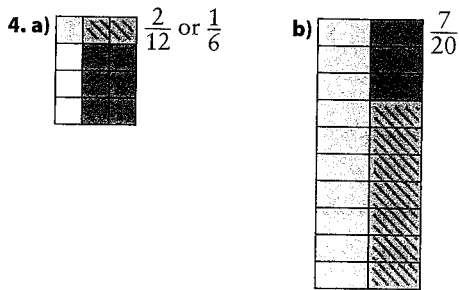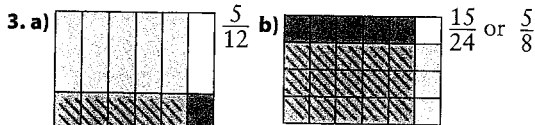**13.** Answers may vary. Example: Ryan divides three quarters of a watermelon among himself and five friends. What fraction of the watermelon does each person receive? Answer: $\frac{1}{8}$

14. $\frac{8}{15}, \frac{10}{15}$ or $\frac{2}{3}$

15. a)

b) Answers may vary. Example: The number line shows that there would be four sections of $\frac{1}{6}$.

6.3 Multiplying Proper Fractions, pages 214–215

3. a)

$\frac{5}{12}$ **b)**

$\frac{15}{24}$ or $\frac{5}{8}$

4. a)

$\frac{2}{12}$ or $\frac{1}{6}$ **b)**

$\frac{7}{20}$

5. a) Estimates will vary. Example: $\frac{1}{4}$; Answer: $\frac{1}{4}$

b) Estimates will vary. Example: 0; Answer: $\frac{3}{42}$ or $\frac{1}{14}$

c) Estimates will vary. Example: $\frac{1}{2}$; Answer: $\frac{9}{16}$

6. a) Estimates will vary. Example: $\frac{1}{2}$; Answer: $\frac{8}{25}$

b) Estimates will vary. Example: 1; Answer: $\frac{7}{10}$

c) Estimates will vary. Example: $\frac{1}{4}$; Answer: $\frac{12}{36}$ or $\frac{1}{3}$

7. $\frac{1}{8}$ of a pie

8. a) $\frac{1}{12}$ **b)** 2 h

9. approximately $\frac{1}{200}$

10. $\frac{3}{10}$

11. a) $\frac{1}{3}$ **b)** 28

12. Answers may vary. Example: A bottle is $\frac{3}{4}$ full of juice. If Karen drinks $\frac{1}{2}$ of the juice in the bottle, what fraction of a full bottle did she drink? Answer: $\frac{3}{8}$

13. $\frac{6}{52}$ or $\frac{3}{26}$

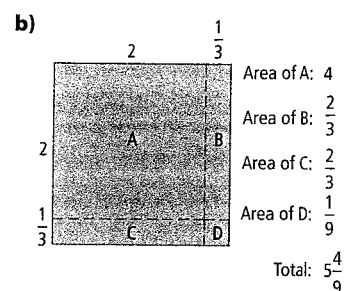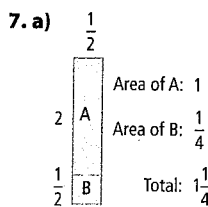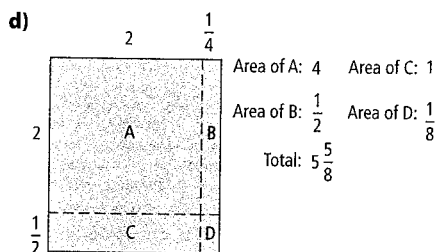**14. a)** $\frac{1}{8}$ **b)** $\frac{1}{15}$ **c)** $\frac{1}{8}$ **d)** $\frac{7}{32}$
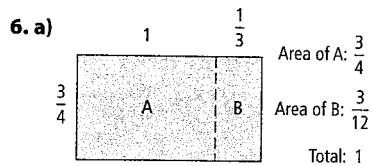
15. a) $\frac{5}{8}$ **b)** $\frac{7}{9}$ **c)** $\frac{3}{4}$ **d)** $\frac{5}{6}$
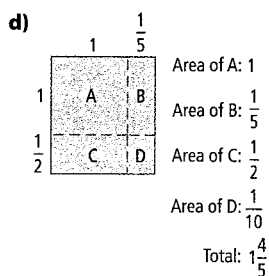
16. a) $\frac{1}{4}$ and $\frac{1}{4}$ **b)** $\frac{1}{3}$ and $\frac{1}{2}$ **c)** $\frac{1}{6}$ and $\frac{1}{2}$

6.4 Multiplying Improper Fractions and Mixed Numbers, pages 220–221

4. a) $3\frac{2}{3}$ **b)** $2\frac{5}{6}$ **c)** $12\frac{1}{2}$ **d)** $1\frac{3}{5}$

5. a) $\frac{19}{4}$ **b)** $\frac{23}{8}$ **c)** $\frac{19}{3}$ **d)** $\frac{25}{7}$

6. a)

Area of A: $\frac{3}{4}$

Area of B: $\frac{3}{12}$

Total: 1

b)

Area of A: 2   Area of C: $\frac{6}{5}$

Area of B: $\frac{1}{2}$ Area of D: $\frac{3}{10}$

Total: 4

c)

Area of A: 1   Area of C: $\frac{1}{2}$

Area of B: $\frac{1}{3}$ Area of D: $\frac{1}{6}$

Total: 2

d)

Area of A: 4   Area of C: 1

Area of B: $\frac{1}{2}$ Area of D: $\frac{1}{8}$

Total: $5\frac{5}{8}$

7. a)

