

## Chapter 1, p. 1

### 1.1 Divisibility by 10, 5, and 2, p. 6

- a)** 10 no, R5; 5 yes; 2 no, R1  
**b)** 10 no, R7; 5 no, R2; 2 no, R1  
**c)** 10 no, R6; 5 no, R1; 2 yes  
**d)** 10 yes, 5 yes, 2 yes
- a)** 0    **b)** 2, 4, 6, 8    **c)** 2, 7    **d)** 5
- e.g., Every number is divisible by 1.
- e.g., 1005; The ones digit is 5, so it is divisible by 5 but not by 10.
- e.g., 1 kg or 5 kg bags; 1645 is divisible by 1 and 5, but not by 2 or 10.
- a)** 1 way, with 2¢ coins; 2 is a factor of 456, but 5 and 10 are not.  
**b)** 3 ways, with 10¢, 5¢, or 2¢ coins; 10, 5, and 2 are factors of 1430.  
**c)** 1 way, with 5¢ coins; 5 is a factor of 2455, but 2 and 10 are not.  
**d)** 0 ways; 2, 5, and 10 are not factors of 6843.
- a)** e.g., I was born in 1994, which is divisible by 2 because it ends in an even number but not divisible by 5 or 10 because it does not end in 0 or 5.  
**b)** e.g., The next year divisible by 10, 5, and 2 is 2010. I'll be 16.
- a)** 1000, 1020, 1040, 1060, 1080, 1100  
**b)** e.g., If the last two digits are divisible by 20, the number is divisible by 20; 6860 is divisible by 20 because 60 is.
- e.g., I am 13;  $2 \times 13 = 26$ ;  $26 \times 5 = 130$ ;  $130 \div 5 = 13$ . It works because multiplying by 2 and then by 5 is the same as multiplying by 10. Removing the last digit 0 is the same as dividing by 10. Multiplying by a number then dividing by it leaves the starting number.

- 910, 990
- Be specific about how the rules are alike and different.

### 1.2 Divisibility by 3 and 9, pp. 9–10

- a)** 3 yes, 9 yes  
**b)** 3 no, 9 no; digits sum to 20, which has a remainder of 2 when divided by 3 and 9  
**c)** 3 yes, 9 no; digits sum to 6, which has a remainder of 6 when divided by 9  
**d)** 3 yes, 9 yes
- a)** 7    **b)** 6    **c)** 0 or 9    **d)** 6
- a)** No, the digits sum to 10, which is not divisible by 9, so there can't be 9 equal rows.  
**b)** No, the digits sum to 21, which is divisible by 3.
- a)** 3 yes, 9 yes  
**b)** 3 no, R2, 9 no, R8  
**c)** 3 yes, 9 yes  
**d)** 3 yes, 9 no, R6
- 9999, 1008
- If the number is divisible by 3, it could be 150, 450, or 750; if it is divisible by 9, it must be 450.
- e.g.,  $1234 \div 9$  and  $4321 \div 9$  both have a remainder of 1; rearranging the digits doesn't change their sum.
- a)** e.g., 1001  
**b)** e.g., 3330    **c)** e.g., 3000    **d)** e.g., 4500
- 3879; e.g., Add 3 to 3876 because both 3876 and 3 are divisible by 3 so the sum is too.

10. e.g., I'd divide 18 927 because each digit or pair of digits is divisible by 9. I'd use a divisibility rule for 17 658 because it's harder to divide.
11. Be specific about how the rules are alike and different.

### 1.3 Divisibility by 6, pp. 13–14

1. a) yes    b) no    c) no    d) yes
2. a) 0, 6    b) 0, 3, 6, 9
3. a) no    b) yes    c) yes    d) no
4. e.g., 3
5. a) No, 3258 is divisible by 2 (ones digit even) and by 3 (digits sum to 18, which is divisible by 3), so it's divisible by 6.
- b) No, 9355 is not even, so it is not divisible by 6.

6. a) 2 is a factor

		Yes	No
3 is a factor	Yes	6, 12, 18, 24	3, 9, 15, 21
	No	2, 4, 8, 10, 14, 16, 20, 22	1, 5, 7, 11, 13, 17, 19, 23

- b) e.g., Each multiple of 6 is in the cell in which 2 and 3 are factors.
7. no, e.g., 1006 is not divisible by 6.
8. e.g., An odd number cannot be divisible by 6.
9. a) e.g., 7002    b) e.g., 2700    c) e.g., 3600
10. a) not always, e.g., 6, 18, and 30 are divisible by 2 and by 6 but not by 12
- b) yes, e.g., If a number is divisible by 12, you can form groups of 12, which you can arrange as 4 groups of 3 or 6 groups of 2. So both 2 and 3 must be factors of the number.
11. Use the divisibility rules for 2, 3, and 6.

### 1.4 Divisibility by 4 and 8, p. 18

1. a) 4 no, R2; 8 no, R2  
b) 4 yes, 8 yes  
c) 4 yes; 8 no, R4  
d) 4 yes; 8 no, R4
2. a) 2, 6  
b) 2, 6  
c) 0, 4, 8  
d) 0, 2, 4, 6, 8
3. a) yes    b) yes, yes
4. a) 4 no, R2; 8 no, R6  
b) 4 yes, 8 yes  
c) 4 yes, 8 yes
5. no, e.g., 4 and 12
6. 98 760
7. a) e.g., The last 3 digits of 5320 are 320, and 320 is divisible by 8. 5320 is divisible by 8 because  $3 \times 4 + 2 \times 2 + 0 = 16$ , which is divisible by 8. Maddy's rule works for 5320.
- b) e.g., The thousands place value and greater place values are divisible by 8, so you only have to divide the number formed by the last 3 digits.
- c) e.g., If the last 2 digits of a number are divisible by 4, the entire number is divisible by 4; the rule makes sense because the hundreds place value and greater place values are divisible by 4.
8. e.g., Dividing by 2 a second time is like dividing by 4; dividing by 2 a third time is like dividing by 8.
9. Look for a pattern in the divisibility rules for 4 and 8, and extend that pattern for 16.

