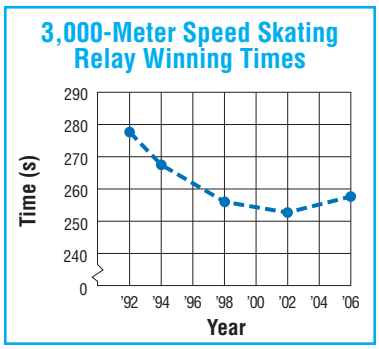
Georgia Test Practice

12. Every Sunday, Kailey saves a portion of her weekly earnings. The table shows the total amount of money she has saved each week. What is the best prediction for the total amount she will have saved after Week 8?

Week	Total Amount Saved $)
1	15
2	34
3	42
4	60
5	78

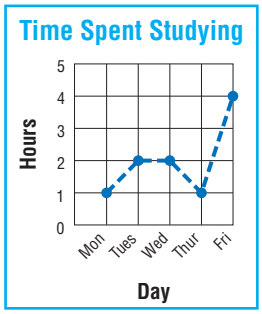
Ⓐ $100
Ⓑ $130
Ⓒ $150
Ⓓ $170

13. For which year would the winning time in the Olympic Women's 3,000-Meter Speed Skating Relay have been the most difficult to predict based on previous results?



Ⓕ 1994
Ⓖ 1998
Ⓗ 2002
Ⓘ 2006

14. Short Response The graph shows the time Mia spent studying during one week. Describe the change in the number of hours Mia studied from Wednesday to Thursday.



Common Core Review

Find the greatest number in the set. MCC4.NBT.2

15. {23, 34, 41, 25, 36}

16. {65, 58, 64, 56, 62}

17. {18, 16, 22, 19, 24}

Find the total of the set of numbers. MCC4.NBT.4

18. {95, 88, 97, 89, 91}

19. {56, 71, 68, 62, 74}

20. {33, 36, 38, 29, 27}

21. The table shows the miles the Smythe family traveled each day. What is the total number of miles they traveled? MCC4.NBT.4 _____

Day	Miles
Saturday	125
Sunday	84
Monday	112

22. Selena can make 24 cookies in 30 minutes. At this rate, how many cookies can she make in 90 minutes? MCC6.RP.3b _____

Lesson 6

Select an Appropriate Display

What You'll Learn

Scan the lesson. Predict two things you will learn about selecting an appropriate display.

- _____
- _____

Essential Question

WHY is it important to carefully evaluate graphs?

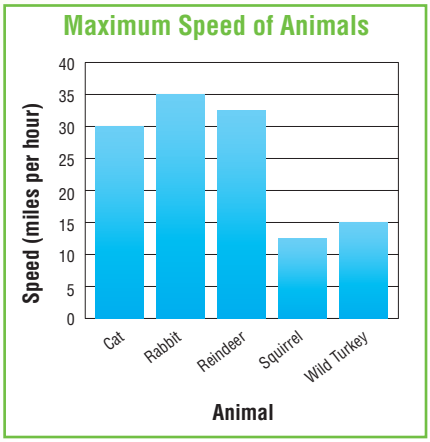
Common Core GPS

Content Standards
Extension of MCC6.SP.4

Mathematical Practices
1, 3, 4, 5, 6

Real-World Link

Animals The displays show the maximum speed of six animals.



Animal Speeds	
Speeds	**Number of Animals**
1–5	
6–10	
11–15	
16–20	
21–25	
26–30	
31–35	

1. Use the bar graph to fill in the "Number of Animals" column in the table.

2. Which display allows you to find a rabbit's maximum speed?

_____

3. In which display is it easier to find the number of animals with a maximum speed of 15 miles per hour or less? Explain.

