

Name _____

Reteaching

14-1

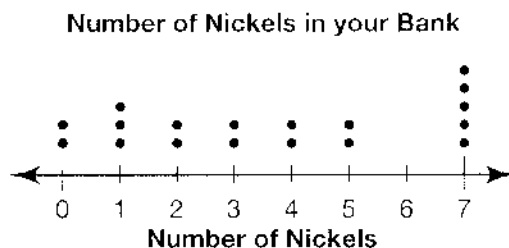
Statistical Questions

To determine if a question you want to ask a group of people is statistical, ask yourself if it has several different answers.

How many nickels are in a dollar? **Not statistical**

How many nickels are in your bank? **Statistical**

A dot plot shows one way to display data collected from a statistical question.



For 1 through 6, tell whether or not each question is statistical.

1. How many of the cards are baseball cards?

Not statistical

2. When does summer break begin?

Not statistical

3. Who is the current President of the United States?

Not statistical

4. Who are the debate team members' favorite presidents?

Statistical

5. How long does it take sixth-grade students to eat lunch?

Statistical

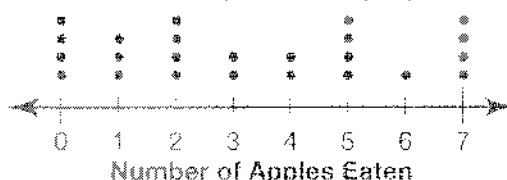
6. Where are your classmates' favorite places to vacation?

Statistical

7. **Writing to Explain** Explain why *How many days did it rain in September this year?* is not a statistical question.

The question does not have different answers.

8. Dean asked his class, *How many apples do you eat in a week?* He got the following responses: 7, 5, 5, 5, 7, 3, 2, 1, 0, 0, 4, 3, 2, 1, 0, 7, 5, 6, 7, 0, 2, 2, 1, 4. Make a dot plot to display the data.



Name _____

Practice

14-1

Statistical Questions

For 1 through 4, tell whether or not each question is statistical.

1. What was the low temperature each day last month?

Statistical

2. What color shirt am I wearing?

Not Statistical

3. What size shoes do the students in your class wear?

Statistical

4. How long does it take students in a class to read a book?

Statistical

For 5 through 8, write a statistical question that could be used to gather data on each topic. **Sample answers given.**

5. Distances members of the track team jogged last week

How far did you jog last week?

6. Numbers of letters in name of street you live on

How many letters are in your street name?

7. Cost of a restaurant dinner

How much did you pay for dinner?

8. Numbers of cars of different colors in a parking lot

What color is your car?

9. The data shown are the responses to the question, *How tall, in centimeters, is each bean plant?* Make a dot plot to display the data.

8	6	7	5	8	6	8	7	9	4
5	2	8	6	9	5	7	6	7	7

Check students' plots.

10. What statistical question might Brittany have asked to get this data?

18 min, 20 min, 30 min, 16 min, 45 min

- ☒ **A** How long did you spend on homework last night?
☐ **B** How long do the directions say to cook the pie?
☐ **C** At what time does school end?
☐ **D** How many minutes does it take Eric to get to school?

11. **Writing to Explain** Wyatt says that statistical questions must involve numbers in the question. Do you agree with Wyatt? Explain.

No; Sample answer: What is your favorite color? can be asked to 10 people. This is statistical because different answers would be expected.

Name _____

Cricket Weather!

Did you know that you can tell the temperature by counting a cricket's chirps? The table shows the number of chirps a cricket makes each minute at different temperatures. Use the data in the table to make a line graph on a separate sheet of paper.

Data

Number of Chirps (per minute)	Temperature
40	50°F
60	55°F
80	60°F
100	65°F
120	70°F

1. Label the vertical axis "Temperature." Let each line stand for 5°F. Starting with 50°F and ending with 75°F, number the vertical lines of the graph.

1–3: Check students' graphs.

2. Label the horizontal axis "Number of Chirps." Let each line stand for 20 chirps. Starting with 20 and ending with 140, number the horizontal lines of the graph.
3. Use dots to show the data on the graph. Use a ruler to connect the dots. Give the graph a title.
4. What is the difference in temperature from 40 chirps per minute to 120 chirps per minute?

20°F

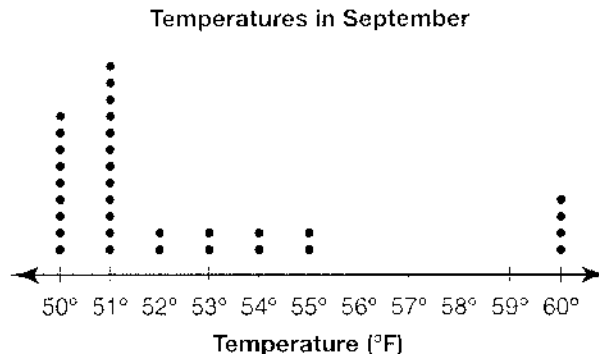
5. Use your ruler to extend the line on the graph so that it crosses the vertical line labeled 140. What should the temperature be if a cricket chirps 140 times?

75°F

Looking at Data Sets

You can describe a data distribution, or how data values are arranged, by looking at its overall shape, its center, and its least and greatest values.

By looking at this dot plot, you can describe the data distribution as being spread out to the right and not symmetric. The data is grouped between 50 and 51, and there is a gap between 55 and 60.



The center of the data can be found by looking for the middle number in the largest group of data. A good estimate would be 50 or 51 because that is where most of the temperatures are plotted.

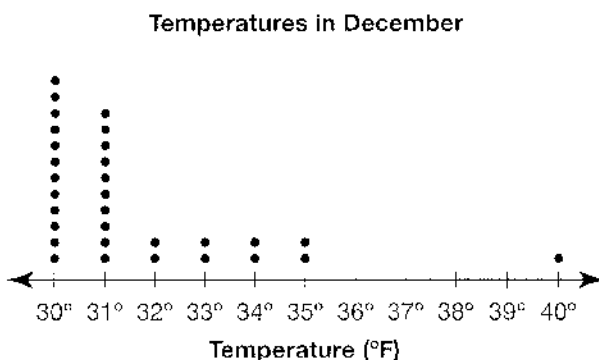
Use the dot plot to the right to answer the following questions.

1. What is the least temperature?
Greatest temperature?

30°F; 40°F

2. Are there any gaps in the data?
If so, where?

Yes; Between 35°F and 40°F



3. What temperature would be considered an outlier?

40°F

4. Is the data symmetric or spread out to one side?

The data is spread out to the right.

5. **Writing to Explain** Where do you think the center of the data is in the dot plot? Explain how you found your answer.

