Investigation 1 Additional Practice

1. **a.** If you add up the numbers of years for all the activities, you get a lifetime of approximately 73 years.
   b. More time is spent sleeping than watching TV. The ratio is approximately 2 to 1.
   c. 2 times
   d. sleeping: 24 1/2 hours out of 73 hours, or about 34%; work or school: 13 1/2 hours out of 73 hours, or about 18%
   e. 13 out of 73 is about 12 out of 72, or $\frac{1}{6}$; $9\frac{1}{2}$ out of 73 is about 9 out of 72, or $\frac{1}{8}$.
   f. Answers will vary.
2. **a.** The percent is found from the ratio of the weight of the body part to the total body weight of 152 pounds: head is 7%, neck and trunk are 46%, arms are 11%, hands are 2%, legs are 31%, and feet are 3%.
   b. To determine the size of the sections, students must determine percents of 360 degrees.
   c. The neck, trunk, and legs account for 77% of the total body weight.
3. **a.** $756 \times 0.29 = 219$
   b. $756 \times 0.37 = 280$
   c. The percents don't add to 100% because the three groups are not necessarily exclusive. For example, a student might take the bus and play in the band. Because the percents add to more than 100%, there must be some overlap between the groups of students who participate in sports, play in the band, and take the bus.
4. **a.** There are 30 students (16 + 10 + 4), and 10/30 = $33\frac{1}{3}$% of the students are wearing boots.
   b. If we assume that the ratio of students in Ms. Yadav's class wearing boots is the same as the ratio of students in the entire school wearing boots, then an estimate would be $33\frac{1}{3}$% of 1,006, or 335 students.
5. **a.** The total number of endangered species is 640 + 61 + 494 = 1,195. Of these, 494 are found only in foreign countries. This is $\frac{494}{1,195}$, or about $\frac{5}{12}$.
   b. 35 times more endangered plant species in the United States than in foreign countries; species in U.S.: 378 + 10 = 388; species in foreign countries: 10 + 1 = 11; 388 is about 35 times 11.
   c. About 32%. 262 ÷ 816 = 0.321784314
   d. (Animals) 378 : 262 (378 to 262) and (Plants) 1 : 493 (1 to 493)
   e. 41

Skill: Writing Ratios

1–2. Sample answers:

1. 3 hearts : 4 diamonds; 4 diamonds : 7 shapes; 3 hearts : 7 shapes
2. 3 pencils : 2 pens; 2 pens : 3 pencils; 3 pencils : 5 writing implements
3. $\frac{7}{8}$; 0.88
4. $\frac{8}{7}$; 1.14
5. $\frac{7}{15}$; 0.47
6. $\frac{8}{15}$; 0.53
7. 10 : 12; or 5 : 6
8. 39 : 34
9. 4 yellow marbles

Skill: Ratios and Fractions

1. $\frac{1}{3}$	**2.** 1 : 7	**3.** 4 to 5	**4.** $\frac{1}{10}$
5. 2 to 3	**6.** 3 : 1	**7.** $\frac{3}{14}$	**8.** 7 to 2
9. >	**10.** >	**11.** =	**12.** <
13. >	**14.** <	**15.** >	**16.** =
17. <	**18.** >	**19.** <	**20.** <

Investigation 2 Additional Practice

1. **a.** 75 minutes; Adding 20 customers would increase the number of customers by one-half, so it would increase his time by about one-half.
   b. It will take Bill $\frac{30}{40} \times 50 = 37.5$ minutes to deliver the Sunday papers.

2. a. 100 centimeters = 1 meter = 1,000,000 microns. So 1 centimeter = 10,000 microns.
b. 0.2911 centimeter
c. 351 microns
d. Centimeters would be best. Meters are too big, and microns are too small.

