13-1 Practice

A calculator is allowed ☺

Measures of Central Tendency

Find the mean, median, and mode for each set of data. If necessary, round to the nearest tenth.

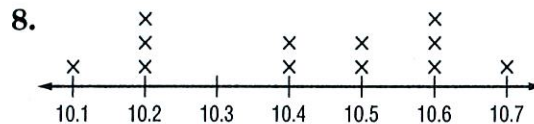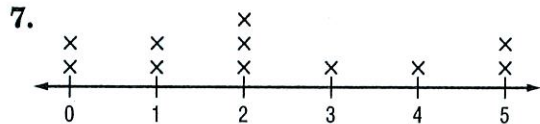1. 4, 6, 12, 5, 8

2. 16, 18, 15, 16, 21, 16

3. 55, 46, 50, 42, 39

4. 17, 16, 13, 17, 17, 10, 10, 13, 10

5. 25, 25, 25, 20

6. 3.1, 4.5, 4.5, 4.3, 6.0, 3.2

Find the mean, median, and mode for each set of data. If necessary, round to the nearest tenth.

7.

8.

9. **TORNADOES** The table below shows the number of tornadoes reported in the United States from 1997–2007. Find the mean, median, and mode for the number of tornadoes. If necessary, round to the nearest tenth.

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of Tornadoes	1148	1417	1342	1071	1216	941	1367	1819	1264	1106	1074

10. **SCHOOLS** The following set of data shows the number of students per teacher at different elementary schools in one school district. Which measure of central tendency best represents the data? Justify your selection and then find the measure of central tendency. 13, 15, 11, 15, 20, 14, 16, 16, 13, 17

13-1 Word Problem Practice   A calculator is allowed ☺

Measures of Central Tendency

1. MARATHON Martin is training for a marathon. The table below shows the total number of miles he has run each week for the first 6 weeks of his training. What is the mode distance that Martin has run?

Date	Miles Run
Week 1	47
Week 2	35
Week 3	53
Week 4	52
Week 5	47
Week 6	56

2. WAGES Each state in the U.S. has its own minimum wage. The table below shows the minimum wage for 6 states. What is the median minimum wage for these 6 states?

State	Wage
Alaska	$7.15
California	$8.00
Florida	$6.79
Illinois	$7.50
New York	$7.15
Texas	$5.85

Source: U.S. Department of Labor

3. HEIGHTS David measured the heights of 10 classmates. He found the mean of their heights to be 54.8 inches. He then added in his own height and found the mean again. With David's height, the mean was 55 inches. What is David's height?

4. ACADEMICS The class average for the first social studies test in Molly's class was 85%. 23 students took the test. When the 24th student joined the class and took the same test, the class average went up to 85.5%. What grade did the new student earn on the exam?

5. ADVERTISING Shawn kept track of the lengths of the television commercials during a 1-hour program. He found that 5 commercials were 30 seconds long, 10 commercials were 15 seconds long, 2 commercials were 60 seconds long, and 1 commercial was 90 seconds long.

a. What is the mean number of seconds that a commercial lasted?

b. What is the median time length for a commercial?

c. Which measure is a more accurate representation of the lengths of the commercials Shawn recorded?

Lesson 13-1

13-2 Practice

Stem-and-Leaf Plots

Display each set of data in a stem-and-leaf plot.

1. {68, 63, 70, 59,
78, 64, 68, 73,
61, 66, 70}

2. {27, 32, 42, 31, 36,
37, 47, 23, 39,
31, 41, 38, 30,
34, 29, 42, 37}

3.

Major League Baseball Leading Pitchers, 2007	
Player and Team	Wins
J. Beckett, Boston	20
F. Carmona, Cleveland	19
K. Escobar, Los Angeles	18
J. Lackey, Los Angeles	19
J. Peavy, San Diego	19
C. Sabathia, Cleveland	19
J. Verlander, Detroit	18
C. Wang, New York	19
B. Webb, Arizona	18
C. Zambrano, Chicago	18

Source: ESPN

4.

Average Prices Received by U.S. Farmers	
Commodity	Price (dollars per 100 pounds)
Beef Cattle	86
Hogs	49
Lambs	101
Milk	16
Veal Calves	119

Source: U.S. Department of Agriculture

RECREATION For Exercises 5–7, use the information in the back-to-back stem-and-leaf plot shown at the right.