Sample answer: I think the center of the data is about 31°F. Most of the data is grouped on the left side of the distribution.

Name _____

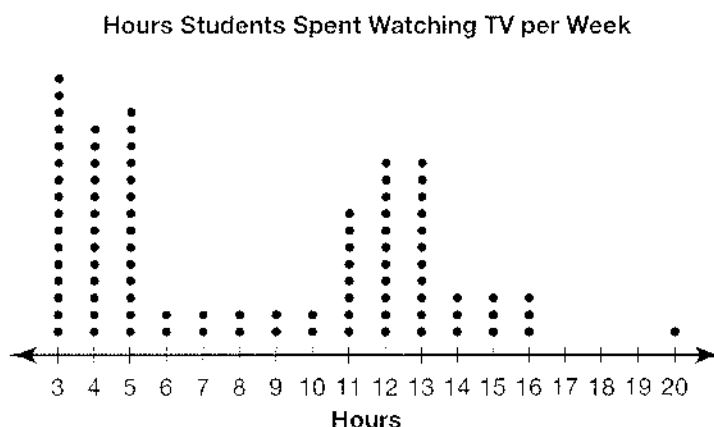
Practice

14-2

Looking at Data Sets

For 1 through 4, use the dot plot.

Maria took a school survey to find out how many hours per week students watch television. Her results are in the dot plot below.



1. Where are there groupings of data?

From 3–5 hours and from 11–16 hours

2. Is the data symmetric or is it spread out to one side?

The data is spread out more to the right than to the left.

3. Give the least and greatest values in the data.

Least: 3; Greatest: 20

4. **Writing to Explain** Using the dot plot for the hours students spend watching TV, where do you think the center of the data is? Explain how you found your answer.

Sample answer: The center is about 7 hours. More data is on the left so the center is closer to that side.

For 5 and 6, use the line plot.

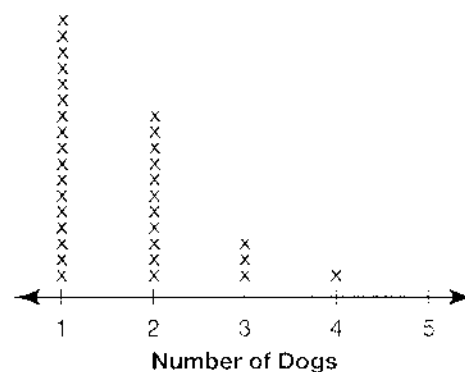
Number of Dogs Students Own

5. Which is the best representation of the center of this data set?

- ☒ **A** 2 dogs **B** 3 dogs
☐ **C** 4 dogs **D** 5 dogs

6. Which best describes this data set?

- ☐ **A** Spread out to the left ☐ **B** No noticeable shape
☒ **C** Spread out to the right ☐ **D** Symmetric



Name _____

Enrichment

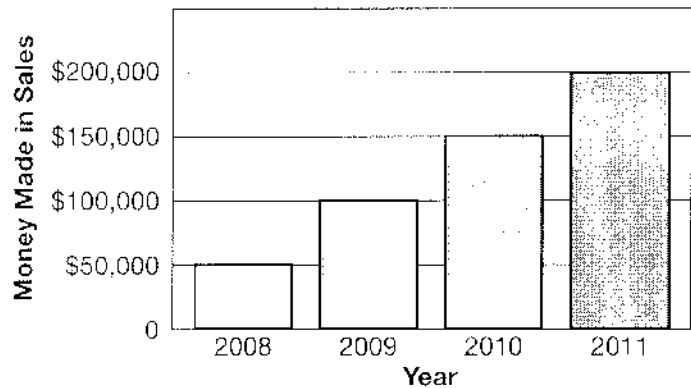
14-2

Ink, Inc.

Ink, Inc. sells cards, stationery, and specialty pens. Sales for the last four years are shown in the bar graph.

Reasoning

Sales for Last 4 Years



1. What pattern or trend do you see in the bar graph?

Answers may

vary. Sales

increased

steadily each year.

2. If the pattern continues, predict what the total sales might be in 2012.

\$250,000

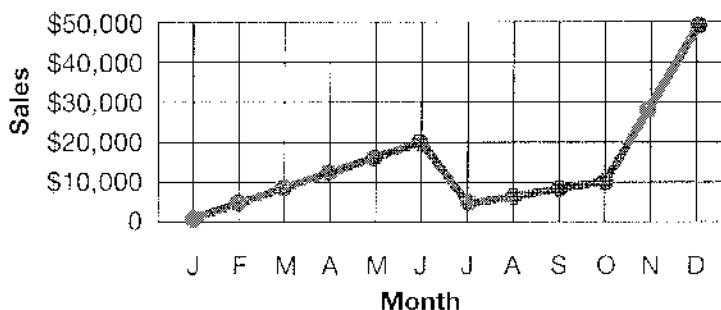
3. If the intervals on the bar graph were changed to \$200,000 each, how would that change the appearance of the bar graph?

The increase would not seem so dramatic.

A new business manager has been hired who believes that an analysis of monthly sales will help the company. Here is some data she has collected.

- January–June 2011 steady increase to \$20,000
- Dip in July to \$5,000
- Then steadily rising to \$10,000 in October
- Rise through December to \$50,000

4. Complete the line graph that represents the information.



Name _____

Reteaching

14-3

Mean

The mean is the sum of all the values in a set divided by the number of items in the set. The mean is also called the average.

How to find the mean of a set of data:

Eduardo surveyed 7 of his friends to find out how many books they read during the month. The frequency table shows the data. What is the average number of books read by Eduardo's friends?

Book Reading	
Friend	Number of books read
Jean	2
Raul	3
Sally	8
Jonathan	5
Haley	6
Kristen	3
Owen	1

1. Add the number of books read by each friend.

$$2 + 3 + 8 + 5 + 6 + 3 + 1 = 28$$

2. Divide the sum by the number of friends.

$$\frac{28}{7} = 4$$

3. Use the average to answer the question.

Eduardo's friends read an average of 4 books during the month.

1. Find the mean of this set of data: 241, 563, 829, 755. 597

2. This frequency table shows the number of silver medals won by American athletes in Summer Olympic Games between 1972 and 2000. What is the mean of this set of data?

31

3. **Estimation** What is the approximate average of these three numbers: 9, 18, and 31? about 20

4. **Explain It** Explain how you would find the mean of this set of data: 4, 3, 5.

Sample answer: Add the numbers in the set. Then divide by three.

US Silver Medals Summer Olympic Games	
Year	Medals
2000	24
1996	32
1992	34
1988	31
1984	61
1980	0
1976	35
1972	31

Name _____

Mean

Find the mean of each set of data.

