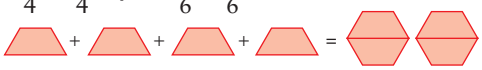
Chapter 6

6.1 Multiplying a Fraction and a Whole Number, pages 202–203

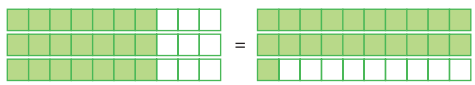
4. a) $4 \times \frac{1}{3} = \frac{4}{3}$ **b)** $3 \times \frac{2}{5} = \frac{6}{5}$

5. a) $2 \times \frac{5}{4} = \frac{10}{4}$ **b)** $4 \times \frac{1}{6} = \frac{4}{6}$

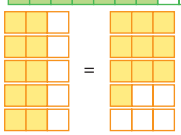
6. a) 2;



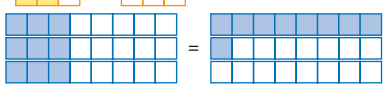
b) $\frac{21}{10}$;



c) $\frac{10}{3}$;



d) $\frac{9}{8}$;



7. a) $\frac{3}{8}$ **b)** $\frac{6}{4}$ **c)** $\frac{12}{5}$ **d)** $\frac{8}{3}$

8. $4 \times \frac{1}{2} = 2$; The width of the flag is 2 m.

9. $12 \times \frac{3}{4} = 9$; There are nine people on the minibus.

10. a) $\frac{1}{6}$ **b)** $6 \times \frac{1}{6} = 1$; The area of each face is 1 cm^2.

11. $12 \times \frac{5}{6} = 10$; Asma's car uses only 10 L of gasoline per 100 km.

12. $10\,000\,000 \times \frac{1}{5} = 2\,000\,000$; Nunavut is about 2 000 000 km^2.

13. a) 5; Example: Divide the previous product by two to continue the pattern. **b)** Answer may vary.

Example: $9 \times 9 = 81$, $3 \times 9 = 27$, $1 \times 9 = 9$, $\frac{1}{3} \times 9 = 3$

14. Answers may vary. Example: Jane spends $\frac{1}{4}$ of her allowance on books. If Jane's allowance is \$8 each week, how much does she spend on books? Answer: $\frac{1}{4} \times 8 = 2$; She spends \$2 each week on books.

15. $30 \times \frac{4}{5} = 24$; Twenty-four students have brown eyes.

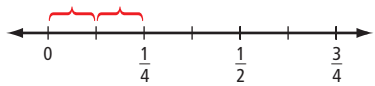
16. $15 \times \frac{1}{5} = 3$; The shortest side measures 3 cm.

$15 - 3 = 12$, $12 \div 2 = 6$; The other two sides measure 6 cm each.

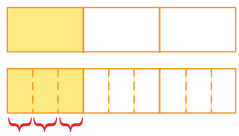
17. 341 cm

6.2 Dividing a Fraction by a Whole Number, pages 208–209

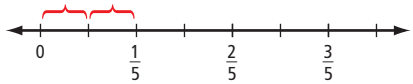
4. a) $\frac{1}{4} \div 2 = \frac{1}{8}$;



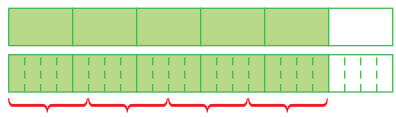
b) $\frac{1}{3} \div 3 = \frac{1}{9}$;



c) $\frac{1}{5} \div 2 = \frac{1}{10}$;



d) $\frac{5}{6} \div 4 = \frac{5}{24}$;



5. a) $\frac{3}{10}$ **b)** $\frac{1}{15}$ **c)** $\frac{1}{8}$ **d)** $\frac{1}{9}$

6. a) A serving of dhopa requires $\frac{1}{4}$ of a coconut.

b) A serving of molee curry requires $\frac{1}{8}$ of a coconut.

7. Each student gets $\frac{1}{6}$ of a full pitcher.

8. Each of these provinces represents $\frac{1}{15}$ of the area of Canada.

9. a) She averages $\frac{1}{12}$ of an hour per lap. **b)** 5 min

10. He averages $\frac{1}{15}$ of a tank per round trip.

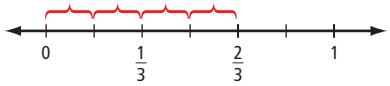
11. Vancouver has frost on about $\frac{3}{20}$ of the days in a year.