## Mid-Chapter Review, p. 21

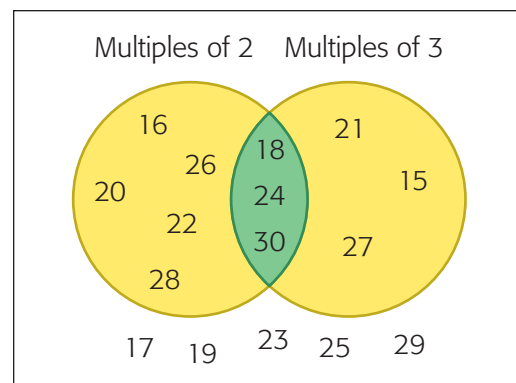
- a)** 10 no, R1; 5 no, R1; 2 no, R1  
**b)** 10 yes, 5 yes, 2 yes  
**c)** 10 no, R8; 5 no, R3; 2 yes
- the height of 5 cubes, because 1405 is divisible by 5 but not by 2 or by 3
- 990
- 22 077
- Yes, 2043 is divisible by both 3 and 9.
- a)** yes    **b)** no, R3    **c)** yes    **d)** yes
- Yes, it is divisible by 6 because it is divisible by 2 (ones digit even) and by 3 (digits sum to 9, which is divisible by 3) and divisible by 9 (digits sum to 9, which is divisible by 9).
- a)** 4 yes, 8 yes  
**b)** 4 yes, 8 yes  
**c)** 4 no, R1; 8 no, R1
- 9992; e.g., 10 000 is divisible by 8, and the greatest multiple of 8 less than 10 000 is  $10\ 000 - 8 = 9992$ .
- e.g., The last 2 digits, 48, are divisible by 4, and the last 3 digits, 048, are divisible by 8. Each place value greater than or equal to 1000 is divisible by both 4 and 8.

## 1.6 Determining Common Multiples, p. 25

- a)** 2, 4, 6, 8, 10  
**b)** 5, 10, 15, 20, 25  
**c)** 6, 12, 18, 24, 30
- 30
- e.g., 5 is a factor because the last digit is 0; 3 is a factor because the sum of the digits is divisible by 3.
- a)** 36    **b)** 12    **c)** 30    **d)** 60
- e.g., 16 packages of buns, 12 packages of soy patties

6. **a)** no    **b)** yes    **c)** no    **d)** no

7. **a)**



- b)** e.g., common multiples of 2 and 3
8. once
9. not always correct

## 1.7 Determining Common Factors, p. 29

- a)** common factors: 1, 5; GCF 5  
**b)** common factors: 1, 2, 3, 6; GCF 6  
**c)** common factors: 1, 5; GCF 5  
**d)** common factors: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48; GCF 48
- 60 cm
- a)** e.g., 2, 3, 5  
**b)** e.g., 2, 4, 8  
**c)** e.g., 3, 5, 9
- a)** yes    **c)** no    **e)** yes  
**b)** yes    **d)** yes
- a)** 150: 5, 15; 200: 100, 5, 20  
**b)** 50
- 110, e.g., 5 is a factor, so the number ends in 0 or 5; it is divisible by 2, so its ones digit is even.
- 1, e.g., The GCF must be a common factor of the two primes. The only two factors of a prime number are 1 and itself; the two primes are different so the only common factor and the GCF is 1.



5. 1

6. 21 456 is divisible by 2 (last digit even) and by 3 (digits sum to 18, which is divisible by 3), so it is divisible by 6.

7. 0, 2, 4, 6, or 8 because  $\blacksquare 8$  must be divisible by 4.

8. yes, 2232 is divisible by 8 and by 4

9. a) e.g., To calculate  $0 \div 3$ , think what number multiplied by 3 equals 0:  $0 \times 3 = 0$  so  $0 \div 3 = 0$ . To calculate  $3 \div 0$ , think what number multiplied by 0 equals 3. No number multiplied by 0 equals 3 because 0 multiplied by any number is 0, so  $3 \div 0$  has no solution.

b) e.g., To get multiples of a number, multiply it by 1, 2, 3, and so on. If you multiply 0 by 1, 2, 3, and so on, you always get 0. If you multiply other numbers by 1, 2, 3, and so on forever, you get an unlimited number of multiples.

10. a) 12th

b) 8, e.g., every 12th car is a green convertible, and there are 8 multiples of 12 less than 100: 12, 24, 36, 48, 60, 72, 84, and 96

c) e.g., Without common multiples, I would have to make a list or draw a diagram. That would take a long time and it would be easy to make a mistake.

11. a) 80; e.g., 160, 240, 320

b) 200; e.g., 400, 600, 800

c) 60; e.g., 120, 180, 240

d) 120; e.g., 240, 360, 480

12. D

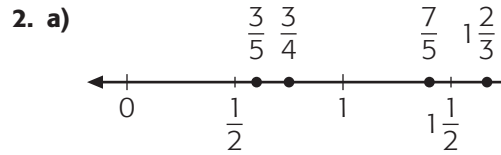
13. 30 cm, e.g., The lengths must be the GCF of 90 and 120, which is 30.