- | | |
|-----------------------------|------------|
| 1. 2, 5, 9, 4 | <u>5</u> |
| 2. 44, 73, 63 | <u>60</u> |
| 3. 11, 38, 65, 4, 67 | <u>37</u> |
| 4. 3, 6, 3, 7, 8 | <u>5.4</u> |
| 5. 120, 450, 630 | <u>400</u> |
| 6. 4.2, 5.3, 7.1, 4.0, 11.9 | <u>6.5</u> |

Gene's scores were as follows: 8, 4, 10, 10, 9, 6, 9.

7. What was his average score? 8
8. If Gene gets two more scores of 10, what is his new average? 8.44
9. **Reasoning** Krishan wants his quiz average to be at least 90 so that he can get an A in the class. His current quiz scores are: 80, 100, 85. What does he have to get on his next quiz to have an average of 90?
- A 85 B 90 C 92 **D 95**
10. **Explain It** Suppose Krishan's teacher says that he can drop one of his test scores. Using his test scores of 80, 100, and 85, which one should he drop, and why? What is his new average?

Drop the lowest score: 80. His new average would be 92.5.

Name _____

Enrichment

14-3

Mean Scores

1. Solomon has been keeping track of his scores on daily spelling tests for one week. Use his data to find Solomon's mean score. **Number Sense**

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Spelling Score	94	88	96	92	100

94

2. Terri went to 6 movies during August. They had play lengths of 120 min, 108 min, 99 min, 105 min, 116 min, and 130 min. What was the mean play length for the movies?

113 min

3. Janet recorded the height of some skyscrapers in Dallas. Use her data to find the mean height.

Building	Height (ft)
Comerica Bank Tower	787
JP Morgan Chase Tower	738
Fountain Place	720
Trammell Crow Center	686

732.75 ft

4. Tim recorded the lengths of some of the longest vehicular tunnels in North America. Use his data to find the mean length.

Tunnel	Length (ft)
Brooklyn-Battery	9,117
Holland Tunnel	8,557
Ted Williams Tunnel	8,448
Lincoln Tunnel	8,216

8,584.5 ft

Median, Mode, and Range

The median, mode, and range are each numbers that describe a set of data.

Here is Eduardo's survey of how many books his friends read last month.

What are the median, mode, and range of Eduardo's survey?

Book Reading	
Friend	Number of books read
Jean	2
Raul	3
Sally	8
Jonathan	5
Haley	6
Kristen	3
Owen	1

Median: The median is the middle number in a set of data. To find it:

1. Arrange the data in order from least to greatest.
2. Locate the middle number.

1, 2, 3, 3, 5, 6, 8



middle number = 3

The median number of books read is 3.

Mode: The mode is the data value that occurs most often. To find it:

1. List the data. 1, 2, 3, 3, 5, 6, 8
2. Find the number that occurs most. 3

The mode of the books read by Eduardo's friends is 3 books.

Range: The range is the difference between the greatest and least values. To find it:

1. Identify the greatest and least values. 8 and 1
2. Subtract the least from the greatest value. $8 - 1 = 7$

The range of the books read by Eduardo's friends is 7 books.

1. Find the median of this data set: 12, 18, 25, 32, 67.

2. Find the mode of this data set: 123, 345, 654, 123, 452, 185.

3. Find the range of this data set: 24, 32, 38, 31, 61, 35, 31.

25

123

37

Name _____

Practice

14-4

Median, Mode, and Range

- Find the range of this data set: 225, 342, 288, 552, 263.
- Find the median of this data set: 476, 234, 355, 765, 470.
- Find the mode of this data set:
16, 7, 8, 5, 16, 7, 8, 4, 7, 8, 16, 7.
- Find the range of this data set:
64, 76, 46, 88, 88, 43, 99, 50, 55.
- Reasoning** Would the mode change if a 76 were added to the data in Exercise 4?

327

470

7

56

Yes. The mode is now 88. With another 76, the modes would be 76 and 88.

The table below gives the math test scores for Mrs. Jung's fifth-grade class.

76	54	92	88	76	88
75	93	92	68	88	76
76	88	80	70	88	72

Test Scores

- Find the mean of the data.
 - Find the mode of the data.
 - Find the median of the data.
 - What is the range of the data set?
10. Find the range of this data set: 247, 366, 785, 998.

80

88

78

39

A 998

B 781

C 751

D 538

11. **Explain It** Will a set of data always have a mode?
Explain your answer.

No: if every item is different, there is no mode.

Name _____

Enrichment

14-4

School Surveys

1. Angela surveyed the students in her school. Use her results below to find the median, mode, and range for Angela's data.

Number Sense

Recreational Reading	Number of Students
Comic book	10
Biography	6
Novel	13
How-to book	7
Mystery	9
Joke book	7

median 8, mode 7, range 7

2. Daniel surveyed the students in his school. Use his results below to find the median, mode, and range for Daniel's data.

Favorite Music	Number of Students
Rock	17
Country	5
Rap	11
Classical	9
Jazz	12
New Age	5

median 10, mode 5, range 12

3. If Daniel added Hip-Hop to his survey with 13 students selecting that category, how would his data change?

The median would be 11, the mode would remain 5, and the range would remain 12.

Name _____

Reteaching

14-5

Frequency Tables and Histograms

Maya recorded the number of bags of popcorn she sold each day at the carnival, and then represented the data in a frequency table and histogram.

Bags of popcorn: 62, 65, 58, 31, 64, 58, 66, 68, 56, 67, 68, 51

Make a Frequency Table

Choose a Range: The range should cover all of the data. Divide the range into equal intervals or groups.

Range in popcorn data: $68 - 31 = 37$
You can make intervals of 10 by using a range of 30 to 69.

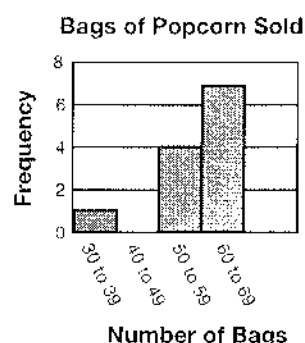
Tally Marks: Record a tally mark for each value in the range.

Frequency: Count the tally marks and record.

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

Make a Histogram

Choose a Title: Bags of Popcorn Sold
Choose a Scale for the Vertical Axis: Use frequency of the data for the scale.
List Intervals on Horizontal Axis



Use a Histogram

Look for clusters, gaps, and outliers.

Clusters: 50–69 for popcorn data

Gaps: 40–49; no bags sold in this interval

Outliers: 1 bag sold in 30–39 range

Use the information below for 1 through 3.

