Practice 12-1

Display each set of data in a frequency table.

1. 5 1 4 6 2 6 4 5 1 3 2 6 4 5 4 6

Number						
Frequency						

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

Number			
Frequency			

Draw a line plot and histogram for each frequency table. Find the range.

3.

Number	1	2	3	4	5	6
Frequency	2	0	4	1	2	4

range: _____

```
←—+—+—+—+—+—+→
  1  2  3  4  5  6
```
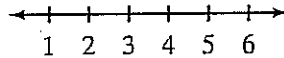
4.

Number	1	2	3	4	5	6
Frequency	4	4	0	0	3	2

range: _____

```
←—+—+—+—+—+—+→
  1  2  3  4  5  6
```
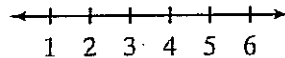
Construct a frequency table from the line plot.

5.

State Average Pupils per Teacher

```
                    X
                    X
                    X
                X   X
                X   X
                X   X
            X   X   X
        X   X   X   X
        X   X   X   X
        X   X   X   X  X   X   X
        X   X   X   X  X   X   X
        X   X   X   X  X   X   X           X
        X   X   X   X  X   X   X           X
    ←—+—+—+—+—+—+—+—+—+—+—+→
     14 15 16 17 18 19 20 21 22 23 24
```
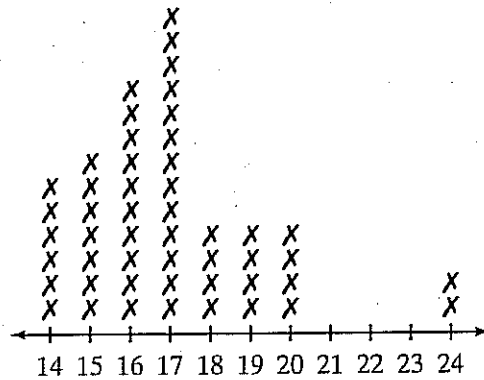
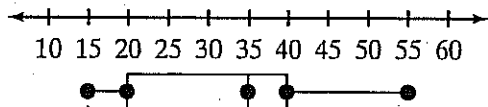| Pupils per Teacher											
Frequency											

6. What is the range in pupil-teacher ratios? _____

Practice 12-2

Use the box-and-whisker plot to answer each question.

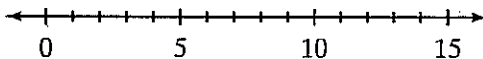**Weekly Mileage Totals, 24 Runners**

10 15 20 25 30 35 40 45 50 55 60

1. What is the highest weekly total? _____ the lowest? _____

2. What is the median weekly total? _____

3. What percent of runners run less than 40 miles a week? _____

4. How many runners run less than 20 miles a week? _____

Make a box-and-whisker plot for each set of data.

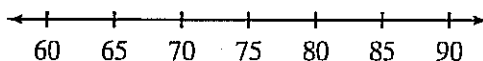5. 16 20 30 15 23 11 15 21 30 29 13 16

   10   15   20   25   30
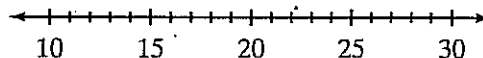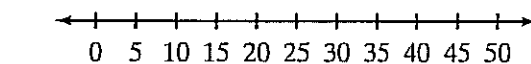
6. 9 12 10 3 2 3 9 11 5 1 10 4 7 12 3 10

   0   5   10   15

7. 70 77 67 65 79 82 70 68 75 73 69 66
   70 73 89 72

   60   65   70   75   80   85   90

Use box-and-whisker plots to compare data sets. Use a single number line for each comparison.
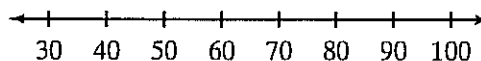
8. 1st set: 7 12 25 3 1 29 30 7 15 2 5
             10 29 1 10 30 18 8 7 29

   2nd set: 37 17 14 43 27 19 32 1 8 48
             26 16 28 6 25 18

   0 5 10 15 20 25 30 35 40 45 50

   1st Set

   2nd Set

9. Area in 1,000 mi²
   Midwestern states:
   45 36 58 97 56 65 87 82 77
   Southern states:
   52 59 48 52 42 32 54 43 70 53 66
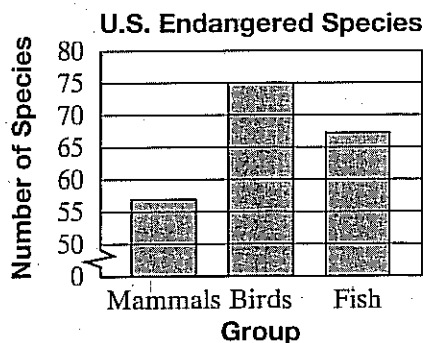
   30   40   50   60   70   80   90   100