_____

_____

_____

Key Concept

Statistical Displays

Type of Display	Best used to
Bar Graph	show the number of items in specific categories
Box Plot	show measures of variation for a set of data, also useful for very large sets of data
Histogram	show frequency of data divided into equal intervals
Line Graph	show change over a period of time
Line Plot	show how many times each number occurs

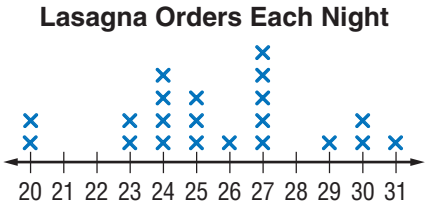
Work Zone

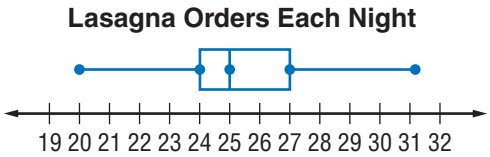
Data can often be displayed in several different ways. The display you choose depends on your data and what you want to show.

Example

Tutor

1. **Which display allows you to tell the mode of the data?**





The line plot shows each night's data. The number of orders that occurs most frequently is 27. The box plot shows the spread of the data, but does not show individual data so it does not show the mode.

Show your work.

Got It? **Do this problem to find out.**

a. Which of the above displays allows you to easily find the median of the data?

a. _____

Examples

Tutor

2. **A survey compared different brands of hair shampoo. The table shows the number of first choice responses for each brand. Select an appropriate type of display to compare the number of responses. Justify your choice.**

Favorite Shampoo Survey			
Brand	Responses	Brand	Responses
A	35	D	24
B	12	E	8
C	42	F	11

These data show the number of responses for each brand. A bar graph would be the best display to compare the responses.

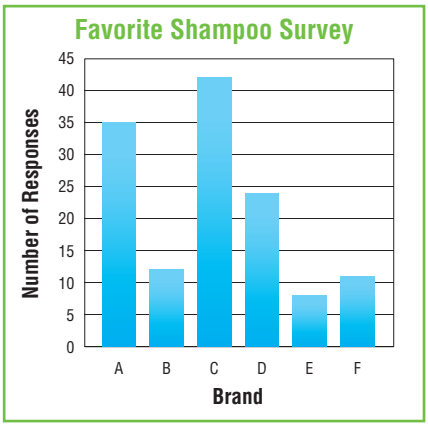
STOP and Reflect

What type of data are best represented in a bar graph? Explain below.

3. **Make the appropriate display of the data.**

Step 1 Draw and label horizontal and vertical axes. Add a title.

Step 2 Draw a bar to represent the number of responses for each brand.



Got It? Do these problems to find out.

Show your work.

The table shows the quiz scores of Mr. Vincent's math class.

Math Quiz Scores											
70	70	75	80	100	85	85	65	75	85	95	90
90	100	85	90	90	95	80	85	90	85	90	75

b. Select an appropriate type of display to allow you to count the number of students with a score of 85. Explain your choice.

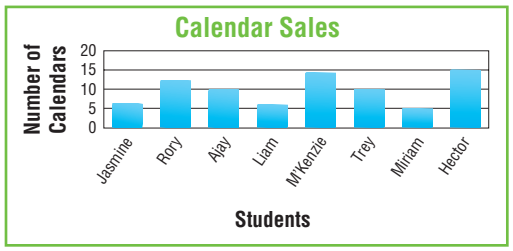
b. _____

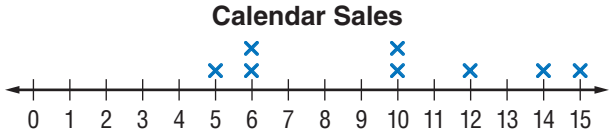
c. Make the appropriate display of the data.

Show your work.

Guided Practice

1. Which display makes it easier to determine the greatest number of calendars sold? Justify your reasoning. (Example 1)





Select an appropriate type of display for data gathered about each situation. Justify your reasoning. (Example 2)

2. the favorite cafeteria lunch item of the sixth-grade students

3. the temperature from 6 A.M. to 12:00 P.M.

4. Select and make an appropriate display for the following data. (Example 3)

Number of Push-Ups Done by Each Student											
15	20	8	11	6	25	32	12	14	16	21	25
18	35	40	20	25	15	10	5	18	20	31	28

Show your work.

5. **Building on the Essential Question** Why is it important to choose the appropriate display for a set of data?

Rate Yourself!

How confident are you about selecting an appropriate display? Shade the ring on the target.

For more help, go online to access a Personal Tutor.