Tickets Sold to Charity Ice-Skating Event							
72	81	88	51	90	89	85	74
87	100	80	99	87	96	99	84
84	86	94	88	91	85	78	90

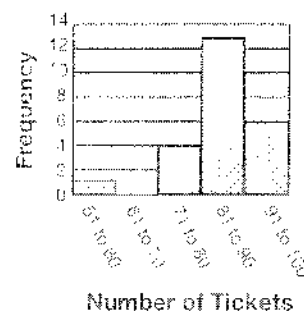
1. Represent the data in the table in a histogram.
2. Where do most of the data in your histogram cluster?

Sample answer: 81 to 90 tickets

3. **Reasoning** Describe any outliers or gaps in the data.

Sample answer: Only 1 ticket was sold in the 51 to 60 ticket interval, which is an outlier, and no tickets were sold in the 61 to 70 ticket interval, which is a gap in the data.

Tickets Sold to Charity Ice-Skating Event



Name _____

Practice

14-5

Frequency Tables and Histograms

Conrad recorded the total number of hours 14 friends spent on the Internet in a week. He made a frequency table of the data. Use the table for 1 through 2.

Hours on the Internet	
Hours	Frequency
0–4	2
5–9	3
10–14	7
15–19	0
20–24	0
25–29	2

1. What is the mode of the data? Explain.

10–14 hours; sample answer: The mode is the interval with the most data values.

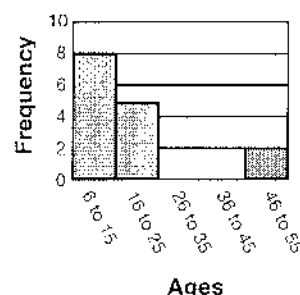
2. How many friends spent 9 hours or less on the Internet that week? Explain.

5 friends; sample answer: There are 2 friends in the 0–4 interval and 3 friends in the 5–9 interval, for a total of 5 friends.

Use the information below for 3 through 5.

Ages of Players at Castle Miniature Golf				
14	7	6	24	15
9	19	25	10	17
51	8	21	48	12

Ages of Players at Castle Miniature Golf



3. How many of the players are over 25? Explain.

2; sample answer: There are no players in the 26 to 45 age range and only 2 in the 46 to 55 age range.

4. Where do most of the data in the histogram cluster?

- ☒ A 6–15 C 26–55
☐ B 16–25 D Over 15

5. **Writing to Explain** Explain how you can tell whether a histogram has an outlier.

Sample answer: Look for a gap in the histogram; if the gap precedes or follows an interval, the interval is an outlier since an outlier is a value that is much greater or less than other values in the data set.

Name _____

Enrichment

14-5

Which Is Number One?

Which restaurant has the best smoothie in town? It depends on the criteria used. Susan surveyed four restaurants that served fruit smoothies for an article in the school newspaper.

Number Sense

Restaurant	Thickness	Taste	Healthy Ingredients	Cost per Size
Sam's Smoothies	4	3.5	5	1.5
Health Hut	4	4	4	3.5
Drink and Dine	4	4	1	4
Sav o' Straw	3	3	3	5

To rate each restaurant, Susan calculated the mean and the median according to four categories. The ratings went from 1 (poor) to 5 (excellent) in each category.

Answers may vary.

- Which restaurant would be rated the highest if Susan compared the mean scores?

Health Hut

- Which restaurant would be happier if Susan used the median to compare the scores? Explain.

Drink and Dine has a median of 4, which would put it in a tie for first place.

- Which restaurant's rating would go down if Susan used the median to rank?

Sav o' Straw would drop to a 3 from 3.5.

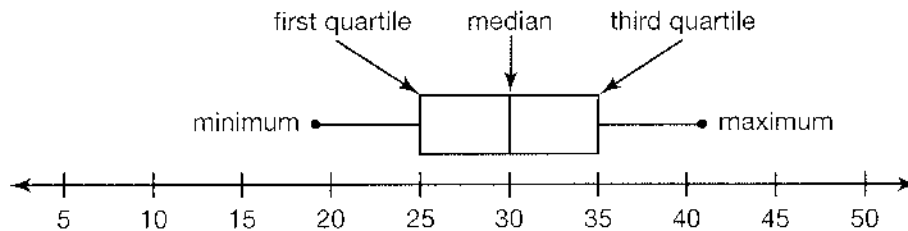
- Choose one criterion from the survey that you feel is most important and weigh it double in value. Divide by 5 to find a new mean. What happens to the ranking of the restaurant?

Choosing "healthy" drops Drink and Dine to last.

Box Plots

To create a box plot for a data set, follow these steps:

- Step 1:** Check to see if the numbers are in order from least to greatest. If they are not, place them in that order. Draw a number line using an appropriate scale to include the numbers.
- Step 2:** Find the least value and greatest value. The least is the *minimum*. The greatest is the *maximum*.
- Step 3:** Find the number that is midway between the minimum and maximum. This value is the *median*.
- Step 4:** Find the value that is halfway between the minimum and the median. This is the *first quartile*.
- Step 5:** Find the value that is halfway between the median and the maximum. This is the *third quartile*.



For 1 through 5, use the five-step process for the following data:

8, 9, 3, 1, 2, 6, 5, 7, 4, 0, 10

1. Are the data in this set in order? If not, write them in order.

No; 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

2. What is the median? How can you tell?

5; It is halfway between the beginning and end.

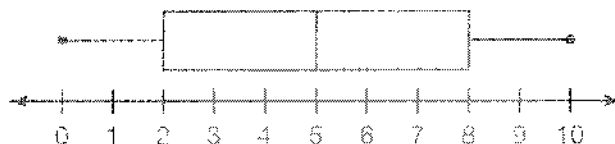
3. What is the minimum?
The maximum?

0; 10

4. What is the first quartile?
The third quartile?

2; 8

5. Draw a box plot for this data.



Box Plots

In 1 and 2 find the median, the first quartile, and third quartile.

1. In a bowling tournament, Sylvan got the following scores.

167, 178, 193, 196, 199, 199, 203, 209, 217, 220, 221

- a. The median: 199
b. The first quartile: 193
c. The third quartile: 217

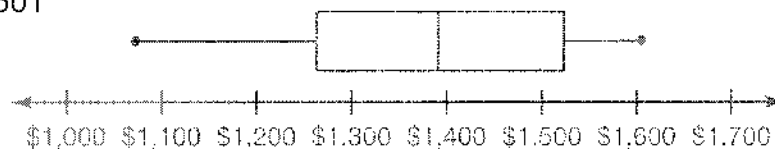
2. Sarina raised flowers. In a competition with other flower growers, she earned the following scores.