5. The category with the greatest expenditure in 1995 was video and audio goods. What was its total?

6. What is the median expenditure for 1995? For 2005?

7. Compare the total expenditure on recreation in 1995 with that in 2005.

Personal Consumption Expenditure for Recreation (by Category)

1995		2005
8 6 4 4	0	5 6
4	1	0 3
3 1	2	0
	3	8
4 0	4	2
7	5	
	6	7
	7	
	8	2 6

3 | 2 = $23 billion   3 | 8 = $38 billion

13-2 Word Problem Practice

Stem-and-Leaf Plots

1. CUSTOMER SERVICE A restaurant owner recorded the average time in minutes customers waited to be seated each night. His data are shown in the table below. To organize the data into a stem-and-leaf plot, how many stems would you need?

Week 1	15	8	10	5	20	35	45
Week 2	9	3	7	8	25	38	43

2. PHONE Allison's mother makes a stem-and-leaf plot to track the time in minutes that Allison spends talking on the phone each night. In which interval are most of Allison's calls?

Minutes on Phone

Stem	Leaf
1	0 5
2	3 4 5 8 9
3	0 5 8
4	1 3 5

$1|5 = 15$ minutes

3. ELECTRIC BILLS Jenny's family is selling their house. Jenny's mother wants to put together a table of monthly electricity costs. Below is a list of their electric bills for the past twelve months. Organize the data in a stem-and-leaf plot. In which interval are most of the electric bills?

$95, $99, $85, $79, $82, $88,

$98, $95, $94, $87, $89, $90

4. TEST SCORES The scores from the most recent test in Mr. James' biology class are shown in the stem-and-leaf plot below. Find the highest and lowest scores, and then write a statement that describes the data.

Test Scores

Stem	Leaf
5	4 5
6	3 7 8
7	0 1 5 5 8 9
8	0 2 3 7 9
9	0 3 5 8 8

$5|4 = 54\%$

5. SPORTS Tamara and LaDawn have recorded their times in seconds in the 100-meter dash from the past six track meets in the table below.

LaDawn	16.5	16.6	17.0	16.8	17.2	17.1
Tamara	16.7	16.4	16.1	17.0	16.5	16.8

a. Organize the times in a back-to-back stem-and-leaf plot.

b. What are the median times for LaDawn and for Tamara?

c. If you were the coach, who would you choose to represent the team at the next competition? Explain.

Name:_____ Date:_____ Period:_____

Study the Situation

Patty and Carlos were planning to toss a coin 20 times and record the number of heads.

Patty said, "We should get 10 heads."

Carlos disagreed. He said, "I expect we will get something close to that, but all 20 tosses could come up heads."

Who do you think is right?

Let's Find Out
Toss a coin 20 times and record the outcomes in the table.

Number of Tosses	Toss #1	Toss #2	Toss #3	Toss #4	Toss #5	Toss #6	Toss #7	Toss #8	Toss #9	Toss #10	Toss #11	Toss #12	Toss #13	Toss #14	Toss #15	Toss #16	Toss #17	Toss #18	Toss #19	Toss #20
Heads or Tails?																				

Follow-up Questions
Use mathematical evidence to answer the following questions in complete sentences. Provide details to support your answer.

1. Why would Patty think they should get 10 heads?

2. Do you think it is possible to get 20 heads in 20 tosses? Why or why not?

3. Using your data from the table, how many heads did you get? What was the percent? Is this what you expected? Why or why not?

4. What did you learn from this experiment about probability?

Name:_____ Date:_____ Period:_____

5. Using the whole classes' data, how many heads did you get? What was the percent? Is this what you expected? Why or why not?