3. a. 3 cups of mix and 7 cups of water make 10 cups of punch. To make 50 cups of punch, they need 5 times each ingredient. So $5 \times 3 = 15$ cups of mix are needed.
b. 35 cups of water.
c. 3 bowls

4. a. The ratio is found by comparing the number of congruent triangles that make up each figure. The ratio of the area of the trapezoid to the area of the hexagon is 3 : 6, or 1 : 2.
b. The ratio of the area of the large triangle to the area of the hexagon is 4 : 6, or 2 : 3.
c. Using the above ratios, the area of the trapezoid is 12 square units, and the area of the large triangle is 16 square units.
d. $4 \times \frac{4}{3} = \frac{16}{3} = 5\frac{1}{3}$ square units

5. The sweetest is the ratio with the least number of cups of blueberries per cup of sugar.
$6 : 2 = 3 : 1$
$2 : \frac{1}{2} = 4 : 1$
$20 : 7$ is less than $3 : 1$
(since $3 : 1 = 21 : 1$); $20 : 7 = 6\frac{6}{7} : 1$
The recipe with the least amount of blueberries per cup of sugar is the Country recipe.

6. a. 3 : 4 (3 to 4)
b. 4 : 3 (4 to 3)
c. The two ratios are reciprocals of each other.

7. a. 18 : 12 or 3 : 2
b. 12 : 18 or 2 : 3
c. 18 : 30 or 3 : 5
d. 30 : 18 or 5 : 3

Skill: Equal Ratios

1. 5	**2.** 17	**3.** 20	**4.** 45
5. 7	**6.** 3	**7.** 12	**8.** 30
9. 14	**10.** 8	**11.** 28	**12.** 12
13. 4	**14.** 4		

Investigation 3 Additional Practice

1.

	<35	35–44	45–54	55–64
Male	85,000	150,000	140,000	90,000
Female	50,000	60,000	35,000	10,000

a. 85,000 to 50,000 = 17 to 10
b. 150,000 to 60,000 = 5 to 2
c. 140,000 to 35,000 = 4 to 1
d. 90,000 to 10,000 = 9 to 1

2. a. $\frac{10}{27}$ and 37%. $50{,}000 \div (50{,}000 + 85{,}000) = 50{,}000 \div 135{,}000 = \frac{10}{27} \approx 0.37$
b. $\frac{2}{7}$ and 29%. $60{,}000 \div (150{,}000 + 60{,}000) = 60{,}000 \div 210{,}000 = \frac{2}{7} \approx 0.286$
c. $\frac{1}{5}$ and 20%. $35{,}000 \div (140{,}000 + 35{,}000) = 35{,}000 \div 175{,}000 = \frac{1}{5} = 0.2$
d. $\frac{1}{10}$ and 10%. $10{,}000 \div (90{,}000 + 10{,}000) = 10{,}000 \div 100{,}000 = \frac{1}{10} = 0.1$

3. a. $8 \times 3 = 24$, so we can write a proportion to solve. $\frac{24}{3} = \frac{x}{52}$.
$x = 416$ miles
b. For Josh to have a four-week average of 10 miles per week, he will need to jog a total of 40 miles. Since he has jogged $3 \times 8 = 24$ miles for the first three weeks, Josh will need to jog $40 - 24 = 16$ miles during the fourth week.

4. a. $W = 55 \times T$

b. $55 \times 20 = 1{,}100$ words

c. Yes, he will be able to finish the essay; Tony can type 1,650 words in 30 minutes.

5. a.

	12-Ounce Can	20-Ounce Bottle
Diet Sun Drop	69	115
Mountain Dew	55	91.6 (92)
Dr. Pepper	41	68.4 (68)
Pepsi Cola	38	63.4 (63)
Coca-Cola	34	56.6 (57)
Barq's Root Beer	22	36.6 (37)

b. i. 115 to 37 (or 69 to 22), or about 3 to 1

ii. 92 to 68 (or 55 to 41), or about 9 to 7

iii. 92 to 57 (55 to 34), 8 to 5

6. a. $\frac{4}{10} = \frac{2}{5}, \frac{5}{13}, \frac{5}{8}, \frac{B}{(B + A)}$

b. 4 to 3, 4 to 1, 5 to 2

c. 1 to 2, 3 to 5, 9 to 4, $B - A$ to A

7. Out of 12 animals, the ratio of cats is $\frac{4}{12}$, or $\frac{1}{3}$, and the ratio of dogs is $\frac{8}{12}$, or $\frac{2}{3}$. So $\frac{1}{3}$ of the 150 animals, or 50 animals, are cats, and $\frac{2}{3}$, or 100 animals, are dogs.