7, 10, 10, 6, 7, 8, 8, 7, 9

- a. The median: 8
b. The first quartile: 7
c. The third quartile: 9.5

3. Make a box plot to display the distribution of sales Solon's restaurant made over 9 days:

\$1,074, \$1,209, \$1,315, \$1,360, \$1,391, \$1,442, \$1,482, \$1,569, \$1,601



4. Which describes how to find the first quartile in a data set?

- A Find the median of the data set.
B Find the median of the upper half of the data.
☒ C Find the median of the lower half of the data.
D Count 3 spaces to the right from the minimum.

5. **Writing to Explain** David wants to make a box plot showing his team's points for the year. The median score was 7, first quartile was 4, and third quartile was 10. The minimum was 2 and the maximum was 20. Explain how David can draw the box plot.

Draw a number line from 0 to 20. Use a vertical segment above 7. Draw a box that contains points from 4 to 10. Extend segments from the box at 4 to 2 and from 10 to 20.

Name _____

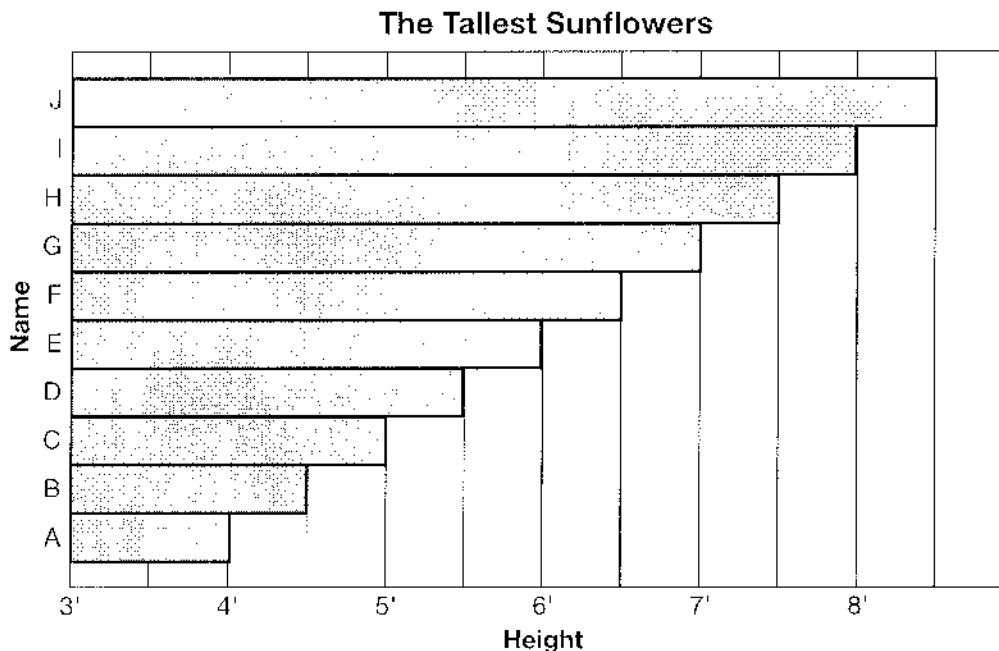
Enrichment

14-6

And the Winner Is . . .

Anita grew giant sunflowers from ten different kinds of seed. She named each patch for one of her favorite cousins. At the end of the summer, she graphed the height of the tallest flower from each patch. Answer the questions using the clues below.

Reasoning



Ed is taller than Ned. Ned is taller than Red. Red is taller than Ted. Al is taller than Red, but shorter than Ned. Ike's bar is between Sal's and Todd's. Todd is shorter than Ed, but taller than Ike. Van's bar is between Ed's and Ian's. Ian's bar is next to Todd's. There are seven bars between Van and Ted.

1. Which is the tallest?

Ed

2. Which is 4 ft tall?

Ted

3. What is the mean of the heights of the flowers?

6 ft 3 in.

4. What is the median of the heights of the flowers? What is the name of the flower at the median height?

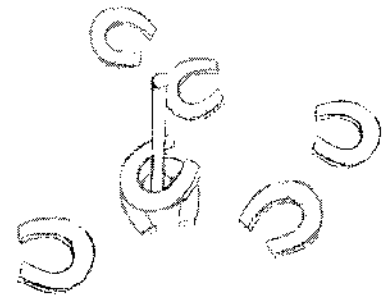
6 ft 3 in.; No one had that height

5. Which flowers represent bars B, C, H?

Red, Al, Ian

Measures of Variability

Variability describes how clustered or spread out data is. You might think of variability in terms of a game of horseshoes. The goal of the game is to get as many horseshoes as you can to “ring,” or hook around, a post. Once a player has taken a turn, the horseshoes—or data—look something like this picture.



One way of measuring variability of data is by finding the *mean absolute deviation*.

Step 1. Find the mean of the data. To do this, you add the data values and divide by the number of values in the set. Suppose you have 20, 40, 60, 80, 100 as the data. The sum of these numbers $20 + 40 + 60 + 80 + 100 = 300$. Since there are 5 items in the set, $300 \div 5 = 60$.

Step 2. Find the absolute deviation for each value in the data set. To do this, find each absolute value of the difference between the mean and each number in the set. So, for the numbers in the set, you get:

$$|60 - 20| = 40$$

$$|60 - 40| = 20$$

$$|60 - 60| = 0$$

$$|80 - 60| = 20$$

$$|100 - 60| = 40$$

Step 3. Find the mean of the absolute deviations. You find the mean of the absolute deviations by adding $40 + 20 + 0 + 20 + 40 = 120$. Then divide by the number of values, 5, which gives you 24. So the mean absolute deviation for 20, 40, 60, 80, 100 is 24.

Use the 3-step process to find the mean absolute deviation for each set of data. Give the mean of the original set, the sum of the absolute deviations, and the mean absolute deviation.

1. 10, 15, 20, 30, 50

Mean of original data: 25; sum of the absolute deviations: 60; mean absolute deviation: 12

2. 500; 1,000; 1,500; 2,000

Mean of original data: 1,250; sum of the absolute deviations: 2,000; mean absolute deviation: 500

Name _____

Practice

14-7

Measures of Variability

For 1 through 6, use the following data set: 12, 20, 16, 10, 17, 9, 23, 13

1. What is the mean of this set?

15

2. What is the absolute deviation from the mean for the following values:

a. 12 3

b. 16 1

c. 20 5

3. Which value in the original set has the greatest absolute deviation from the mean? Which has the least absolute deviation?