Person	# of heads	Person	# of heads
1		16	
2		17	
3		18	
4		19	
5		20	
6		21	
7		22	
8		23	
9		24	
10		25	
11		26	
12		27	
13		28	
14		29	
15		30	

6. What did you learn about experimental probability compared to theoretical probability from this experiment?

13-5 Practice

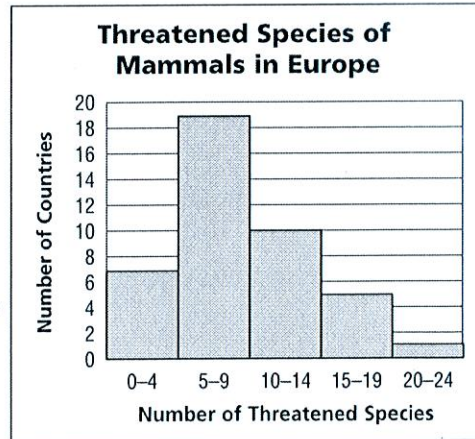## Histograms

Display each set of data in a histogram.

1.

Ages of Zoo Volunteers		
Age	Tally	Frequency
18–27	III	3
28–37	JHT III	8
38–47	JHT JHT JHT I	16
48–57	JHT JHT II	12
58–67	JHT	5
68–77	II	2

2.

Crossword Puzzle Solving Times		
Time (min)	Tally	Frequency
0–4	III	3
5–9	I	1
10–14	JHT I	6
15–19	JHT JHT IIII	14
20–24		0
25–29	II	2

For Exercises 3–6, use the histogram at the right.

3. What size are the intervals?

4. How many countries have nine or fewer threatened species?

5. Which interval contains the median number of endangered species?

6. Can you tell from the histogram whether any of the countries have zero threatened species? Explain.
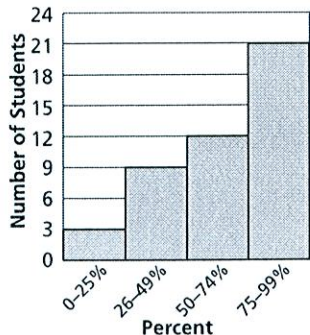
Threatened Species of Mammals in Europe

Source: IUCN

13-5 Word Problem Practice
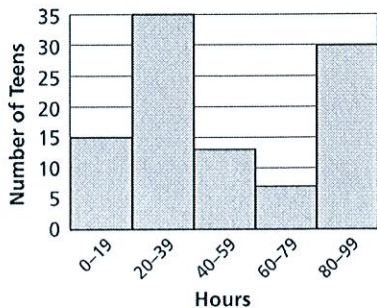
Histograms

1. MUSIC Students in grades 6–12 were asked, "Of the songs you listen to, what percent of the songs' lyrics do you know?" The histogram shows the results. How many students responded in all?

Percent of Song Lyrics Known

2. VOLUNTEERING The histogram shows how many hours per year a group of teens said they spend volunteering. How many hours did most of them volunteer?
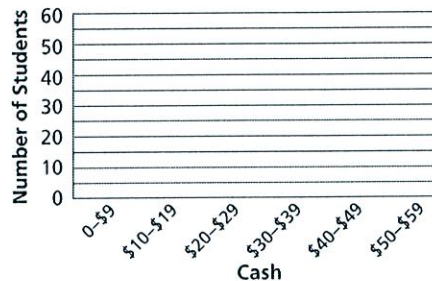
Hours Spent Volunteering

3. MONEY A group of students were asked how much cash (in bills) is in your wallet right now? Construct a histogram to represent the data.
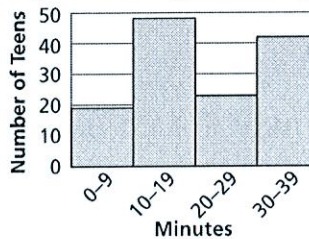
Amount	Number of Students
0–$9	54
$10–$19	20
$20–$29	16
$30–$39	5
$40–$49	4
$50–$59	1

Amount of Cash in Wallet

4. NEWSPAPERS Teens ages 13 to 18 who read a newspaper at least once a week were asked, How many minutes a day, on average, do you spend reading the newspaper? The responses are displayed in the histogram.

Time Spent Reading the Newspaper

a. How many teens said they read a newspaper for less than 30 minutes?

b. How many teens were surveyed in all?

8-3 Practice

Stem-and-Leaf Plots

Display each set of data in a stem-and-leaf plot.

1.

Test Scores				
78	99	83	92	90
94	88	88	94	87
70	86	85	86	93

2.

Weight of Male Lions (pounds)			
440	425	452	433
445	436	440	475
426	444	455	485
437	450	466	470

GOLD MEDALS For Exercises 3–5, use the stem-and-leaf plot that shows the number of gold medals won by each of the top 15 countries at the 2004 Summer Olympics.

