# 5.6 Analyzing Data Sets

Essential Question How can you use tables and graphs to help organize data?

1 ACTIVITY: Conducting an Experiment

Work with a partner.

a. Roll a number cube 20 times. Record your results in a tally chart.

b. Make a bar graph of the totals.

c. Go to the board and enter your totals in the class tally chart.

d. Make a second bar graph showing the class totals. Compare and contrast the two bar graphs.

Tally Chart	
1	
2	
3	
4	
5	
6	
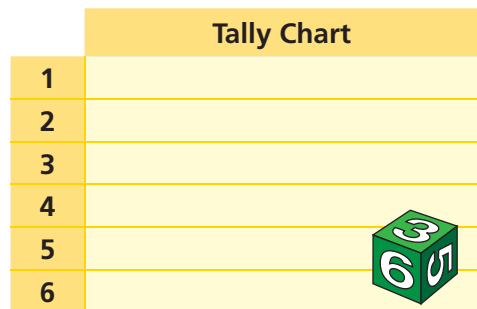
Key: | = 1   ЖНТ = 5

2 ACTIVITY: Organizing Data

Work with a partner. You are judging a paper airplane contest. Each contestant flies his or her paper airplane 20 times. Make a tally chart and a graph of the distances.
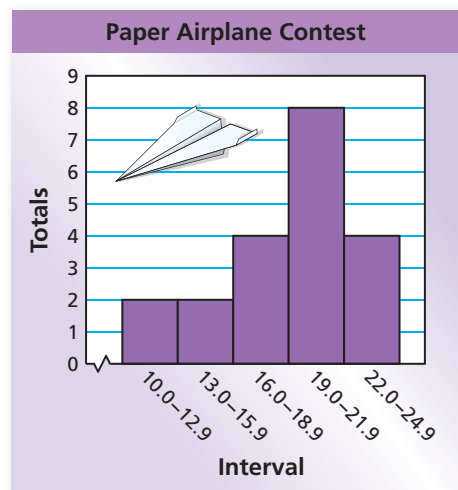
Sample:

20.5 ft, 24.5 ft, 18.5 ft, 19.5 ft, 21.0 ft, 14.0 ft, 12.5 ft, 20.5 ft, 17.5 ft, 24.5 ft,

19.5 ft, 17.0 ft, 18.5 ft, 12.0 ft, 21.5 ft, 23.0 ft, 13.5 ft, 19.0 ft, 22.5 ft, 19.0 ft

Tally Chart		
Interval	**Tally**	**Total**
10.0−12.9	II	2
13.0−15.9	II	2
16.0−18.9	IIII	4
19.0−21.9	ЖНТ III	8
22.0−24.9	IIII	4

Paper Airplane Contest

a. Make a different tally chart and graph of the distances using the following intervals.

10.0–11.9, 12.0–13.9, 14.0–15.9, 16.0–17.9, 18.0–19.9, 20.0–21.9, 22.0–23.9, 24.0–25.9