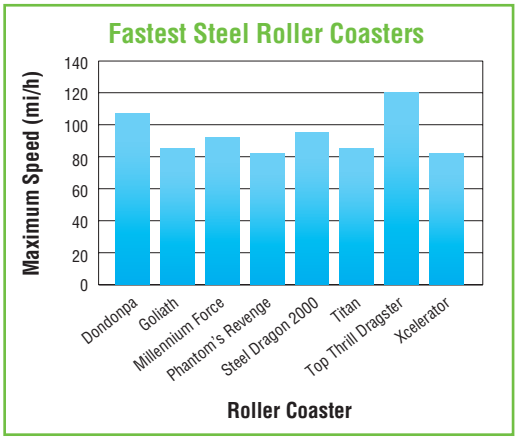
Tutor

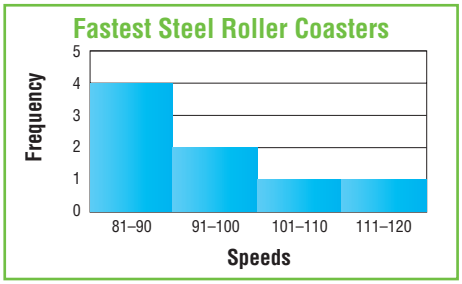
Name _____ My Homework _____

Independent Practice

Go online for Step-by-Step Solutions eHelp

1 Which display makes it easier to compare the maximum speeds of Top Thrill Dragster and Millennium Force? Justify your reasoning. (Example 1)





Select an appropriate type of display for data gathered about each situation. Justify your reasoning. (Example 2)

2. the test scores each student had on a language arts test

3. the median age of people who voted in an election

Use Math Tools **Select and make an appropriate type of display for the situation.** (Example 3)

Show your work.

4.

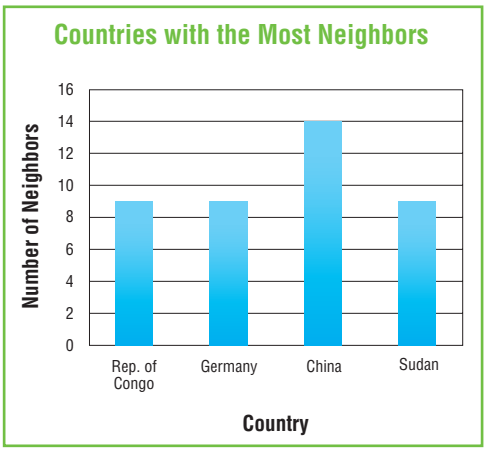
South American Country	Water Area (km^2)	South American Country	Water Area (km^2)
Argentina	47,710	Guyana	18,120
Bolivia	15,280	Paraguay	9,450
Chile	12,290	Peru	5,220
Ecuador	6,720	Venezuela	30,000

5. **Use Math Tools** Use the Internet or another source to find a set of data that is displayed in a bar graph, line graph, frequency table, or circle graph. Was the most appropriate type of display used? What other ways might these same data be displayed? _____

6. **Be Precise** Fill in the graphic organizer below.

Display	What it shows
line plot	
histogram	
box-and-whisker plot	
bar graph	

7 Display the data in the bar graph using another type of display. Compare the advantages of each display.



H.O.T. Problems Higher Order Thinking

8. **Construct an Argument** Determine whether the following statement is *true* or *false*. If true, explain your reasoning. If false, give a counterexample.

Any set of data can be displayed using a line graph.

9. **Persevere with Problems** Which type of display allows you to easily find the mode of the data? Explain your reasoning.

Georgia Test Practice

10. Which of the following situations would involve data that are best displayed in a box plot?

Ⓐ the number of each type of drink a cafeteria sells

Ⓑ the response the most people gave to a survey on number of pets

Ⓒ the number of points Liam scored in each basketball game this season

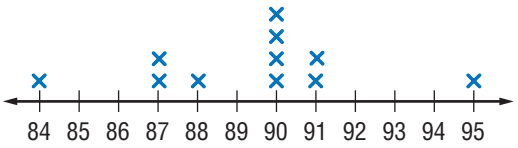
Ⓓ the median age of a TV show's viewers

Name _____ My Homework _____

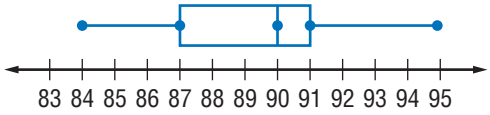
Extra Practice

11. Which display makes it easier to see the median distance? Justify your reasoning.

Winning Distance of Men's Olympic Javelin Throw Winners 1968–2008



Winning Distances of Olympic Javelin Throw



Homework Help

box plot; The median is easily seen on the box plot as the line in the box.