   Midwestern
   States

   Southern
   States

Practice 12-3

**Use the graph at the right for Exercises 1–5.**

U.S. Endangered Species

1. Which group of animals appears to have more than twice as many endangered species as mammals?

   _____

2. Does one group actually have twice as many endangered species as mammals?

   _____

3. What gives the impression that one group has twice as many endangered species as mammals?

   _____

   U.S. Endangered Species

4. Redraw the graph without a break.

5. Describe the effect the change in scale has on what the graph suggests.

   _____
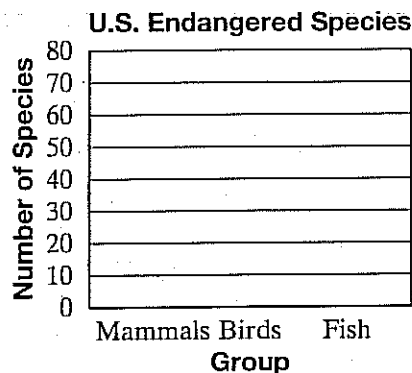
Use the data in the table for Exercises 6–8.

U.S. Union Membership							
Year	1930	1940	1950	1960	1970	1980	1990
Union members (millions)	3	9	14	17	19	20	17

6. Draw a line graph of the data using the grid below.

7. Draw a line graph of the data using the grid below.

U.S. Union Membership

U.S. Union Membership
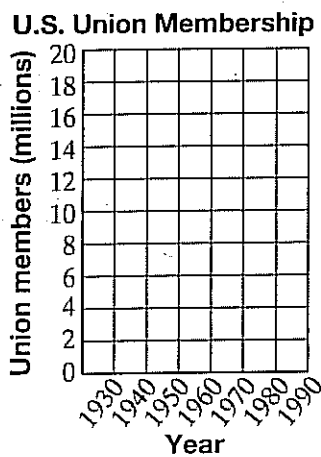
8. What gives the different impressions in the two graphs?

   _____

Practice 12-4

Counting Outcomes and Theoretical Probability

A computer store sells 4 models of a computer (m1, m2, m3, and m4). Each model can be fitted with 3 sizes of hard drive (A, B, and C).

1. Find the sample space.

_____

_____

2. What is the probability of choosing a computer with a size C hard drive at random?

_____

3. What is the probability of choosing a model 2 computer with a size A hard drive at random?

_____

Solve each problem by drawing a tree diagram.

4. A ballot offered 3 choices for president (A, B, C) and 2 choices for vice president (M, N). How many choices for a combination of the two offices did it offer? List them.

_____

5. The Cougar baseball team has 4 pitchers (P1, P2, P3, P4) and 2 catchers (C1, C2). How many pitcher-catcher combinations are possible? List them.

_____

_____

Solve each problem by using the counting principle.

6. There are 5 roads from Allen to Baker, 7 roads from Baker to Carlson, and 4 roads from Carlson to Dodge. How many different routes from Allen to Dodge by way of Baker and Carlson are possible?

_____

7. Drapery is sold in 4 different fabrics. Each fabric comes in 13 different patterns. Each pattern is offered in 9 different colors. How many fabric-pattern-color combinations are there?

_____

Name _____ Class _____ Date _____

A shelf holds 3 novels, 2 biographies, and 1 history book. Two students in turn choose a book at random. What is the probability that the students choose each of the following?

1. both novels _____

2. both biographies _____

3. a history, then a novel _____

4. both history books _____

Meg flipped a penny the given number of times. What is the probability the results were as follows?

5. 2; two heads _____

6. 3; three tails _____

7. 2; a tail, then a head _____

8. 5; five tails _____

Two puppies are chosen at random from a box at the mall. What is the probability of these outcomes?

Free Puppies for Adoption!
5 black retrievers
3 brown hounds
4 black setters

9. both black _____

10. both brown _____

11. a setter, then a hound _____

12. a retriever, then a setter _____

13. both setters _____

Are the events independent or dependent? Explain.

14. A guest at a party takes a sandwich from a tray. A second guest then takes a sandwich.

_____

_____

15. Sam flips a coin and gets heads. He flips again and gets tails.

_____

You can select only two cards from the right. Find the probability of selecting a T and an N for each condition.

M	A	T	H
I	S
F	U	N

16. You replace the first card before drawing the second.

_____

17. You do not replace the first card before drawing the second.

_____

Practice 12-6

Simplify each expression.