Area of A: 1

Area of B: $\frac{1}{4}$

Total: $1\frac{1}{4}$

b)

Area of A: 4

Area of B: $\frac{2}{3}$

Area of C: $\frac{2}{3}$

Area of D: $\frac{1}{9}$

Total: $5\frac{4}{9}$

c)

Area of A: 2
Area of B: 1
Area of C: $\frac{1}{3}$
Area of D: $\frac{1}{6}$
Total: $3\frac{1}{2}$

d)

Area of A: 1
Area of B: $\frac{1}{5}$
Area of C: $\frac{1}{2}$
Area of D: $\frac{1}{10}$
Total: $1\frac{4}{5}$

8. a) Estimates may vary. Example: 1; Answer: $1\frac{1}{7}$

b) Estimates may vary. Example: 20; Answer: $18\frac{3}{4}$

c) Estimates may vary. Example: 4; Answer: $3\frac{2}{3}$

9. a) Estimates may vary. Example: 4; Answer: $4\frac{8}{9}$

b) Estimates may vary. Example: 12; Answer: $11\frac{1}{3}$

c) Estimates may vary. Example: 24; Answer: $22\frac{3}{4}$

10. $7\frac{1}{2}$ laps

11. 54 h

12. $3\frac{1}{2}$ h

13. a) $\frac{5}{8}$ h **b)** $37\frac{1}{2}$ min

14. $4\frac{3}{8}$ times as much as the den

15. $96 altogether

16. $1.75

17. Answers may vary. Example: The product is smaller than the mixed fraction. The product is larger than the proper fraction.

18. Answers may vary. Example: It took Mary $3\frac{1}{3}$ h to finish her project. Roger spent $1\frac{1}{2}$ times as long as Mary to complete his project. How many hours did it take Roger to complete his project? Answer: 5 h

19. a) If each fraction is changed to its improper fraction form, the numerator is 13, and the denominator is twice the denominator of the previous term; $\frac{13}{48}, \frac{13}{96}, \frac{13}{192}$

b) Each term is multiplied by $\frac{3}{2}$ to get the next term; $20\frac{1}{4}, 30\frac{3}{8}, 45\frac{9}{16}$

20. a) 15 **b)** 10 **c)** $12\frac{5}{6}$ **d)** $3\frac{11}{15}$

21. a) $1\frac{1}{2}$ **b)** $1\frac{1}{5}$ **c)** $2\frac{1}{2}$ **d)** $2\frac{1}{2}$

6.5 Dividing Fractions and Mixed Numbers, pages 227–229

5. a)

$\frac{5}{8} \div \frac{1}{4} = 2\frac{1}{2}$ **b)**

$\frac{1}{4} \div \frac{1}{3} = \frac{3}{4}$

c)

$1\frac{1}{2} \div \frac{2}{3} = 2\frac{1}{4}$

d)

$2\frac{1}{3} \div \frac{5}{6} = 2\frac{4}{5}$

6. a)

$\frac{9}{10} \div \frac{1}{5} = 4\frac{1}{2}$ **b)**

$\frac{1}{4} \div \frac{3}{8} = \frac{2}{3}$

c)

$1\frac{2}{3} \div \frac{1}{2} = 3\frac{1}{3}$

d)

$2\frac{3}{4} \div \frac{2}{3} = 4\frac{1}{8}$
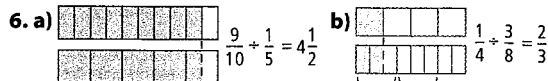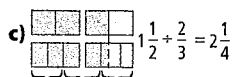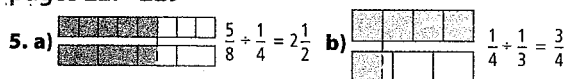
7. a) $\frac{2}{3}$ **b)** $1\frac{4}{5}$ **c)** $1\frac{9}{11}$

8. a) $\frac{5}{9}$ **b)** $3\frac{3}{5}$ **c)** 4

9. a) $\frac{15}{16}$ **b)** $\frac{10}{17}$ **c)** 16

10. a) $\frac{13}{30}$ **b)** $\frac{10}{11}$ **c)** $\frac{1}{2}$

11. 8 performers

12. 6 cakes

13. 8 glasses

14. $\frac{2}{9}$ as much energy

15. $1\frac{5}{6}$ as much paint

16. $2\frac{1}{2}$ times as big as South America

17. 20 km/h

18. a) No. Answers may vary. Example: The reciprocal of $\frac{5}{6}$ is $\frac{6}{5}$. **b)** No. Answers may vary. Example: $\frac{9}{10} \times \frac{5}{6} = \frac{45}{60}$ **c)** Yes. Answers may vary. Example: $\frac{9}{10} \div \frac{5}{6} = 1\frac{2}{25}$

19. a) 4200 km **b)** 2000 km

20. $\frac{1}{50}$ of the Earth's surface

21. a) 8; The quotient is doubled each time the divisor is halved.

b) $9 \div 9 = 1, 9 \div 3 = 3, 9 \div 1 = 9, 9 \div \frac{1}{3} = 27$

22. Answers may vary. Example: Mac can ride his scooter to his grandmother's house in $3\frac{3}{4}$ h. If he takes the bus, he can make the trip in $2\frac{1}{4}$ h. How many times longer does it take him to ride his scooter than it takes him to ride the bus? Answer: It takes Mac $1\frac{2}{3}$ times longer to ride his scooter.

23. $4\frac{1}{3}$ times as fast

24. $\frac{35}{39}$ of the area of Ellesmere Island