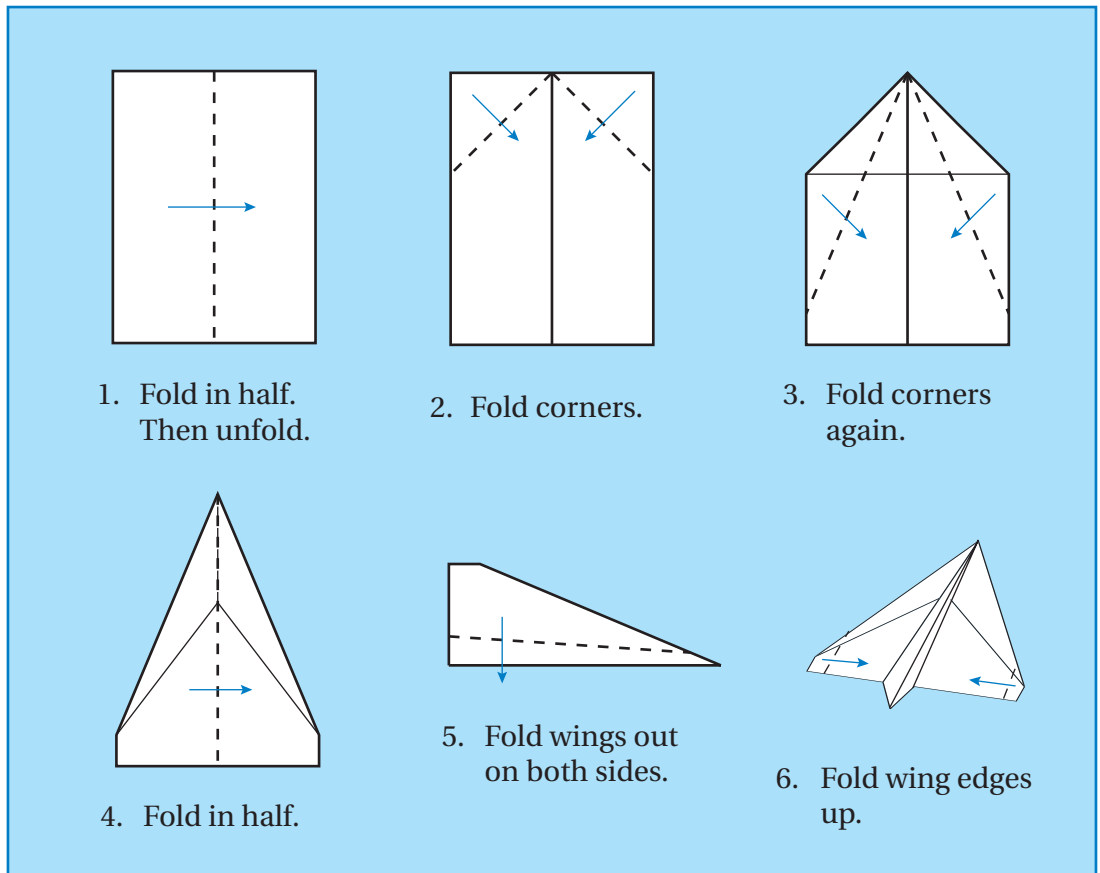b. Which graph do you think represents the distances better? Explain.

ACTIVITY: Developing an Experiment

Work with a partner.

a. Design and make a paper airplane from a single sheet of $8\frac{1}{2}$-by-11-inch paper.

Sample:

1. Fold in half. Then unfold.
2. Fold corners.
3. Fold corners again.
4. Fold in half.
5. Fold wings out on both sides.
6. Fold wing edges up.

b. Fly the airplane 20 times. Keep track of the distance flown each time.

c. Organize your results in a tally chart and a graph. What is the mean distance flown by the airplane?

What Is Your Answer?

4. IN YOUR OWN WORDS How can you use tables and graphs to help organize data? Give examples of careers in which the organization of data is important.

Practice Use what you learned about organizing data to complete Exercises 4 and 5 on page 226.

5.6 Lesson

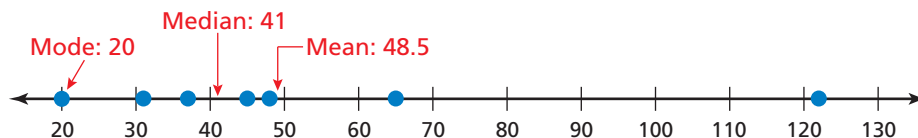### EXAMPLE 1 · Choosing the Best Measure of Central Tendency

Find the mean, median, and mode of the sneaker prices. Which measure best represents the data?