1. $_7P_2$ _____

2. $_7C_2$ _____

3. $_8P_3$ _____

4. $_9P_4$ _____

5. $_3C_2$ _____

6. $_{10}C_4$ _____

7. Art, Becky, Carl, and Denise are lined up to buy tickets.
   a. How many different permutations of the four are possible?

   _____

   b. Suppose Ed was also in line. How many permutations would there be?

   _____

   c. In how many of the permutations of the five is Becky first?

   _____

   d. What is the probability that a permutation of this five chosen at random will have Becky first?

   _____

8. Art, Becky, Carl, Denise, and Ed all want to go to the concert. However, there are only 3 tickets. How many ways can they choose the 3 who get to go to the concert?

   _____

9. A combination lock has 36 numbers on it. How many different 3-number combinations are possible if no number may be repeated?

   _____

Numbers are to be formed using the digits 1, 2, 3, 4, 5, and 6. No digit may be repeated.

10. How many two-digit numbers can be formed? _____

11. How many three-digit numbers can be formed? _____

12. How many four-digit numbers can be formed? _____

13. How many five-digit numbers can be formed? _____

14. How many six-digit numbers can be formed? _____

Practice 12-7

• •

The table shows the colors of Rahmi's soccer shirts. For each color, find the experimental probability that a random shirt from Rahmi's collection is that color. Write the probability as a percent, to the nearest tenth of a percent.

Color	Number of shirts
red	6
white	4
orange	3
blue	2

1. red _____

2. white _____

3. orange _____

4. blue _____

5. red or blue _____

6. not white _____

7. not orange or red _____

8. green _____

Your school's basketball team has an equal chance of winning or losing the first three games of the season. You simulate the probability by tossing a coin 60 times, letting heads stand for a win and tails stand for a loss. Use the data below. Find each experimental probability as a percent.

HHH THH THT TTH THH
HTH THH THH HTH HHH
THH TTH THH HTT TTT
HTT HHT TTH HTH THH

9. P(win all 3) _____

10. P(win exactly 2) _____

11. P(win exactly 1) _____

12. P(win none) _____

13. P(win at least 2) _____

14. P(win at least 1) _____

15. P(win less than 2) _____

Students were surveyed about the number of children living in their household. The table shows the results. Write each experimental probability as a fraction in simplest form.

Number of children	Number of students
0	0
1	11
2	15
3	3
4 or more	4

16. P(one child) _____

17. P(2 or more children) _____

18. P(at least 3 children) _____

Practice 12-8

A school has 800 students. Two random surveys are conducted to determine students' favorite sport. Use the data in the table to estimate the total number of students who prefer each sport.

Sport Samples				
Sample	Number Sampled	Favorite sport		
		Basketball	Football	Baseball
A	40	16	14	10
B	50	22	16	12

1. basketball based on Sample A _____

2. basketball based on Sample B _____

3. baseball based on Sample A _____

4. baseball based on Sample B _____

You want to find out if a school bond issue for a new computer center is likely to pass in the next election. State whether each survey plan describes a good sample. Explain your reasoning.

5. You interview people coming out of a computer store in your town.

_____

_____

_____

6. You choose people to interview at random from the city telephone book.

_____

_____

_____

7. You interview every tenth person leaving each voting place in your school district.

_____

_____
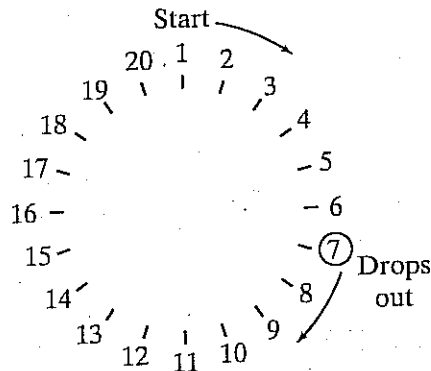
Practice 12-9

Solve by simulating the problem.

1. Twenty people seated in a circle counted to seven, beginning with the number one. The seventh person dropped out and those remaining counted to seven again. If every seventh person dropped out, what was the number of the last person remaining in the circle? Use the number circle to simulate the problem.

   _____

2. The Rockets played their first volleyball game on Friday, October 18, and played a game every Friday thereafter.

   a. What was the date of their ninth game?

   _____

   b. What was the number of the game they played on February 7?