Select an appropriate type of display for data gathered about each situation. Justify your reasoning.

12. the amount of sales a company has over 6 months

13. the prices of five different brands of tennis shoes at an athletic store

14. the amount in a savings acount over a year

15. the shape of the distribution of a team's football scores for one season

CCSS **Model with Mathematics** **Select and make an appropriate type of display for the situation.**

16.

Number of Counties in Various Southern States	
67	67
95	82
33	64
63	29
46	100
75	77
95	105

Show your work.

Georgia Test Practice

17. Which of the following situations would involve data that are best displayed in a line graph?

Ⓐ the favorite subject of the students in Mrs. Ling's homeroom

Ⓑ the weight a puppy gains in one year

Ⓒ the number of hits Dylan got in each game this baseball season

Ⓓ the number of miles each student travels to school

18. The table shows the prices of the skateboards Jacy might buy.

Skateboards	
Brand	**Price**
Blackbird	$55
Earth Bound	$68
Element Skateboards	$44
Venus Boards	$61
ZoomFast	$75

Which type of display would help Jacy best compare the prices of these skateboards?

Ⓕ bar graph

Ⓖ line graph

Ⓗ line plot

Ⓘ frequency table

19. **Short Response** The table shows the heights of 15 different Collie dogs. Which display would be most appropriate to show this data? Explain.

_____

Height of Collies (in.)				
24	26	22	22	23
24	25	24	23	23
18	26	25	22	24

Common Core Review

Divide. MCC5.NBT.6

20. 36 ÷ 12 = _____

21. 108 ÷ 12 = _____

22. 138 ÷ 23 = _____

23. 204 ÷ 17 = _____

24. 192 ÷ 12 = _____

25. 390 ÷ 15 = _____

26. 324 ÷ 36 = _____

27. 540 ÷ 36 = _____

28. 792 ÷ 12 = _____

29. Measure the pencil below to the nearest centimeter. Then represent your measurement in meters. MCC5.MD.1 _____

Inquiry Lab

Use Appropriate Units and Tools

Inquiry HOW do you determine a measureable attribute?

Content Standards
MCC6.SP.5, MCC6.SP.5a, MCC6.SP.5b, MCC6.SP.5c

Mathematical Practices
1, 3, 4

School Each item in a backpack has different attributes such as color, size, and weight. Some of the attributes of the objects can be measured.

Investigation

You can choose the appropriate unit and tool to measure an object.

Step 1 Select an object in your classroom such as a desk, book, backpack, or trash can.

Step 2 List all of the measureable attributes of your object in the Step 3 table. Choose from among length, weight or mass, or capacity.

Step 3 Select an appropriate tool and measure each attribute. Record each measure using appropriate units in the table below.

Object	Attribute	Tool	Measurement

Step 4 Choose a different object with at least one attribute that requires the use of a different tool to measure. Then repeat steps 1–3.

Object	Attribute	Tool	Measurement

Step 5 Write and solve a real-world problem in which one of your measurements is needed to solve the problem.

Collaborate

Work with a partner. Choose an attribute common to several similar objects and use the appropriate unit and tool to measure.

1. Choose a set of objects and a measurable attribute.

2. Measure the attribute and record the results in a table.

3. Create a display of the data.

Reflect

4. **Model with Mathematics** Write a few sentences describing your data. Include the number of observations, how the data was measured, and the overall pattern of the data.

5. **Make a Conjecture** Explain how the way you measured the objects influenced the shape of the display.

6. HOW do you determine a measureable attribute?

21ST CENTURY CAREER in Envionmental Science

Environmental Engineer

Are you concerned about protecting the environment? If so, you should think about a career in environmental science. Environmental engineers apply engineering principles along with biology and chemistry to develop solutions for improving the air, water, and land. They are involved in pollution control, recycling, and waste disposal. Environmental engineers also determine methods for conserving resources and for reducing environmental damage caused by construction and industry.