Stem	Leaf
0	6 8 8 9 9 9 9
1	0 1 4 6 7
2	7
3	2 5 1|4 = 14 gold medals

3. Find the range of gold medals won.

4. Find the median and the mode of the data.

5. Based on the data, write one inference that can be made about the data.

PRESIDENTS For Exercises 6–10, use the stem-and-leaf plot that shows the age of each United States President at inauguration.

Ages of U.S. Presidents at Inauguration

Stem	Leaf
4	2 3 6 6 7 8 9 9
5	0 0 1 1 1 1 2 2 4 4 4 4 5 5 5 5 6 6 6 7 7 7 7 7 8
6	0 1 1 1 2 4 4 5 8 9 4|1 = 41 years

6. How many presidents were under the age of 45 when inaugurated?

7. Find the ages of the youngest and oldest president at inauguration.

8. Find the range of the data.

9. Find the median and the mode of the data

10. Based on the data, in what age group were the majority of the presidents when inaugurated?

13-6 Study Guide and Intervention

Theoretical and Experimental Probability

You can measure the chance of an event happening with **probability**.
The **theoretical probability** is the chance that some event *should* happen.

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

The **experimental probability** is what *actually* happens when an experiment is repeated a number of times.

$$P(\text{event}) = \frac{\text{number of favorable outcomes that have happened}}{\text{number of outcomes that have happened}}$$

The **odds** in favor of an event is the ratio that compares the number of ways the event *can* occur to the number of ways that the event *cannot* occur. The **odds against** an event occuring is the ratio that compares the number of ways the event *cannot* occur to the number of ways that the event *can* occur.

Example 1 A bag contains 6 red marbles, 1 blue marble, and 3 yellow marbles. One marble is selected at random. Find the theoretical probability of each outcome.

a. $P(\text{yellow})$

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

$$= \frac{3}{10} \text{ or } 30\%$$

There is a 30% chance of choosing a yellow marble.

b. $P(\text{blue or yellow})$

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

$$= \frac{(1 + 3)}{10} = \frac{4}{10} \text{ or } 40\%$$

There is a 40% chance of choosing a yellow marble.

c. What are the odds in favor of picking a red marble?

Since there are 6 ways of picking a red marble, and 4 ways of not picking a red marble, the odds in favor are 6:4, or 3:2.

Example 2 Ten marbles are selected from a bag of colored marbles. The results are shown in the table at the right. Find the experimental probability of selecting a red marble.

$$P(\text{red}) = \frac{\text{number of favorable outcomes that have happened}}{\text{number of outcomes that have happened}}$$

$$= \frac{4}{10} \text{ or } 40\%$$

Outcome	Frequency
Red	4
Blue	2
Yellow	4

Exercises

A bag contains 5 red marbles, 5 blue marbles, 6 green marbles, 8 purple marbles, and 1 white marble. One is selected at random. Find the theoretical probability of each outcome. Express each theoretical probability as a fraction and as a percent.

1. $P(\text{white})$

2. $P(\text{white, blue, or green})$

3. $P(\text{red, blue, green, purple, or white})$

13-6 Study Guide and Intervention *(continued)*

Theoretical and Experimental Probability

Use a Sample to Make Predictions To make a prediction about an event that will happen in the future, take a sample or survey of all the outcomes. Then use the experimental probability to predict how often that event will happen again.

Example **SHOES** The chart to the right shows the number of people wearing different types of shoes in Mr. Thompson's English class. Suppose that there are 300 students in the cafeteria. Predict how many would be wearing low-top sneakers. Explain your reasoning.

Shoes	Number of Students
Low-top sneakers	12
High-top sneakers	7
Sandals	3
Boots	6

Out of $12 + 7 + 3 + 6$ or 28 students, 12 wore low-top sneakers. So, you would expect $\frac{12}{28}$ or $\frac{3}{7}$ or about 43% of students to wear low-top sneakers.

Use the percent proportion to find 43% of 300.

$$\begin{array}{l} \text{part} \longrightarrow \\ \text{whole} \longrightarrow \end{array} \left. \frac{n}{300} = \frac{43}{100} \right\} \text{percent}$$

$$100 \cdot n = 43 \cdot 300$$

$$100n = 12{,}900 \qquad \text{Find the cross products.}$$

$$= 129 \qquad \text{Mentally divide each side by 100.}$$

Out of 300 students, you would expect about 129 students to wear low-top sneakers.