   _____

3. Five coins are placed side by side as shown. A move consists of sliding two adjacent coins to an open spot without changing the order of the two coins. (The move "2-3 right" is illustrated.) Find three successive moves that will leave the coins in this order: 3-1-5-2-4

   _____
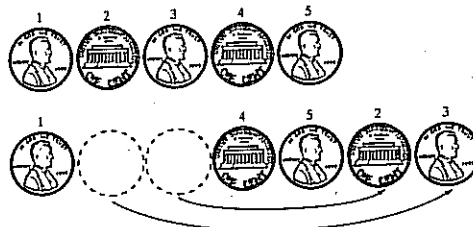
4. An irresponsible TV weatherperson forecasts the weather by throwing a number cube and consulting the weather key shown here. The weather during one 5-day stretch is given in the table. What is the probability that the forecaster was right at least 3 days out of 5? Use a number cube to simulate the forecaster's predictions. A successful trial occurs when you roll the correct weather three or more times out of five.

Weather Key
1–clear and warm
2–clear and cool
3–cloudy and cool
4–intermittent showers
5–continual rain
6–snow

Mon	Tue	Wed	Thu	Fri
continual rain	continual rain	clear and cool	cloudy and cool	snow

Work with a partner. Carry out 50 trials. Write the probability after the given number of trials.

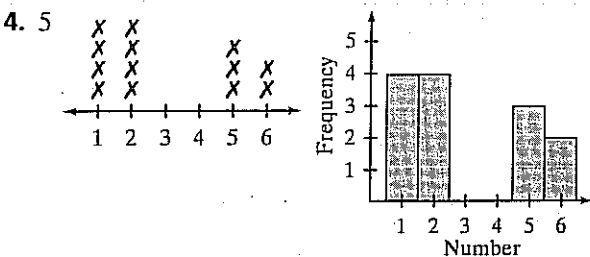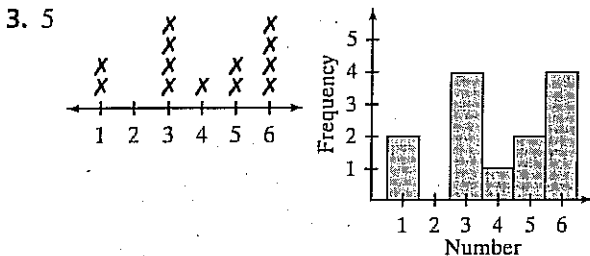**a.** 10 _____   **b.** 30 _____   **c.** 50 _____

Chapter 12 Answers

Practice 12-1

1.

Number	1	2	3	4	5	6
Frequency	2	2	1	4	3	4

2.

Number	1	2	3	4
Frequency	4	2	4	1

3. 5

4. 5

5.

Pupils per Teacher	14	15	16	17	18	19	20	21
Frequency	6	7	10	13	4	4	4	0

22	23	24
0	0	2

6. 10 pupils per teacher

Practice 12-2

1. 55 miles, 15 miles   **2.** 35 miles   **3.** 75%
4. 6 runners
5.

6.

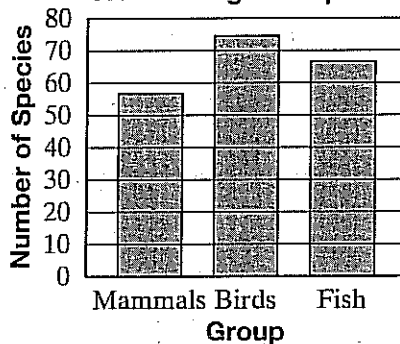**7.**

8.

9.
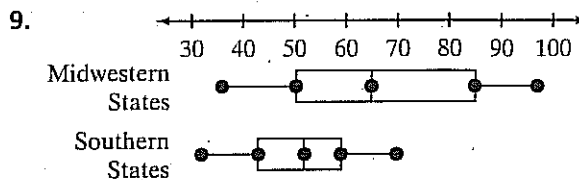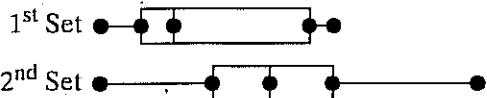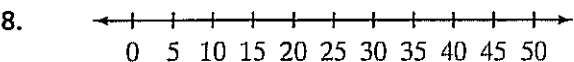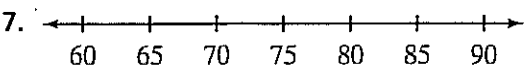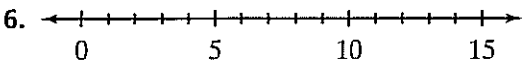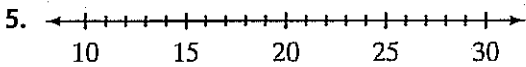
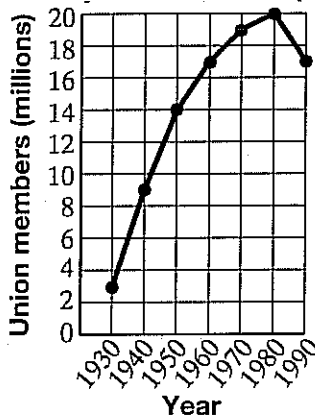## Practice 12-3

1. birds   **2.** no   **3.** the break in the vertical axis
4.