College & Career READINESS

Explore college and careers at ccr.mcgraw-hill.com

Is This the Career for You?

Are you interested in a career as an environmental engineer? Take some of the following courses in high school.

- Algebra
- Biology
- Environmental Science
- Environmental History

Turn the page to find out how math relates to a career in Environmental Science.

Thinking Green!

Use the information in the table to solve each problem. Round to the nearest tenth if necessary.

1. Find the mean, median, and mode of the percent of recycled glass data. _____

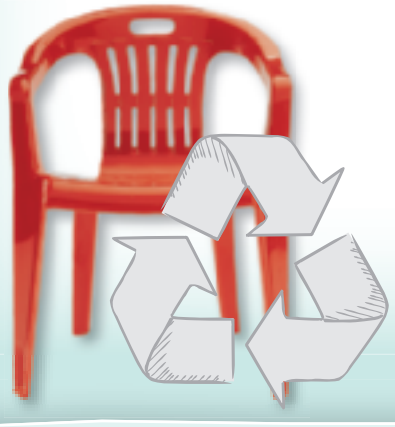
2. If Lee County is removed from the recycled aluminum cans data, which changes the most: the mean, median, or mode? Does this make sense? Explain your reasoning.

3. Find the range, quartiles, and interquartile range of the percent of recycled newspapers data. _____

4. Find any outliers in the percent of recycled plastic bottles data. _____

5. Make a box plot of the percent of recycled glass data.

6. Refer to the box plot you made in Exercise 5. Compare the parts of the box and the lengths of the whiskers. What does this tell you about the data? _____



Percent of Materials That Are Recycled				
County	**Aluminum Cans (%)**	**Glass (%)**	**Newspapers (%)**	**Plastic Bottles (%)**
Broward	15	13	41	7
Dade	4	17	28	15
Duval	31	17	81	7
Hillsborough	14	21	38	23
Lee	48	16	66	53
Orange	12	29	33	16
Polk	6	26	22	8

Career Project

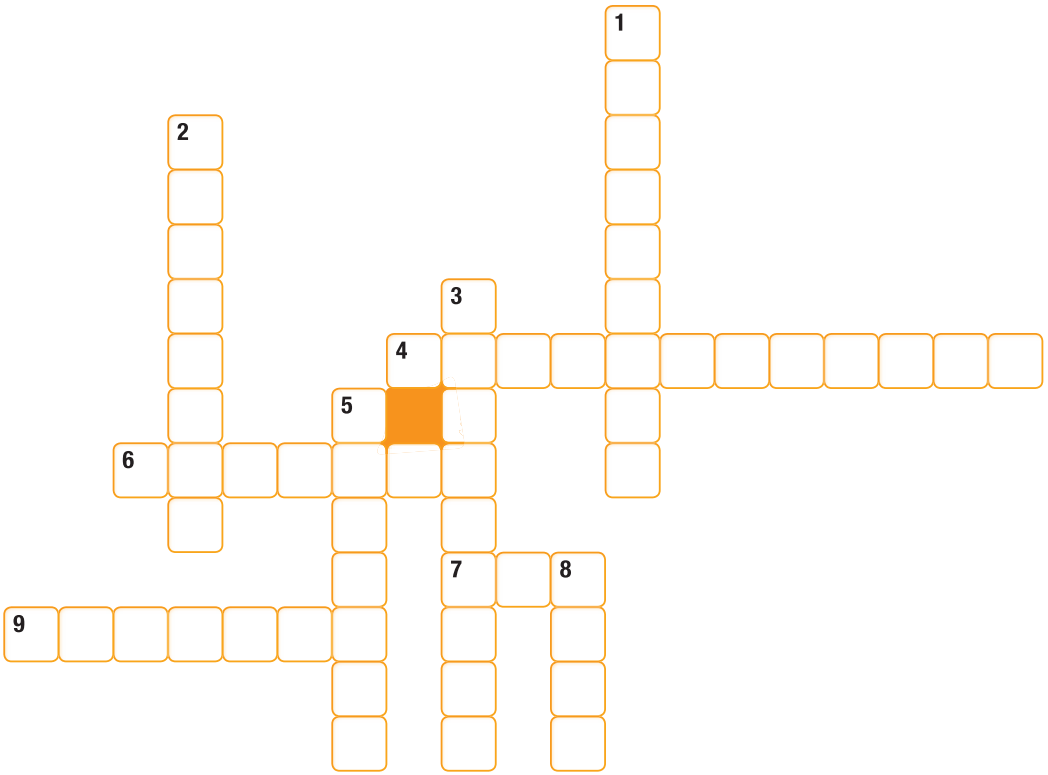
It's time to update your career portfolio! Describe an environmental issue that concerns you. Explain how you, as an environmental engineer, would work to resolve this issue. Then research how the issue is being addressed by envionmental scientists today.