## Chapter 2, p. 41

### 2.1 Comparing Fractions, pp. 47–49

1. a)  $\frac{12}{20}$  and  $\frac{10}{20}$       c)  $\frac{6}{30}$  and  $\frac{2}{30}$

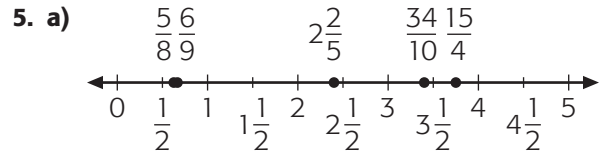
b)  $\frac{5}{8}$  and  $\frac{6}{8}$       d)  $\frac{16}{24}$  and  $\frac{3}{24}$



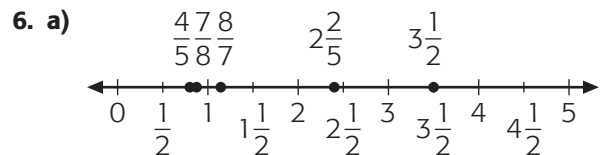
b)  $\frac{3}{5}$ ,  $\frac{3}{4}$ ,  $\frac{7}{5}$ ,  $1\frac{2}{3}$

3. a)  $\frac{3}{7} < \frac{2}{3}$       b)  $\frac{2}{5} < \frac{1}{2}$       c)  $\frac{8}{6} > \frac{4}{8}$

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



b)  $\frac{5}{8}$ ,  $\frac{6}{9}$ ,  $2\frac{2}{5}$ ,  $\frac{34}{10}$ ,  $\frac{15}{4}$



b)  $3\frac{1}{2}$ ,  $2\frac{2}{5}$ ,  $\frac{8}{7}$ ,  $\frac{7}{8}$ ,  $\frac{4}{5}$

7. a)  $\frac{4}{9} < \frac{5}{6}$       b)  $\frac{4}{5} > \frac{1}{6}$       c)  $\frac{8}{3} > \frac{13}{15}$

8. a)  $\frac{3}{8}$       b)  $2\frac{1}{2}$       c)  $\frac{2}{3}$       d)  $\frac{2}{10}$

9. a)  $\frac{8}{5}$       b)  $\frac{3}{8}$       c)  $\frac{21}{9}$

10. Quiz B

11. Yes,  $\frac{6}{8} < \frac{8}{10}$

12. e.g., Alasdair  $\frac{1}{3}$  or  $\frac{1}{5}$ , Briana  $\frac{13}{24}$  or  $\frac{7}{12}$ , Lesya  $\frac{5}{7}$  or  $\frac{17}{24}$

13. e.g., It is often between the original two fractions; no,  $\frac{4}{9}$  can be chosen for  $\frac{3}{5}$  and  $\frac{7}{10}$ , but  $\frac{4}{9} < \frac{3}{5}$  and  $\frac{4}{9} < \frac{7}{10}$

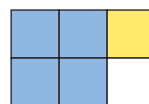
14. e.g., if the numerator is more than half the denominator
15. Explain why it's easier to compare fractions when the numerators are the same than when they are different.

### 2.3 Adding Fractions with Fraction Strips, pp. 54–55

1. a)  $\frac{3}{5} + \frac{1}{2} = \frac{11}{10}$       b)  $\frac{1}{10} + \frac{1}{2} = \frac{6}{10}$
2. a) e.g.,  $\frac{1}{6}$  is less than  $\frac{1}{4}$ , and  $\frac{1}{4} + \frac{3}{4} = 1$ , so  $\frac{1}{6} + \frac{3}{4}$  would be less.  
b)  $\frac{11}{12}$
3. a) e.g., about  $\frac{4}{5}$       c) e.g., about  $1\frac{1}{4}$   
b) e.g., about  $1\frac{1}{4}$       d) e.g., about  $1\frac{1}{2}$
4. a)  $\frac{4}{5}$       c)  $\frac{5}{12}$       e)  $1\frac{1}{6}$   
b)  $\frac{4}{3}$       d)  $\frac{11}{12}$       f)  $1\frac{1}{12}$
5.  $\frac{1}{2}$
6. e.g.,  $\frac{1}{2} + \frac{2}{4}$ ,  $\frac{1}{3} + \frac{6}{9}$ ,  $\frac{3}{4} + \frac{3}{12}$ ,  $\frac{2}{5} + \frac{6}{10}$ ,  $\frac{3}{7} + \frac{12}{21}$ ,  
 $\frac{9}{11} + \frac{6}{33}$
7.  $\frac{7}{12}$
8. e.g., 12 or 24
9. no, e.g.,  $\frac{1}{4} + \frac{1}{3} = \frac{7}{12}$ ; also,  $\frac{1}{2} = \frac{6}{12}$  and  $\frac{6}{12} + \frac{7}{12}$  is more than  $\frac{6}{12} + \frac{6}{12}$ , which is a whole pail.
10. Yes, because you add the second fraction onto the end of the first one, so it has to be greater. If you switched them around, you'd be adding the first onto the end of the second one, so it is greater than that one too.
11. Explain why it is faster to add two fractions with the same denominator.