23; 16

4. What is the mean absolute deviation for the set?

4

5. What is first quartile for the set? The third quartile?

11; 18.5

6. What is the IQR for the set?

7.5

For 7 and 8, use the following data set: 3, 7, 11, 15, 20, 31, 39, 42

7. **Writing to Explain** The data set shows the approximate hourly tides in feet recorded at a beach during an 8-hour period. What is the mean absolute deviation for the data set? Explain how you found it.

12.25 feet; Find the mean of the data. Then find the absolute deviation from the mean for each value. Then add up the values and divide the sum by the number of numbers in the set.

8. Which is the IQR for the set?

A 26

B 28

C 35

D 36

Name _____

Enrichment

14-7

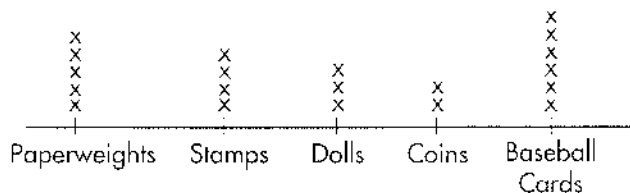
Class Surveys

The students in Ms. Young's fifth-grade class completed several surveys and then organized the results in different graphs.

Decision Making

Use the line plot below to answer questions 1 and 2.

Students in Ms. Young's Class



Survey Results

1. How many students responded to this survey?

20

2. What question do you think was asked for this survey?

Sample answer: What do you collect?

Use the frequency tables below for questions 3 and 4.

Favorite Dessert	
Apple pie	2
Brownies	4
Chocolate cake	6
Ice cream	7
Fruit	1

Second-Favorite Dessert	
Apple pie	6
Brownies	2
Chocolate cake	6
Ice cream	4
Fruit	2

3. The school needs to choose two types of desserts to serve at a class picnic. Which two desserts would you suggest?

Possible answer: Chocolate cake and ice cream, because they were chosen the most as the favorite and second-favorite dessert.

4. If the school needed to choose only one type of dessert to be served at the class picnic, which dessert would you suggest?

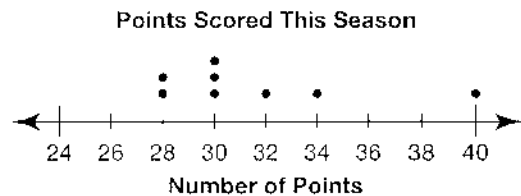
Chocolate cake: 12 students chose it as favorite or second-favorite.

Appropriate Use of Statistical Measures

Paige tracked the number of points scored so far this season by each member of her basketball team: 28, 30, 28, 30, 40, 30, 34, 32. Which measure of center and measure of variability best describe the typical number of points scored?

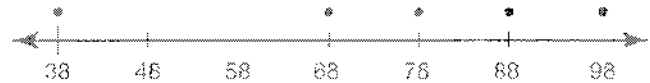
Make a dot plot to organize the data and identify any outliers.

The median and mode are 30. The mean is 31.5. There is a gap between 34 and 40, and 40 is an outlier.



Since the outlier, 40, affects the mean, the median is the best measure of center for the data. For measures of variability, use the mean absolute deviation when the mean is the appropriate measure of center. Use the interquartile range when the median is more appropriate. Since the median is the best measure of center, you would use the IQR to measure variability of this data.

1. Make a dot plot using this set of data:
38, 68, 78, 88, 98



2. Which measure of center and measure of variability best describes this data set? Why?

The median; There is a low outlier that affects the mean and there is no mode. Since the median is the best measure of center, the IQR is better for variability.

3. Make a dot plot using this set of data:
35, 38, 40, 35, 37, 38, 36, 40, 43



4. Find the mean, median, and mode of the data set.

Mean: 38; median: 38; mode: 35, 38, 40

5. Which measure of center best describes this data set? Why?

The mean or median would be best because they are both right in the middle of the cluster.

Appropriate Use of Statistical Measures

1. Find the mean, median, and mode of this data set:

76, 74, 78, 72, 73, 80, 49, 72, 83

Mean: 73; median: 74; mode: 72

2. Which measure of center best describes the data set? Why?

The median is the best because it is closest to the middle of the cluster. The outlier makes the mean low and the mode is at the low end, too.

3. Find the IQR and mean absolute deviation of the data set below.

Round the mean absolute deviation to the nearest hundredth.

13, 19, 17, 15, 11, 19, 18

IQR: 6; mean absolute deviation: 2.57

4. Which measure of variability best describes the data set in Exercise 3? Why?

The mean absolute deviation; It is less varied than the IQR and since the data is more symmetric, it is a better choice.

5. Find the mean, median, and mode of this data set:

150, 138, 130, 127, 140, 108, 138

Mean: 133; median: 138; mode: 138

6. **Critical Thinking** What number could be added to the data set in

Exercise 5 so that the mean, median, and mode are all the same? **Add 173.**

Then the mean, median, and mode would all be 138.

7. **Writing to Explain** Ava found the mean, median, and mode of a data set. Then she discovered that she had not included a very high outlier in her calculations. How will the mean, median, and mode be affected by the inclusion of this outlier? Explain.

Including a very high outlier would increase the mean a lot. The median would also increase, but not as much. The mode of the data set should not change at all unless there is another outlier that is the same as the one she missed.

Name _____

Enrichment

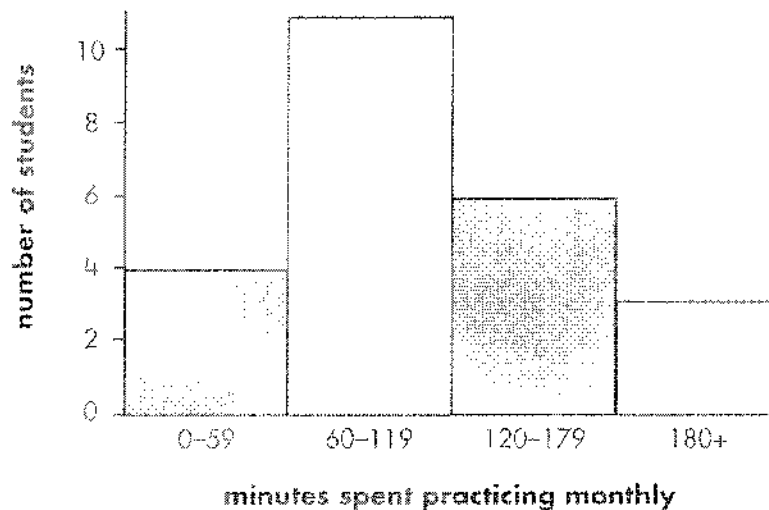
14-8

Histograms

Amount in minutes	Frequency
0–59	4
60–119	11
120–179	6
180 or more	3

Data

- The table shows the number of minutes 24 members of the River Dell Marching Band spent practicing their instruments each month. Make a histogram to show the frequency of data.