Choose your favorite school activity or volunteer job. Could it lead to a possible career? If so, what is it?

Chapter Review

Vocabulary Check

Write the correct term for each clue in the crossword puzzle.



Across

4. the arrangement of a data set

6. a diagram that is constructed using five values

7. an empty space or interval in a set of data

9. a line plot using dots

Down

1. having one side of a distribution looking the same as the other side

2. a diagram that shows the frequency of data on a number line

3. a type of bar graph used to display numerical data that have been organized into equal intervals

5. data that are grouped closely together

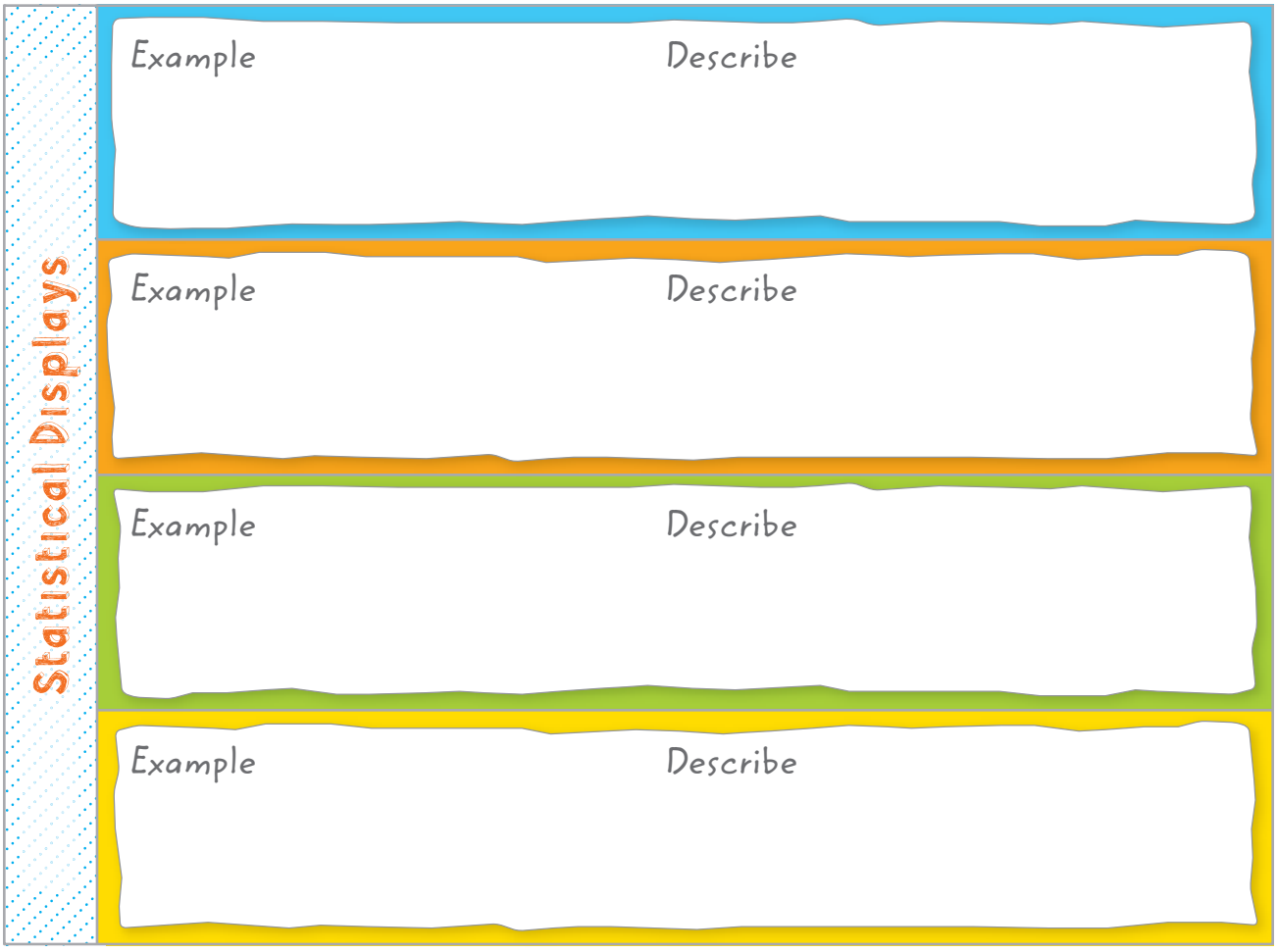
8. the mode of the data

Key Concept Check

Use Your FOLDABLES

Use your Foldable to help review the chapter.

Tape here



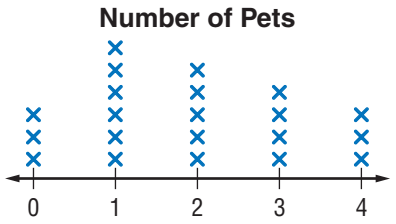
Got it?

Circle the correct term or number to complete each sentence.

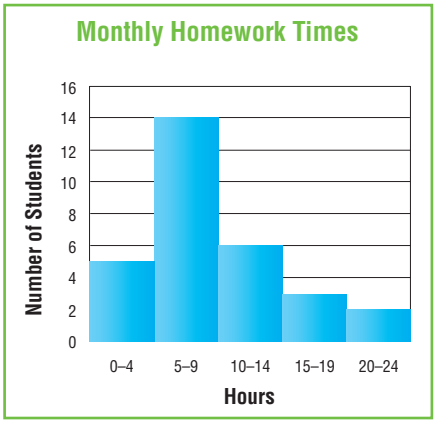
1. It is best to use a (line plot, line graph) to show change over time.
2. A (cluster, gap) is the space on a graph that has no data values.
3. The median of a data set is easily seen in a (box plot, histogram).
4. A (line plot, box plot) will show the mode of the data set.