8. $3.5 \times 50 = 175$ kilometer. This can be set up as a proportion. X stands for the actual distance between the two towns.

$\frac{X}{3.5 \text{ centimeters}} = \frac{50 \text{ kilometers}}{1 \text{ centimeter}}$,

$X = 3.5 \times 50 = 175$ kilometers.

9. a. Because a person can participate in more than one sport and therefore someone may have partaken in multiple activities during the course of a year.

b. Yes, the ratio of female walkers to male walkers is 2 to 1 (43,373,000 to 21,054,000 ≈ 2 to 1)

c. Yes, the ratio of young swimmers to old swimmers is about 4 to 1 (10,874,000 to 2,756,000 ≈ 4 to 1).

d. No, because the data is not broken down into those categories. It gives numbers for males in all age ranges, and females in all age ranges, as well as both ages ranges, but not broken down into gender. There is no way from the given data to conclude the participation of teenage boys and older adult women.

e. (Figure 1)
Solve using equivalent fractions. The number of current participants in 1993 over the total population is equal to the number of projected participants in 2000 over the total population. For example, $\frac{23{,}165{,}000}{258{,}000{,}000} = \frac{?}{281{,}000{,}000}$. Find the scale factor from 258 million to 281 million and then multiply each participation number by the scale factor.

Figure 1

	Males	Females
Bicycle riding	26,751,635 (26,752,000)	25,439,213 (25,439,000)
Camping	25,230,097 (25,230,000)	21,274,314 (21,274,000)
Exercise walking	22,930,907 (22,931,000)	47,239,585 (47,240,000)
Fishing	33,163,446 (33,164,000)	16,211,957 (16,212,000)
Swimming	30,183,539 (30,183,539)	36,638,915 (36,639,000)

Comparing and Scaling Practice Answers

Skill: Finding and Using Rates

1. 50 mi per h **2.** $9.40 per h
3. 40 pages per h
4. 52 words per min or 3,120 words per h
5. 311 parts per h **6.** 25 books per shelf
7. $5 per book **8.** 8 points per game
9. $.0099 per sheet; $.00858 per sheet; 500 sheets
10. $1.29 per lb; $1.267 per lb; 12 oz
11. $.1193 per oz; $.1242 per oz; 15 oz
12. $.63 per lb; $.498 per lb; 5 lb
13. $.3125 per pencil; $.2276 per pencil; 25 pencils
14. $.2225 per bagel; $.2317 per bagel; 4 bagels
15. a. Yolanda; 1 yd
15. b. $11\frac{1}{9}$ yd, or 11 yd 4 in.
16. no **17.** yes

Investigation 4 Additional Practice

1. a. 7 hits.
b. 12 hits.
c. 29 times at bats.
d. 52 times at bats.

2. a. 16; Using equivalent fractions, $\frac{4}{12} = \frac{?}{48}$. The scale factor is 4.
b. 28; The scale factor is about 7.
c. 36 hits; To make 8 more homeruns from the original 4, Calvin would be hitting 12 total. Using equivalent fractions $\frac{4}{12} = \frac{12}{?}$. The scale factor is 3.
d. 120 hits; To hit 36 more homeruns from the original 4, Calvin would be making 40 total. Using equivalent fractions $\frac{4}{12} = \frac{40}{?}$. The scale factor is 10.

3. a. $x = 36$ **b.** $x = 49.8$
c. $x = 351$ **d.** $x = 36$
e. $x = 10.5$ **f.** $x = 3$

4. a. 182 cartons **b.** 12.25 hours
c. 6,720 cartons **d.** $C = 28H$

Skill: Solving Problems

1. 28 **2.** 6 **3.** 35 **4.** 20
5. 9 **6.** 6 **7.** 2 **8.** 18
9. 15 **10.** 3 **11.** 10 **12.** 12
13–18. Sample answers are given.
13. 4 **14.** 21 **15.** 50 **16.** 5.6
17. 9 **18.** 40
19. $12,000 **20.** 1 cup
21. 67.5 minutes **22.** 364 miles
23. 60 days **24.** 18 eggs