### 2.4 Subtracting Fractions with Fraction Strips, pp. 58–60


1. a) e.g., Because if you have 4 fifths and take away 2 of them, you have 2 left.  
b) e.g., about  $\frac{1}{2}$       c)  $\frac{3}{10}$
2.  $\frac{7}{12}$
3. a)  $\frac{3}{6}$       b)  $\frac{3}{8}$       c)  $\frac{3}{12}$
4. e.g., All the numerators are 3, and all the denominators are the same as the denominator in the question; it makes sense since if you have 5 parts of something and take away 2 parts, you always have 3 parts left.
5. a) e.g., about  $\frac{1}{3}$       b) e.g., about  $\frac{1}{2}$   
c) e.g., about  $\frac{3}{4}$
6. a)  $\frac{1}{2}$       c)  $1\frac{11}{12}$       e)  $\frac{1}{10}$   
b)  $1\frac{3}{4}$       d)  $1\frac{1}{12}$       f)  $\frac{5}{6}$
7. a) e.g.,



- b)  $\frac{3}{6}$  or  $\frac{1}{2}$       c)  $\frac{1}{6}$
8. a)  $\frac{3}{10}$   
b) e.g., I know the answer is less than  $\frac{1}{2}$ , which is  $\frac{5}{10}$ , but more than  $\frac{1}{5}$ , which is  $\frac{2}{10}$ , so  $\frac{3}{10}$  makes sense.
9. e.g., yes



$1 - \frac{2}{3}$  is the white part of the  $\frac{2}{3}$  bar. If you subtract the white part of the  $\frac{3}{4}$  bar (which is  $\frac{1}{4}$ ), what is left is the difference you were looking for.

10. a)  $\frac{1}{12}$       b)  $\frac{2}{12}$       c)  $\frac{1}{12}$
11. a) 
- b) It takes  $\frac{1}{4}$  to get from  $\frac{3}{4}$  to 1 and another  $\frac{1}{3}$  to get to  $\frac{4}{3}$ , so you add  $\frac{1}{4}$  and  $\frac{1}{3}$ .
- c)  $\frac{7}{12}$
12. a) e.g., about  $\frac{1}{3}$   
 b) e.g., about  $\frac{1}{5}$   
 c) e.g., about  $\frac{1}{8}$
13. e.g., between none of the performers and  $\frac{1}{4}$  of them since the greatest fraction that will play music is  $\frac{1}{4}$ :  $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$  and  $1 - \frac{3}{4} = \frac{1}{4} + \frac{1}{2} = \frac{3}{4}$
14. a) e.g., Model  $\frac{5}{12}$  and  $\frac{1}{4}$ .



- b)  $\frac{8}{12}$       c)  $\frac{2}{12}$       d) e.g., Yes
15. Explain how the use of common denominators makes addition and subtraction similar.

## 2.6 Subtracting Fractions with Grids, pp. 65–66

1. a)  $\frac{7}{15}$       b)  $\frac{14}{24}$
2.  $\frac{3}{12}$  or  $\frac{1}{4}$
3. a)  $\frac{2}{15}$       c)  $\frac{1}{21}$       e)  $\frac{7}{20}$   
 b)  $\frac{1}{12}$       d)  $\frac{5}{24}$       f)  $\frac{7}{20}$
4. a) e.g., Half of  $\frac{1}{3}$  is  $\frac{1}{6}$ , and  $\frac{1}{5}$  is more, so she phoned more on Saturday.  
 b)  $\frac{2}{15}$

5.  $\frac{5}{8}$ , e.g., I know the answer is more than a half, and  $\frac{3}{4}$  is  $\frac{6}{8}$ , so  $\frac{5}{8}$  is reasonable.
6. e.g., The gas tank started at  $\frac{7}{8}$  full. After the ride to his grandmother's, Jeff's gas gauge read  $\frac{1}{2}$  full. How much of the tank did he use?  $\frac{3}{8}$ . It makes sense, since  $\frac{1}{2}$  is  $\frac{4}{8}$ , and 4 eighths and 3 eighths should be 7 eighths.
7. A: e.g., always true since both are greater than  $\frac{1}{2}$  but less than 1. B: e.g., sometimes true. I know  $\frac{11}{12} - \frac{7}{12} = \frac{4}{12}$  and that's more than  $\frac{1}{4}$ , but  $\frac{5}{6} - \frac{2}{3} = \frac{1}{6}$  and that's less than  $\frac{1}{4}$ .
8. e.g., an eighth note
9. Explain why you prefer one method over the other.

## Mid-Chapter Review, p. 69

1. a)  $\frac{18}{30}$  and  $\frac{10}{30}$   
 b)  $\frac{6}{10}$  and  $\frac{2}{10}$   
 c)  $\frac{9}{30}$  and  $\frac{8}{30}$
2. a)  $\frac{2}{3}$       b)  $\frac{2}{3}$       c)  $\frac{7}{5}$
3.  $\frac{1}{9}$ ,  $\frac{2}{3}$ ,  $\frac{5}{6}$ ,  $\frac{8}{5}$ ,  $\frac{7}{3}$ ,  $3\frac{1}{4}$
4. a) estimate: about  $1\frac{1}{2}$ ; calculation:  $\frac{7}{5}$   
 b) estimate: a little more than 1; calculation:  $1\frac{1}{12}$   
 c) estimate: a little less than 1; calculation:  $1\frac{1}{10}$   
 d) estimate: a little less than  $1\frac{2}{3}$ ; calculation:  $\frac{19}{12}$
5.  $\frac{5}{12}$
6. a)  $\frac{3}{10}$       b)  $\frac{16}{12}$       c)  $\frac{3}{10}$       d)  $\frac{8}{12}$
7. e.g., about  $\frac{1}{2}$