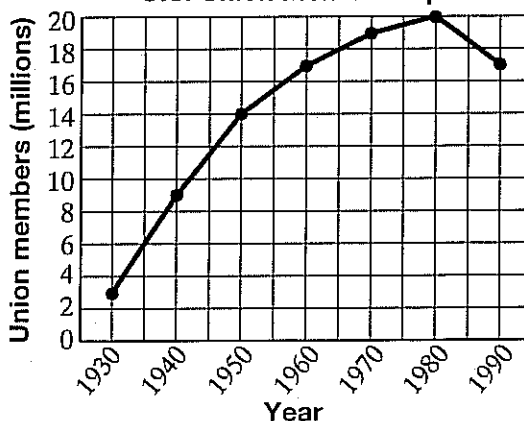**U.S. Endangered Species**

5. The differences seem much less.

6.

U.S. Union Membership

7.

U.S. Union Membership

8. The horizontal scales are different.

Practice 12-4

1. m1A, m1B, m1C, m2A, m2B, m2C, m3A, m3B, m3C, m4A, m4B, m4C   2. $\frac{1}{3}$ 3. $\frac{1}{12}$ 4. 6 choices; AM, AN, BM, BN, CM, CN   5. 8 combinations; P1C1, P1C2, P2C1, P2C2, P3C1, P3C2, P4C1, P4C2   6. 140 routes   7. 468 combinations

Practice 12-5

1. $\frac{1}{5}$ 2. $\frac{1}{15}$ 3. $\frac{1}{10}$ 4. 0   5. $\frac{1}{4}$ 6. $\frac{1}{8}$ 7. $\frac{1}{4}$
8. $\frac{1}{32}$ 9. $\frac{6}{11}$ 10. $\frac{1}{22}$ 11. $\frac{1}{11}$ 12. $\frac{5}{33}$ 13. $\frac{1}{11}$
14. Dependent; the second guest's choice is limited by the first guest's choice.   15. Independent; the second flip is not affected by the first.   16. $\frac{1}{81}$
17. $\frac{1}{72}$

Practice 12-6

1. 42   2. 21   3. 336   4. 3,024   5. 3   6. 210
7.a. 24   b. 120   c. 24   d. $\frac{1}{5}$ 8. 10   9. 42,840
10. 30   11. 120   12. 360   13. 720   14. 720

Practice 12-7

1. 40%   2. 26.7%   3. 20%   4. 13.3%
5. 53.3%   6. 73.3%   7. 40%   8. 0%   9. 10%
10. 55%   11. 30%   12. 5%   13. 65%
14. 95%   15. 35%   16. $\frac{1}{3}$ 17. $\frac{2}{3}$ 18. $\frac{7}{33}$

Practice 12-8

1. 320 students   2. 352 students   3. 200 students   4. 192 students   5. The views of people coming out of a computer store may not represent the views of other voters. This is not a good sample because it is not random.   6. The city telephone book may cover more than one school district. It would also include people who do not vote. This is not a good sample because it does not represent the population.   7. This is a good sample. It is selected at random from the population you want to study.
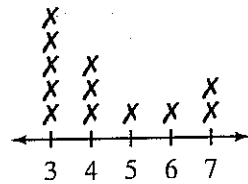
Practice 12-9

1. 3   2.a. December 13   b. 17   3. Sample answer is shown. 1-2 right, 4-5 right, 2-4 right
4. Sample answers are shown. a. $\frac{1}{10}$ b. $\frac{1}{15}$ c. $\frac{1}{25}$
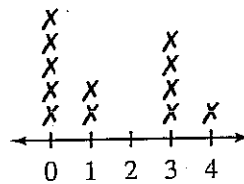
Reteaching 12-1

1.

Inches	3	4	5	6	7
Frequency	5	3	1	1	2

Charleston Rainfall

2.

Inches	0	1	2	3	4
Frequency	5	2	0	4	1

San Francisco Rainfall

3.

Inches	3	4
Frequency	8	4

Wilmington Rainfall

Reteaching 12-2

1. 98, 80.5, 118

2. 13, 4, 21