- According to the histogram, what fraction of the students surveyed practice their instruments 120–179 minutes each month?

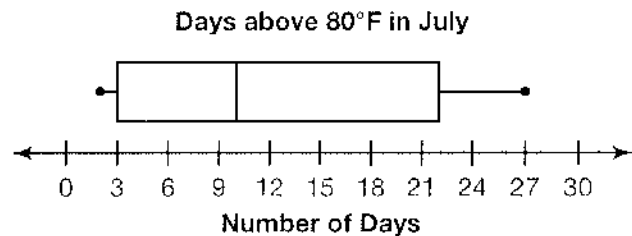
$\frac{1}{4}$

- How can you tell that $\frac{1}{6}$ of the students spend 0–59 minutes each month practicing their instruments?

4 students were in this group. 4 is $\frac{1}{6}$ of the total number of students in the survey, which is 24.

Summarizing Data Distributions

The box plot to the right displays data for the number of days the temperature was over 80°F for the month of July. Data in displays can be summarized.

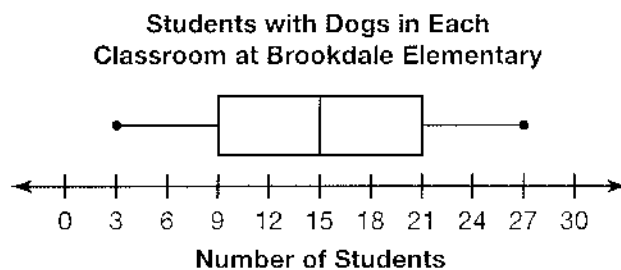


You can summarize this data set by choosing some ways to describe it.

The data are spread out to the right.

The median is 10, and it describes the center of the data. The first quartile is 9 and the third quartile is 22. The interquartile range, or IQR, describes the variability and it can be found by subtracting the first quartile (9) from the third quartile (22) to get 13.

Use the box plot to answer Questions 1 through 4.



- What is the greatest number of students in a classroom who have a dog? The least? 27; 3
- What is the median? 15 students
 - What are the first and third quartiles? 9 students; 21 students
 - What is the interquartile range? 12 students
- Describe the shape of the data distribution.
The data is symmetric.

- Writing to Explain** If a dot plot was used to display the same data, make a prediction about how the data would look.

Sample answer: Since the data are symmetric in the box plot above, the number of dots on the left side of a dot plot should be the same as on the right side.

Summarizing Data Distributions

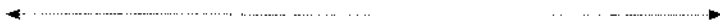
For 1 through 5 use the data set below.

Mr. Hansen's physical education class did a long jump competition.

Each person jumped 3 times and wrote their best long jump (in inches).

84, 80, 80, 76, 79, 82, 89, 72, 76, 78,
80, 85, 110, 79, 77, 79, 81, 79, 80, 81, 72, 83

1. Make a box plot for the data. **Check students' box plots**



2. a What is the mean? The median? 81 in.; 80 in.
 b What are the first and third quartiles? 78 in.; 82 in.
 c What is the interquartile range? 4 in.

3. Describe the shape of the data distribution.

Sample answer: The data is spread out to the right.

4. **Writing to Explain** Which would be the preferable measure of center, the median or the mean? Explain.

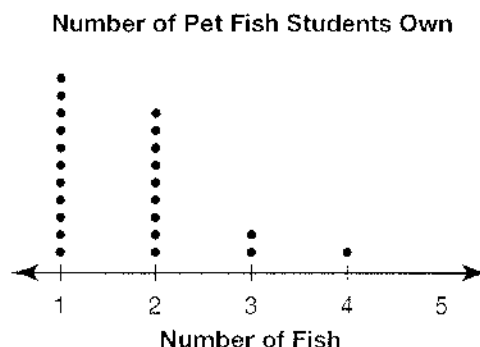
Median or mean; Sample answer: Both would be fine since the median and mean are so close together.

5. Would the median or the mean be more affected if a long jump of 140 inches was added to the data? Explain how you know.

Mean; Sample answer: The mean would be about 83.6 and the median would be the same, 80.

6. Which is the best representation of the center of this data set?

- ☒ A 2 fish C 4 fish
☐ B 3 fish D 5 fish



Name _____

Enrichment

14-9

Is It Reasonable?

Reasonableness

**Answers
may vary.**

1. Ron has an aquarium that is 18 in. by 10 in. by 20 in. He has a bucket with a radius of 5 in. and a height of 12 in. Is it reasonable for Ron to carry a bucket full of water 6 times in order to fill up the aquarium?

No, it would take fewer than 4 times.

2. Martha is making a dessert. After she cooks it in a pot that is 8 in. in height with a radius of 4 in., she will transfer it to a rectangular dish. If the dimensions of the rectangular dish are 3 in. high by 14 in. long, and 8 in. wide, is it reasonable for Martha to be able to transfer the dessert from the pot to the rectangular dish?

No, not if the pot was full.

3. Charlotte keeps her beads in a cylindrical jar that is 12 in. tall and 6 in. in diameter. She would like to use her jar for another purpose. Sheila offered her a box that is 280 in.³. Can Charlotte put all of her beads in the box?

No, not if the jar is full.

4. Asha needs to collect sand. She has a box that is 5 cm by 5 cm by 5 cm. Does she need to fill the box more than three times to collect 375 cm³ of sand?

No

5. José is repotting his fern. It is in a cylindrical pot that is 8 in. tall and 6 in. in diameter. He wants to put it in a container that is twice the volume of the cylindrical pot. Is a cube-shaped container that measures 6 in. by 6 in. by 6 in. the right size?

No

6. Jessi is making frozen yogurt shakes. She adds 1 full cylindrical container of frozen yogurt that is 15 cm tall and 10 cm in diameter, and she adds 2 full cylindrical containers of pineapple juice that are each 12 cm tall with a diameter of 6 cm. Will all of the ingredients fit into a cylindrical blender that is 30 cm tall with a base that is 14 cm in diameter?

Yes

Name _____

Reteaching

14-10

Problem Solving: Try, Check, and Revise

Audrey bowled 3 games. Her mean score was 148. Each score was different. Name three possible scores. Remember that the highest possible score in bowling is 300.

Use the problem solving plan.

Read and Understand:

What do you know?

Audrey bowled 3 games.

Her mean score was 148.

What are you trying to find?

Three scores that have a mean of 148.

Plan and Solve:

What strategy will you use?

Try, check, and revise.