8. A, C, D
- A. e.g., Answer is more than  $\frac{3}{4}$ , so it's more than  $\frac{1}{2}$ . It's less than  $1\frac{1}{2}$  since you'd have to add  $\frac{3}{4}$  again, not just  $\frac{1}{5}$  to get that high.
- B.  $\frac{3}{4} + \frac{3}{4} = 1\frac{1}{2}$ , but  $\frac{5}{6}$  is greater than  $\frac{3}{4}$ , so  $\frac{3}{4} + \frac{5}{6}$  is greater than  $1\frac{1}{2}$ .
- C. It's more than  $\frac{1}{2}$  since you are adding to  $\frac{1}{2}$ , and it's not  $1\frac{1}{2}$  since you're adding less than 1 to the  $\frac{1}{2}$ .
- D. It's more than  $\frac{1}{2}$  since  $\frac{2}{3}$  is already more than  $\frac{1}{2}$ , and it's less than 1 since you're adding less than  $\frac{1}{3}$  to  $\frac{2}{3}$ .
9. a) 2 by 3                      c) 3 by 5  
b) 1 by 5                        d) 2 by 4

## 2.7 Adding and Subtracting Fractions with Number Lines, pp. 72–73

1. a)  $\frac{11}{12}$                       b)  $\frac{8}{15}$   
2. a)  $\frac{9}{20}$                         b)  $\frac{1}{20}$   
3. a)  $\frac{7}{6}$                       b)  $\frac{14}{12}$                       c)  $\frac{2}{9}$                       d)  $\frac{11}{21}$   
4.  $\frac{3}{8}$   
5.  $\frac{9}{35}$   
6.  $\frac{4}{15}$   
7. a) yes, e.g.,  $\frac{2}{4}$  and  $\frac{1}{3}$                       b) yes, e.g.,  $\frac{4}{4} - \frac{1}{6}$   
8. e.g., The part of the long arrows that isn't covered by the short arrows is the same, so the subtractions are the same too.  
9. Explain why you find one method more convenient than another.

## 2.9 Adding and Subtracting Fractions, pp. 77–78

1. a)  $\frac{2}{5}$                       b)  $\frac{7}{6}$                       c)  $\frac{1}{8}$                       d)  $\frac{20}{21}$   
2.  $\frac{2}{3} > \frac{1}{5}$ ;  $\frac{7}{15}$  greater

3. C, D
4. a) e.g., about  $\frac{1}{4}$   
b) e.g., 20 since the fraction  $\frac{1}{20}$  was used
5. e.g.,  $\frac{2}{3} + \frac{3}{5} + \frac{6}{15} = \frac{25}{15}$
6. B, C, D
7. Yes; the answers are equivalent.
8. a)  $\frac{23}{21}$                       b)  $\frac{41}{35}$                       c)  $\frac{55}{36}$                       d)  $\frac{5}{12}$
9.  $\frac{7}{12}$
10. A. false, e.g., The sum would be less than  $\frac{2}{8}$ , or  $\frac{1}{4}$ .  
B. true, e.g., It could be  $\frac{1}{5} + \frac{1}{20}$ .  
C. false, e.g.,  $\frac{2}{5}$  is already more than  $\frac{1}{4}$ .  
D. true, e.g.,  $\frac{1}{10}$  and  $\frac{3}{20}$
11. e.g., about  $\frac{1}{3}$
12. B,  $\frac{1}{30}$
13. e.g., if there was a  $\frac{1}{2}$  can of paint you were adding to a  $\frac{1}{3}$  can and a  $\frac{1}{4}$  can
14. about  $\frac{13}{24}$
15. Explain how to add fractions with different denominators and then subtract the result.

## 2.10 Adding and Subtracting Mixed Numbers, pp. 84–85

1. a)  $5\frac{5}{8}$                       b)  $2\frac{5}{12}$                       c)  $1\frac{1}{4}$                       d)  $8\frac{17}{24}$   
2.  $5\frac{1}{2}$   
3. a)  $3\frac{11}{12}$                       b)  $5\frac{14}{15}$                       c)  $1\frac{4}{5}$                       d)  $1\frac{11}{12}$   
4. a)  $2\frac{1}{3}$                       b)  $1\frac{3}{5}$                       c)  $8\frac{17}{30}$                       d)  $9\frac{7}{20}$   
5.  $2\frac{1}{2}$  squares  
6.  $\frac{5}{6}$  hours, e.g.,  $1\frac{1}{2} + \frac{2}{3}$  is a bit more than 2, so there should be a bit less than 1 hour left and that's what I got.  
7.  $\frac{1}{4}$  boxes  
8. e.g., A, C, B, D



9. a)  $9\frac{3}{4}$       b)  $1\frac{11}{12}$
10.  $4\frac{7}{8}$
11.  $3\frac{2}{3}$  pages
12. e.g., Suppose there are  $3\frac{1}{4}$  pizzas left and people eat  $1\frac{1}{2}$  of them, and you want to know how many pizzas are left.
13. e.g., when the two fraction parts add to 1
14. 7 or 8, e.g., depending on if the two fraction parts added to more than 1
15. e.g., because he was thinking of the difference on a number line. He needed  $\frac{1}{3}$  to get up to 3 and then another  $4\frac{1}{8}$  to get up to  $7\frac{1}{8}$ .
16. a) e.g., just estimate as  $12 - 2$   
 b) e.g., add a bit too much since it's easier, and then take away the extra you added
17. e.g.,  $\frac{1}{6} + 1 + \frac{3}{6} = 1\frac{4}{6}$ ;  
 $\frac{27}{6} - \frac{17}{6} = \frac{10}{6}$ ;  
 $4\frac{1}{2} + \frac{1}{6} = 4\frac{4}{6}$ ;  $2\frac{5}{6} + \frac{1}{6} = 3$ ;  $4\frac{4}{6} - 3 = 1\frac{4}{6}$