12. It takes $\frac{2}{5}$ of a roll to wrap three packages.

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: $\frac{1}{8}$

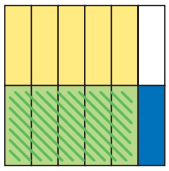
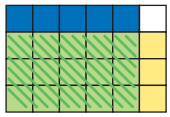
14. $\frac{8}{15}$, $\frac{10}{15}$ or $\frac{2}{3}$

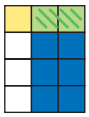
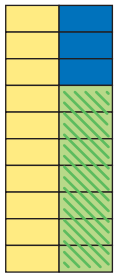
15. a)



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)** $\frac{5}{6}$

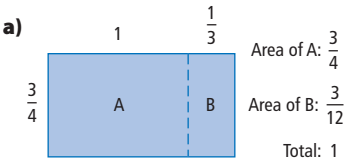
16. a) $\frac{1}{4}$ and $\frac{1}{4}$ **b)** $\frac{1}{3}$ and $\frac{1}{2}$ **c)** $\frac{1}{6}$ and $\frac{1}{2}$

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

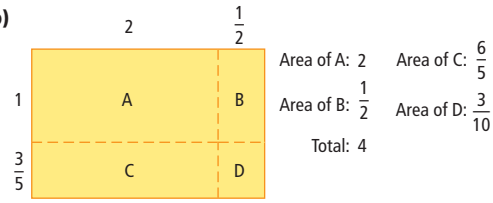
4. a) $3\frac{2}{3}$ **b)** $2\frac{5}{6}$ **c)** $12\frac{1}{2}$ **d)** $1\frac{3}{5}$

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

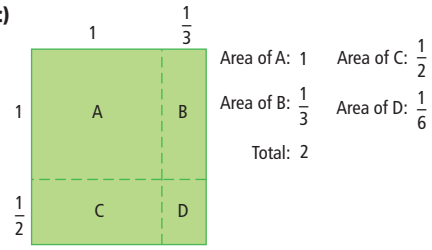
6. a)



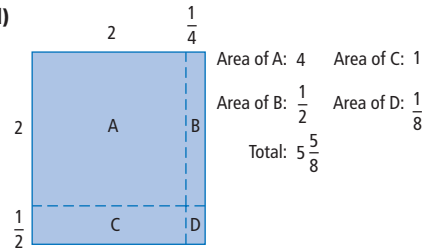
b)



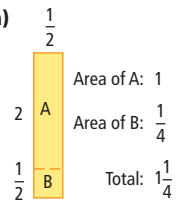
c)



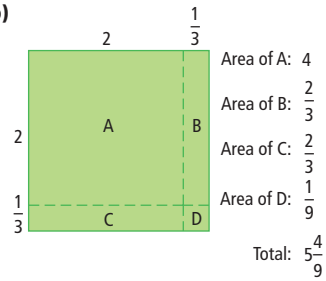
d)



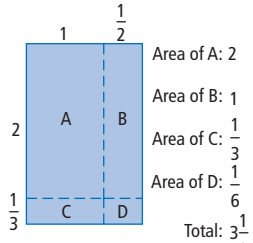
7. a)



b)

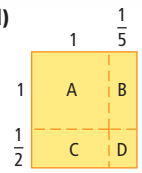


c)



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

6.6 Applying Fraction Operations, pages 234–235

4. a) $\frac{5}{12}$ **b)** 4 **c)** $4\frac{3}{4}$

5. a) $\frac{9}{14}$ **b)** $2\frac{1}{2}$ **c)** $7\frac{7}{11}$

6. a) \$584 **b)** \$656 **c)** \$728 **d)** \$620

7. $\frac{1}{6}$

8. a) $\frac{3}{16}$ **b)** $\frac{1}{8}$

9. $\left(1-\frac{5}{7}\right)\times 28 = 8$; $\frac{5}{7}\times 28 = 20$, $28 - 20 = 8$

10. a) 105 g **b)** 150 g **c)** 125 g

11. a) $4\frac{1}{4}$ pages **b)** \$1050 **c)** approximately \$247.06

12. \$40

13. a) $\frac{5}{2}\times\left(\frac{3}{5}-\frac{2}{5}\right)+\frac{1}{2}=1$ **b)** $1\frac{1}{2}+2\frac{1}{2}\div\left(\frac{3}{4}-\frac{1}{8}\right)$

c) $\left(\frac{2}{3}-\frac{1}{6}+\frac{5}{6}\right)\div\frac{16}{9}=\frac{3}{4}$