Try 156, 140, 160. The mean is

$$(156 + 140 + 160) \div 3 = 456 \div 3 = 152.$$

The mean is too high by 4 points:

$$152 - 148 = 4.$$

Try subtracting 4 points from each score.

$$156 - 4 = 152, 140 - 4 = 136,$$

$$160 - 4 = 156.$$

Check:

Check to see if the mean is 148.

$$(152 + 136 + 156) \div 3 = 444 \div 3 = 148$$

1. The median time 5 people waited to ride on the "Whirl and Twirl" was 38 minutes. List 5 possible times they may have waited.

Sample answer: 52 min, 46 min, 38 min, 36 min, 18 min

2. Ben checked the price of the camera he wants at 4 stores. Each price was different. The mean price was \$238. What are 4 possible prices for the camera?

Sample answer: \$188, \$234, \$248, \$282

3. Five hamsters weigh between 12 and 20 ounces. The mode weight of the 5 hamsters is 18 ounces. List the possible weights of the hamsters.

Sample answer: 12 oz, 15 oz, 18 oz, 18 oz, 20 oz

4. The mean, median, and mode of a set of 4 numbers is 100. Name 4 numbers that could make up the set.

Sample answer: 90, 100, 100, 110

5. The mean and median of a set of 6 numbers is 140. Name 6 numbers that could make up the set.

Sample answer: 90, 110, 138, 142, 170, 190

Problem Solving: Try, Check, and Revise

1. The mean number of passengers on a daily flight from Los Angeles to San Francisco is 82. The plane holds a maximum of 102 passengers. List the possible number of passengers on the flight over the past 5 days.

Sample answer: 56, 77, 85, 92, 100

2. Four adult pandas weigh between 200 and 275 pounds. Their median weight is 240 pounds. List four possible weights for the pandas.

Sample answer: 200 lb, 230 lb, 250 lb, 275 lb

3. Over the past 7 years the median rainfall in West Berry has been 74 inches. The greatest rainfall was 102 inches. The least was 52 inches. List possible rainfall amounts for the 7 years.

Sample answer: 52 in., 60 in., 62 in., 74 in., 78 in., 91 in., 102 in.

4. The mean number of miles Mr. Austin drove in six days was 96. The mode was 82. The median was 97. What are possible distances Mr. Austin drove in the 6 days?

Sample answer: 82 mi, 82 mi, 96 mi, 98 mi, 100 mi, 118 mi

5. **Writing to Explain** The mode of the heights of 5 sunflowers is 70 inches. The median is 68 inches. What are some possible heights of the 5 sunflowers? Tell how you decide.

Sample answer: Since the mode is 70, I will make 2 of the heights 70. The median is 68, so the middle height is 68. Then the other two heights are less than 68, so I will make them 62 and 65. Possible heights are: 62 in., 65 in., 68 in., 70 in., 70 in.

6. **Number Sense** Three consecutive odd integers have a sum of 195. What are the integers?

63, 65, 67

7. **Geometry** The area of a rectangle is 180 square inches. The length and width share no common factors other than one. What are the dimensions of the rectangle?

A 30 in. by 6 in. **C** 14 in. by 16 in.

(B) 20 in. by 9 in. **D** 12 in. by 15 in.

Name _____

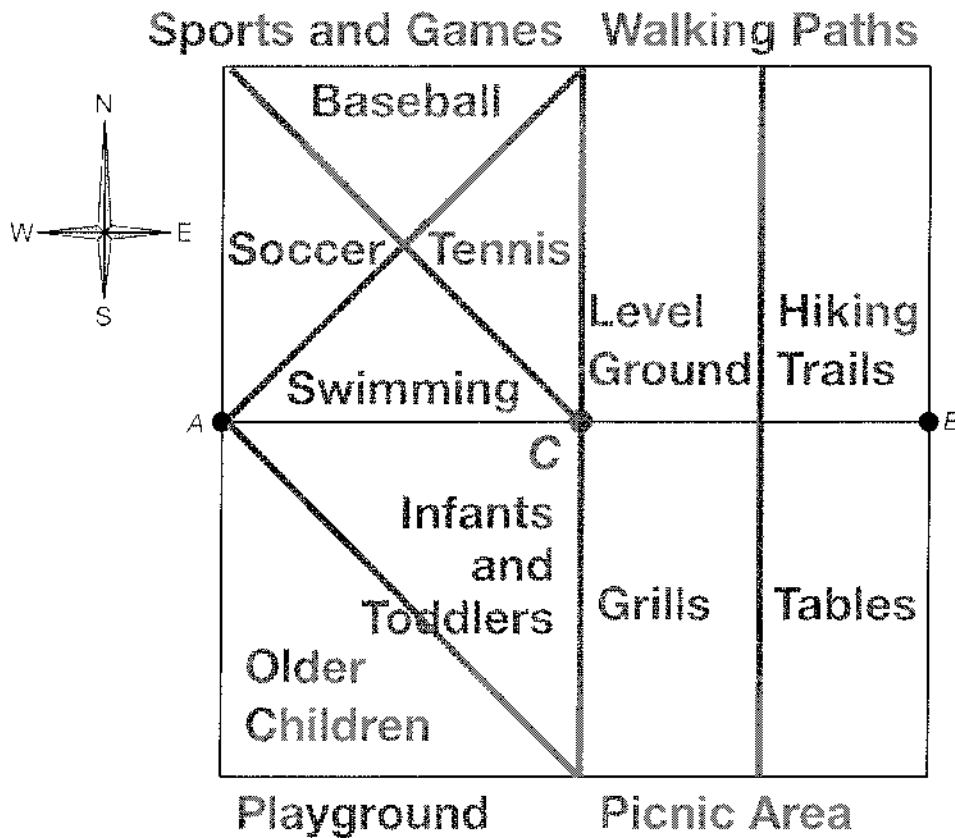
Enrichment

14-10

Park Planning

The township park department is planning to build a new park for the residents. Follow the directions to begin the planning process.

Visual Thinking



1. This line segment will divide the park into four different sections. Construct a perpendicular bisector of line segment AB . Label the middle point of the park C . Then label the northwest section sports and games, the northeast section walking paths, the southwest section playground, and the southeast section picnic area.
2. The playground area will be divided into two play sections, one for older children and one for infants and toddlers. Construct an angle bisector of this area to provide two equal areas for the playgrounds.
3. Construct 2 angle bisectors of the northwest section to create areas for a baseball field, a soccer field, tennis courts, and a swimming pool. Then label the areas you have created.
4. The walking paths area will be divided into hiking trails and level ground. The picnic area will be divided into space for grilling and picnic tables. Construct a perpendicular bisector of line segment BC to create these areas. Then label the areas you have created.