## 2.11 Communicate about Estimation Strategies, p. 88

- e.g., The distance from 3 to 4 is 1. So, the distance from  $2\frac{1}{2}$  to 4 is  $1\frac{1}{2}$ . Therefore, a little more than  $1\frac{1}{2}$  packages will be left.
- e.g.,  $1\frac{5}{6}$  is close to 2. It is  $3\frac{1}{2}$  from 2 to  $5\frac{1}{2}$ . Therefore, a little more than  $3\frac{1}{2}$  packages are left. It doesn't say you need an exact answer, so an estimate should be enough.
- e.g.,  $2\frac{1}{3} + 2\frac{1}{3} + 2\frac{1}{3} = 6\frac{3}{3}$  or 7; another  $2\frac{1}{3}$  gets to  $9\frac{1}{3}$ , so about 4 batches; a whole number estimate is good enough because she probably won't make a fraction of a batch.

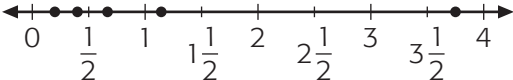
- e.g.,  $3\frac{4}{5}$  bags are a little less than 4 bags.  
 $2\frac{3}{4}$  bags are a little less than 3 bags.  
 $4 \text{ bags} + 3 \text{ bags} = 7 \text{ bags}$   
 $9 \text{ bags} - 7 \text{ bags} = 2 \text{ bags}$   
 Therefore, a little more than 2 bags of straw will be left.
- e.g., They probably have a little more than  $1\frac{1}{2}$  boxes each. They each collected more than 1 box, but less than 2. If they each collected about  $1\frac{1}{2}$  boxes, the total would be  $3 + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 4\frac{1}{2}$ , which is close to 5. This estimate is as good as I can do, because the question says "almost" 5 boxes.

## Chapter Self-Test, pp. 89–90

- $\frac{4}{9}, \frac{3}{5}, \frac{8}{5}$
- a)  $\frac{1}{3}$       b)  $\frac{3}{5}$       c)  $\frac{12}{5}$
- e.g., 2 and 9, or 6 and 18
- a) green and blue      b)  $\frac{1}{2}$
- a)  $\frac{5}{8}$ , e.g.,  $\frac{3}{8}$  is almost  $\frac{1}{2}$ , so adding  $\frac{1}{4}$  should give just over a half, so  $\frac{5}{8}$  is reasonable.  
 b)  $1\frac{3}{20}$ , e.g.,  $\frac{2}{5}$  is a little more than  $\frac{1}{4}$ , so the answer should be a little over 1, so  $1\frac{3}{20}$  is reasonable.
- $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$
- a)  $\frac{1}{8}$       b)  $\frac{1}{20}$
- $\frac{1}{5}$
- a)  $\frac{5}{12}$       b)  $\frac{5}{24}$   
 c) e.g., How much time does Luke spend in school and sleeping altogether?
- $\frac{31}{40}$ , e.g., Write  $\frac{3}{8}$  and  $\frac{2}{5}$  as equivalent fractions with the same denominator and then add:  $\frac{3}{8} + \frac{2}{5} = \frac{15}{40} + \frac{16}{40} = \frac{31}{40}$

11. a)  $\frac{7}{18}$       b)  $\frac{13}{40}$   
 12. a)  $6\frac{23}{36}$     b)  $3\frac{9}{10}$     c)  $\frac{4}{5}$       d)  $1\frac{4}{7}$   
 13. e.g., The fraction parts are the same.

### Chapter Review, pp. 93–94

1. e.g.,  $\frac{2}{3}$ ,  $\frac{5}{6}$ , and  $\frac{11}{10}$ .
2. a)  $\frac{1\frac{2}{5} \frac{2}{5} \frac{2}{3} \frac{8}{7}}{15\frac{1}{4}}$
- 
- b)  $\frac{1}{5}, \frac{2}{5}, \frac{2}{3}, \frac{8}{7}, \frac{15}{4}$
3. a)  $\frac{3}{5}$       b)  $\frac{1}{3}$       c)  $\frac{5}{3}$       d)  $\frac{9}{4}$
4. a)  $\frac{13}{12}$     b)  $\frac{3}{8}$       c)  $\frac{7}{8}$       d)  $1\frac{1}{10}$
5. a)  $\frac{5}{21}$     b)  $\frac{3}{12}$     c)  $\frac{1}{6}$       d)  $\frac{3}{20}$
6. a)  $\frac{11}{12}$     b)  $\frac{1}{12}$
7.  $\frac{2}{15}$
8. a) greater than 1, e.g.,  $\frac{5}{7}$  is greater than half and  $\frac{2}{3}$  is only  $\frac{1}{3}$  away from 1  
 b) not greater than 1, e.g.,  $\frac{5}{6}$  is  $\frac{1}{6}$  away from 1 and  $\frac{1}{7}$  is less than that, so you don't get all the way to 1
9. a)  $1\frac{8}{21}$     b)  $\frac{41}{42}$
10. a)  $\frac{31}{35}$     b)  $1\frac{5}{9}$     c)  $\frac{1}{30}$     d)  $\frac{1}{15}$
11. a)  $2\frac{9}{10}$     b)  $5\frac{2}{9}$     c)  $3\frac{5}{7}$
12.  $1\frac{1}{6}$  h
13. a) yes, e.g., since it's  $2\frac{3}{4}$   
 b) no, e.g., because  $\frac{1}{10}$  is really small  
 c) no, e.g., since  $\frac{2}{3} + \frac{4}{7}$  is more than 1  
 d) yes, e.g., since  $1\frac{9}{13}$  is greater than 1 but less than 2, and  $\frac{3}{5}$  is less than 1