14. Answers may vary. Example: **a)** $\frac{1}{2}\times\frac{1}{2}-\frac{1}{2}\times\frac{1}{2}$

b) $\frac{1}{2}+\frac{1}{2}\div\frac{1}{2}-\frac{1}{2}$ **c)** $\left(\frac{1}{2}+\frac{1}{2}\right)\times\frac{1}{2}\times\frac{1}{2}$ **d)** $\left(\frac{1}{2}+\frac{1}{2}+\frac{1}{2}\right)\div\frac{1}{2}$

e) $\frac{1}{2}\times\frac{1}{2}+\frac{1}{2}\times\frac{1}{2}$ **f)** $\frac{1}{2}\div\frac{1}{2}\div\frac{1}{2}\div\frac{1}{2}$ **g)** $\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}+\frac{1}{2}$

h) $\left(\frac{1}{2}+\frac{1}{2}\right)+\left(\frac{1}{2}\times\frac{1}{2}\right)$ **i)** $\left(\frac{1}{2}+\frac{1}{2}\right)\div\frac{1}{2}+\frac{1}{2}$

15. $\frac{13}{12}$

16. There are 36 black notes and 52 white notes.

17. The racks hold 128, 64, and 32 CDs.

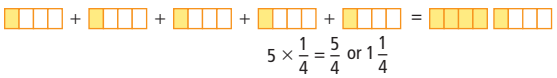
Chapter Review, pages 236–237

1. B **2.** C **3.** A

4. a) reciprocal **b)** Answer may vary. Example: The multiplier of a number to give a product of 1.

5. order of operations

6. Answer may vary. Example: **a)**

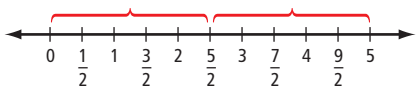


$5\times\frac{1}{4}=\frac{5}{4}$ or $1\frac{1}{4}$

b)

$4\times\frac{2}{3}=\frac{8}{3}$ or $2\frac{2}{3}$

c)

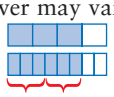


$2\times\frac{5}{2}=\frac{10}{2}$ or 5

7. 9 kg

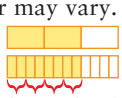
8. 4 cm

9. a) Answer may vary. Example:



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

b) Answer may vary. Example:

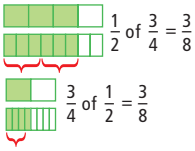


$\frac{2}{3}\div 4=\frac{2}{12}$ or $\frac{1}{6}$

10. $\frac{1}{12}$ of an onion

11. $\frac{3}{40}$ of the days of the year

12.



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

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

13. a) Estimates will vary. Example: $\frac{1}{4}$; Answer: $\frac{9}{25}$

b) Estimates will vary. Example: $\frac{1}{2}$; Answer: $\frac{1}{3}$

c) Estimates will vary. Example: 0; Answer: $\frac{1}{14}$

14. $\frac{1}{5}$ of the class

15. a) Estimates will vary. Example: 3; Answer: $\frac{48}{15}$ or $3\frac{1}{5}$

b) Estimates will vary. Example: 4; Answer: $\frac{49}{12}$ or $4\frac{1}{12}$

c) Estimates will vary. Example: 8; Answer: $\frac{19}{2}$ or $9\frac{1}{2}$

16. 1330 km

17. 84 h

18. approximately 44 cm

19. a) He multiplied the two numbers rather than dividing them. **b)** $\frac{2}{9}$

20. a) $\frac{4}{5}$ **b)** $1\frac{5}{9}$ **c)** 10

21. 30 days

22. $7\frac{1}{2}$ h

23. $1\frac{1}{2}$ times as long

24. a) $\frac{7}{8}$ **b)** $1\frac{4}{5}$

25. $3\frac{1}{2}\div\frac{1}{4}=14$; $16\times\frac{1}{4}=4$; He only has enough pasta to cook 14 dinners. He would need four full packages of pasta to cook 16 dinners.

26. $\frac{1}{2}$ full

27. 6 m