Mean: $\dfrac{20 + 31 + 122 + 48 + 37 + 20 + 45 + 65}{8} = \dfrac{388}{8}$, or 48.5

Median: 20, 20, 31, 37, 45, 48, 65, 122   Order from least to greatest.

$$\dfrac{37 + 45}{2} = \dfrac{82}{2}, \text{ or } 41$$

Mode: 20, 20, 31, 37, 45, 48, 65, 122   The value 20 occurs most often.

∴ The median best represents the data. The mode is less than most of the data and the mean is greater than most of the data.

On Your Own

Now You're Ready
Exercises 6–9

Find the mean, median, and mode of the data. Choose the measure that best represents the data. Explain your reasoning.

1. 1, 93, 46, 48, 34, 194, 67, 55   2. 96, 150, 102, 87, 150, 75

EXAMPLE 2 · Removing an Outlier

Identify the outlier in Example 1. Find the mean, median, and mode without the outlier. Which measure does the outlier affect the most?

The price of $122 is much greater than any other price. So, it is the outlier.

	Mean	Median	Mode
With Outlier (Example 1)	48.5	41	20
Without Outlier	38	37	20

∴ The mean is affected the most by the outlier.

3. The times (in minutes) it takes six students to travel to school are 8, 10, 10, 15, 20, and 45. Identify the outlier. Find the mean, median, and mode with and without the outlier. Which measure does the outlier affect the most?

EXAMPLE 3   **Standardized Test Practice**

Free Throws Made

The bar graph shows the free throws made by a basketball player in the last four seasons. How many free throws does he need to make in Season 5 to have a mean of 400 for the five seasons?

Ⓐ 388   Ⓑ 396

Ⓒ 428   Ⓓ 448

Find the mean of the four seasons.

Mean of four seasons: $\dfrac{277 + 356 + 390 + 529}{4} = \dfrac{1552}{4}$, or 388

A mean of 400 is an increase. So, he needs to make more than 400 free throws in Season 5. You can eliminate choices A and B.
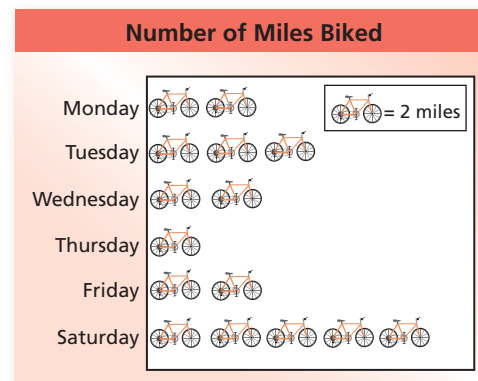
Try choice C.

Choice C: $\dfrac{277 + 356 + 390 + 529 + \textcolor{red}{428}}{5} = \dfrac{1980}{5}$, or 396 ✗

You have eliminated choices A, B, and C. The correct answer is Ⓓ.

On Your Own

4. The pictograph shows the number of miles you ride on your bike for 6 days. How many miles do you need to bike on Sunday so that your mean for the week is 5 miles per day?

Number of Miles Biked

✓ Vocabulary and Concept Check

1. **NUMBER SENSE** Which is most affected by an outlier: the mean, median, or mode? Explain.

2. **NUMBER SENSE** The median of a data set stays the same after an outlier is removed. How is this possible?

3. **OPEN-ENDED** Give an example of a data set that is best represented by the mode.

Practice and Problem Solving

Make a tally chart and a bar graph of the data.

4. 1, 1, 1, 4, 3, 1, 2, 2, 2, 4, 1, 2, 1

5. 7, 10, 9, 8, 9, 9, 7, 6, 9, 9, 8, 8, 9, 9, 10

Find the mean, median, and mode(s) of the data. Choose the measure that best represents the data. Explain your reasoning.

① **6.** 48, 12, 11, 45, 48, 48, 43, 32

7. 12, 13, 40, 95, 88, 7, 95

**8.** 2, 8, 10, 12, 56, 9, 5, 2, 4

9. 126, 62, 144, 81, 144, 103

Find the mean, median, and mode(s) of the data with and without the outlier. Describe the effect of the outlier on the measures of central tendency.