Exercises

DRIVERS From a survey of 100 drivers, 37 said they drove cars, 43 said they drove trucks, 12 said they drove vans, and 8 said they drove motorcycles. Out of 5,000 drivers, predict how many will drive the following vehicle(s).

1. car

2. truck

3. van or motorcycle

4. car or truck

5. truck or van

6. van or truck or car

INSURANCE An insurance company insures 2,342 homes. Of those homes, 1,234 are insured for fire, 456 are insured for fire and flood, and the rest are insured for flood. Out of 12,378 insured homes, predict how many will be insured for the following.
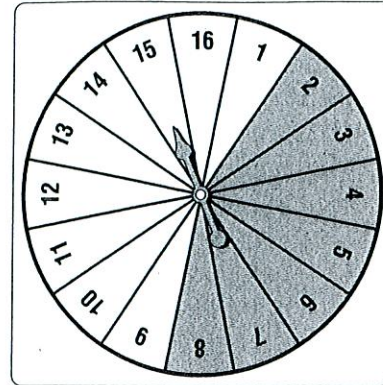
7. fire only

8. flood only

9. fire and flood

13-6 Practice

A calculator is allowed ☺

Theoretical and Experimental Probability

A spinner like the one shown is used in a game. Determine the theoretical probability of each outcome if the spinner is equally likely to land on each section. Express each theoretical probability as a fraction and as a percent.

1. $P(15)$

2. $P(\text{even})$

3. $P(\text{greater than 10})$

4. $P(\text{perfect square})$

5. $P(\text{shaded})$

The table shows the results of an experiment in which the spinner shown above was spun 50 times. Find the experimental probability of each outcome.

6. $P(\text{less than 4})$

7. $P(10 \text{ or } 11)$

8. $P(\text{multiple of 4})$

9. $P(\text{Not Shaded})$

Number	Frequency	Number	Frequency
1	IIII	9	IIII
2	II	10	II
3	III	11	IIII I
4	IIII	12	IIII
5	III	13	IIII
6	II	14	II
7	IIII	15	II
8	I	16	I

Suppose two 6-sided number cubes are rolled. Find the odds in favor of and the odds against each outcome. (*Hint*: Make a table to show the sample space.)

10. sum of 6 or 7

11. sum greater than 8

12. sum is a square

The table on the right shows the type and number of businesses in Wilsonville. If there are 625 businesses in the nearby town of Newberry, predict how many of each type of business there would be in Newberry.

13. grocery stores

14. retail stores

15. restaurants

16. pet shops and copy shops

Business Type	Number
Grocery Store	10
Retail Store	54
Copy Shop	6
Restaurant	40
Car Dealership	5
Pet Shop	10

13-8 Skills Practice
Counting Outcomes

A calculator is allowed ☺

Lesson 13-8

Draw a tree diagram to find the number of outcomes for each situation.

1. Three coins are tossed.

2. A number cube is rolled and a coin is tossed.

Find the total number of outcomes for each situation.

3. One card is drawn from a standard deck of cards.

4. Three six-sided number cubes are rolled.

5. One coin is flipped three consecutive times.

6. One coin is flipped and one eight-sided die is rolled.

7. A sweater comes in 3 sizes and 6 colors.

8. A restaurant offers dinners with a choice each of two salads, six entrees, and five desserts.

Find the probability of each event.

9. Draw the ace of spades from a standard deck of cards.

10. A coin is tossed twice. What is the probability of getting two tails?

11. Draw the six of clubs from a standard deck of cards.

12. Roll a 4 or higher on a six-sided number cube.

13. Roll a 7 or an 8 on an eight-sided die.

14. Roll an even number on an eight-sided die.

15. Draw a club from a standard deck of cards.

16. Roll an odd number on a six-sided number cube.

17. A coin is tossed and an eight-sided die is rolled. What is the probability that the coin lands on tails, and the die lands on a 2?

18. A coin is tossed and a card is drawn from a standard deck of cards. What is the probability of landing on tails and choosing a red card?