5. If a data set is symmetric, the spread should be described by the (interquartile range, mean absolute deviation).

Problem Solving

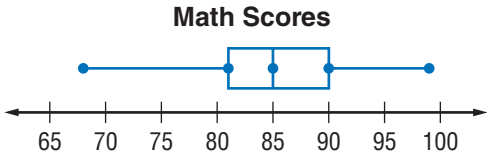
1. Jasmine asked her class how many pets they have. The line plot shows the results. Describe the distribution of the data. (Lesson 1)



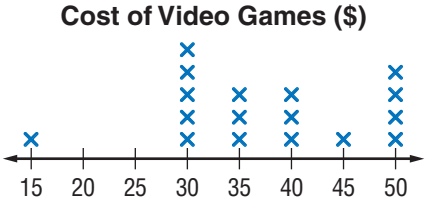
2. Use the histogram. How many students complete 9 or less hours of homework a month? (Lesson 2)



3. The box plot shows scores for a math test. Describe the distribution of the data. (Lesson 3)



4. The line plot shows the cost of different video games at a store. Describe the shape of the distribution. (Lesson 4)



Model with Mathematics **Select the appropriate type of display for the data gathered in Exercises 5 and 6.** (Lesson 6)

5. the number of students who have traveled to Arizona, Louisiana, Kansas, Florida, Michigan, and Wisconsin

6. the change in the value of a house over a period of 30 years

Reflect

Answering the Essential Question

Use what you learned about staistical displays to complete the graphic organizer.

Essential Question

WHY is it important to carefully evaluate graphs?

	When should I use it?
line graph	
histogram	
line plot	
box plot	

Answer the Essential Question. WHY is it important to carefully evaluate graphs?