② **10.** 45, 52, 18, 63, 57

11. 65, 72, 180, 72, 85, 59, 64, 67

12. 6, 12, 5, 8, 15, 5, 4, 7, 16, 80

13. 85, 71, 210, 88, 91, 84, 85

14. WEATHER The weather forecast for a week is shown.

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
High	90° F	91° F	89° F	97° F	101° F	99° F	91° F
Low	74° F	78° F	77° F	77° F	83° F	78° F	72° F

a. Find the mean, median, and mode(s) of the high temperatures. Which measure best represents the data? Explain your reasoning.

b. Repeat part (a) for the low temperatures.

15. CEREAL Go to a grocery store and find the unit cost of ten different kinds of cereal. Choose one cereal whose unit cost will be an outlier.

a. Find the mean, median, and mode(s) of the data. Which measure best represents the data? Explain your reasoning.

b. Identify the outlier in the data set. Find the mean, median, and mode(s) of the data set without the outlier. Which measure did the outlier affect the most?

Volunteering at an Animal Shelter
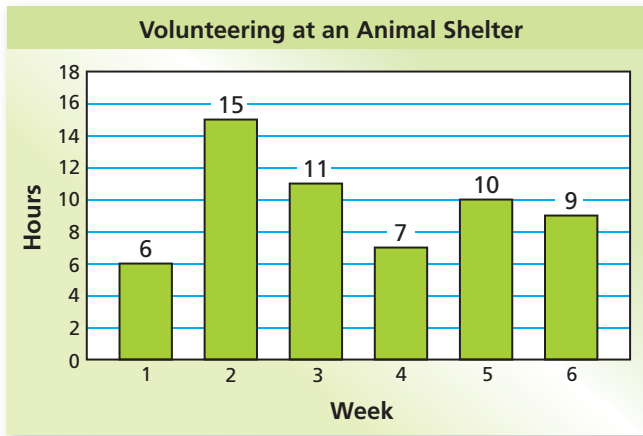
16. VOLUNTEERING The bar graph shows the numbers of hours you volunteered at an animal shelter. You wanted to work a mean of 10 hours for the 7 weeks. How many hours do you have to work in the 7th week to meet your goal? Explain how you found your answer.

17. CAMERAS The data are the prices of several digital cameras at a store.

$130 $170 $230 $130 $250 $275
$130 $185

ON SALE NOW!

NOW ONLY $130

   a. Does the price shown in the advertisement represent the prices well? Explain.
   b. Why might the store use this advertisement?
   c. In this situation, why might a person want to know the mean? the median? the mode? the range? Explain.

18. BASEBALL The data show the number of hits for each player on a baseball team in a recent season. The red numbers are hits for pitchers.

   0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 2, 2, 3, 3, 5, 9, 9, 15, 18,
   28, 33, 35, 45, 46, 54, 58, 105, 107, 113, 127, 138, 155, 188, 212

   a. Explain why the mode is not useful for describing how the team hit. What does the mode describe well?
   b. Is the mean or the median useful for describing how the team hit? Explain.
   c. The team played 162 games. What is the average number of hits in a game for the team for the season? Explain how you found your answer.

19. **Reasoning** You increase every number in a data set by 2. What happens to the mean, median, mode, and range? Explain using an example.

Fair Game Review *What you learned in previous grades & lessons*

Multiply. *(Section 3.2)*

20. 3.14×8 **21.** 2.6×2 **22.** 2.71×7 **23.** $4.6 \times 3 \times 4$

24. MULTIPLE CHOICE It rains 7 inches in 4 hours. At this rate how much will it rain in 15 hours? *(Section 5.3)*

   Ⓐ 8.57 in.   Ⓑ 26.25 in.   Ⓒ 28 in.   Ⓓ 105 in.