## Chapter 3, p. 97

### 3.2 Adding and Subtracting Decimals, pp. 104–105

1. a) e.g., about 10      b) e.g., about 5  
 2. a) 7.94                  b) 1.626  
 3. a) e.g., about 37      c) e.g., about 49  
 b) e.g., about 74      d) e.g., about 540  
 4. a) 23.776      c) 3.039      e) 625.742  
 b) 380.881      d) 231.152    f) 0.923  
 5. Yes, she has enough wire fence.  
 $6.6 \text{ m} + 2.1 \text{ m} + 7.2 \text{ m} = 15.9 \text{ m}$  is greater than 14.6 m. She has  
 $15.9 \text{ m} - 14.6 \text{ m} = 1.3 \text{ m}$  more.  
 6. 14.81 s  
 7. a) e.g., 4.26 and 0.82  
 b) 5.08  
 c) 3.44  
 d) e.g., greatest 10.98, least 0.12  
 8. 0.48 L  
 9. e.g., a 200 m race  
 10. Explain when you might subtract to determine an exact answer and when you might estimate.

### 3.3 Multiplying by Numbers Less than 1, pp. 108–109

1. a) 0.24    b) 0.14  
 2. a) \$0.36, estimate e.g., \$0.40  
 b) \$0.49, estimate e.g., \$0.45  
 3. a) 0.68    b) 6.08  
 4. a) 0.18    b) 0.56  
 5. e.g., c), a), e), b), d), f); check: a) 1.04  
 b) 2.94    c) 0.3    d) 3.18    e) 1.12    f) 4.2

6.  $0.6 \times 8.7 = 5.22$
7.  $1.08 \text{ m}^2$
8. \$1.61
9.  $1.05 \text{ m}^2$  greater
10. e.g., When you multiply by 0.5, it's like taking half. It's easier to take half of 0.64 than to try to multiply  $0.64 \times 0.7$ .
11. Use your knowledge of what happens when a number is multiplied by a decimal less than 1.

### 3.4 Multiplying by Numbers Greater than 1, pp. 112–113

1. a) 6.80    b) 58.30
2. a) estimate e.g., 20; answer 16.2  
b) estimate e.g., 36; answer 35.467
3. a) 3.756            c) 57.184 9  
b) 49.44            d) 3627.978
4. e.g., a), c), e), f), b), d); check: a) 58.05  
b) 1.17    c) 7.902 08    d) 0.066    e) 3.7067  
f) 3.5665
5. a) 557.052; estimate e.g., 450  
b) 0.797 94; When a number is multiplied by a decimal less than 1, the product will be less than the number, so the product is less than 1.023.  
c) 33.4085, estimate e.g.,  $1 \times 30 = 30$   
d) 591.30, estimate e.g.,  $55 \times 10 = 550$
6. e.g.,  $0.4 \times 5.0$ ,  $1.8 \times 4.9$ ,  $4.562 \times 2.120$
7.  $16.72 \text{ m}^2$
8. \$1.88 or \$1.87
9.  $4.1 \text{ m}^2$
10. Miguel: 1.8 m  
Romona: 1.7 m
11. \$46.25
12. e.g., yes, because \$0.85 is less than \$1
13. \$7.65
14. e.g., No, she does not even have enough for one coat because the ceiling has an area of about 4 m by 4 m, or  $16 \text{ m}^2$ , which is more area than the can will cover.
15. \$6890.00
16. Explain why Meagan's statement is incorrect.

### 3.5 Solve Problems Using Guessing and Testing, p. 117

1. 7 of width 20.3 cm, 7 of width 15.6 cm, and 8 of width 8.4 cm
2. a) e.g., 46.8 cm long, 46.8 cm wide or 50.0 cm long, 43.6 cm wide  
b) 46.8 cm long, 46.8 cm wide
3. 4 m long, 2 m wide
4. 31.2 m long, 31.2 m wide
5. a) e.g., 5 cm high, 8 cm long  
b) yes, e.g., 4 cm high, 10 cm length
6. e.g., Model A: 7.7 m long, 7.7 m wide; Model B: 10.8 m long, 5.4 m wide
7. e.g., 160 squares, each with side length of 11 cm; 40 squares, each with side length of 22 cm

### Mid-Chapter Review, p. 119

1. e.g., d), a), b), c); check: a) 8.91    b) 87.282  
c) 119.978    d) 2.133
2. e.g., by estimating  
a) e.g., about 12            c) e.g., about 240  
b) e.g., about 100        d) e.g., about 23
3. a) e.g., yes            b) \$1.82 left over
4. a) 0.18                b) 0.24
5. e.g., d), c), a), b); check: a) 2.952    b) 2.2869  
c) 7.42    d) 13.23
6. \$32.36
7.  $12.3 \text{ cm}^3$

8. 7.400 cm
9. 4781.10 g

### 3.6 Dividing by Numbers Less than 1, p. 123

1. a) 20                      b) 26
2. a) e.g., about 8        b) e.g., about 6
3. a) 5.5                    b) 5.1
4. a) 9.0    b) 7.0    c) 5.0        d) 41.3
5. a) 6.00                  c) 72.86        e) 6.75  
b) 62.00                  d) 82.2        f) 2285.2
6. a) 12 pieces        b) 17 pieces
7. 4 glasses, plus some more water left over
8. 7696.92 s
9. e.g., 11 full boxes plus one half box
10. 50 dice
11. e.g., Division is the reverse of multiplication.
12. Use your knowledge of what happens when a number is divided by a decimal less than 1.

### 3.7 Dividing by Numbers Greater than 1, pp. 126–127

1. a) 3.0    b) 5.5
2. a) 2.3, e.g., calculator  
b) 10, e.g., noticed that  $5.050 \times 10 = 50.50$
3. \$7.50
4. a) 3        b) 2.5        c) 15        d) 3.6
5. e.g., b), a), d), c), e), f); check: a) 3.5    b) 1  
c) 6.8    d) 4.5    e) 22.2    f) 22.33
6. a) correct answer is 1.71  
b) correct answer is 5.93  
c) correct  
d) correct answer is 0.40
7. a) 115 dimes                      c) 46 quarters  
b) 230 nickels                      d) 1150 pennies

8. a) 14 pieces plus some left over  
b) 8 pieces plus some left over  
c) 16 pieces plus some left over  
d) 22 pieces plus rope left over

9. 22 L
10. 22.5 h
11. 12.5 g
12. a) 1.5 m                      b) 1.7 m
13. 8 min
14. 146.667 g
15. e.g., Problem: There are 3 identical pencils in a box. The total mass of the box is 142.4 g, and the empty box has a mass of 18.8 g. What is the mass of each pencil? Solution: Subtract  $142.4 - 18.8 = 123.6$  to determine the mass of the 3 pencils. Divide by 3 to determine the mass of one pencil:  $123.6 \div 3 = 41.2$  on my calculator. The mass of each pencil is 41.2 g.
16. Use your knowledge of what happens to a number when it is divided by a decimal greater than 1.

### 3.8 Using the Order of Operations with Decimals, pp. 130–131

1. 5.1
2. D
3. a) 8.02    b) 6.32
4. a) correct  
b) correct answer 14.4  
c) correct answer 34.26  
d) correct answer 18.7  
e) correct
5. e.g., yes
6. a) The numerical expression requires you to divide 5.8 by 2, then add the result to  $6.2 \times 2$



- b)  $(6.2 \times 2 + 5.8) \div 2$   
 c) 9.1
7. a) 67    b) 8.8    c) 205.7    d) 1
8. a) 2.64    b) 12.7
9. a)  $(5.2 + 8.6) \times 6.2$   
 b)  $(5.24 + 8.6) \times 6 - 5.2$   
 c)  $9.6 \div 3.2 \times 6.1 - 8.5$
10. Division and multiplication are each represented by a letter in BDMAS, but they are done in the same step. The same is true for addition and subtraction.

### 3.9 Expressing Fractions as Decimals, pp. 135–137

1. a)  $0.\overline{5}$     b)  $0.\overline{13456}$
2. a)  $0.3125 > 0.\overline{2}$   
 b)  $0.\overline{63} > 0.625$   
 c)  $0.85 > 0.\overline{78571428}$
3. a) terminates    c) repeats  
 b) repeats    d) terminates
4. a)  $\frac{13}{80}$     b)  $\frac{171}{200}$
5. a) 0.56    c) 0.0625    e) 0.95  
 b) 0.625    d) 0.8    f) 0.6875
6. a)  $0.\overline{16}$     c)  $0.\overline{63}$     e) not repeating  
 b)  $0.\overline{8}$     d)  $0.4\overline{6}$     f)  $0.5\overline{13}$
7. a) repeats    d) terminates  
 b) terminates    e) repeats  
 c) repeats    f) terminates
8. b)  $0.2\overline{7}$ ,  $0.\overline{4}$ ,  $0.59375$ ,  $0.6$ ,  $0.8\overline{3}$ ,  $0.9375$
9. a)  $\frac{8}{9999}$ ,  $\frac{8}{99999}$ ,  $\frac{8}{999999}$   
 b)  $0.\overline{8}$ ,  $0.\overline{08}$ ,  $0.00\overline{8}$ ,  $0.000\overline{8}$ ,  $0.0000\overline{8}$ ,  $0.00000\overline{8}$   
 c) repeating decimal, with 8 as last digit
10. a)  $0.\overline{142857}$     b)  $0.285\overline{714}$     c)  $0.428\overline{571}$
11. a) When the numerator increases by 1, add  $\frac{1}{7}$ .  
 b)  $0.571\overline{428}$ ,  $0.714\overline{285}$
12. a)  $<$     b)  $=$     c)  $>$     d)  $>$     e)  $<$     f)  $>$
13. a)  $\frac{1}{8}$ ,  $0.35$ ,  $0.\overline{39}$ ,  $\frac{5}{7}$ ,  $\frac{9}{10}$   
 b)  $\frac{27}{50}$ ,  $\frac{5}{9}$ ,  $0.56$ ,  $0.5\overline{6}$ ,  $0.5\overline{6}$
14. a)  $0.\overline{6}$     b)  $0.\overline{1}$     c)  $0.0\overline{3}$     d)  $1.\overline{3}$
15. a)  $0.08\overline{3}$     c)  $0.022\overline{7}$   
 b)  $0.03\overline{571428}$     d)  $0.019\overline{23076}$
16. a) e.g., All the decimal equivalents have a repeating period that starts in the thousandths.  
 b) e.g., The denominators are all multiples of 4.
17. a)  $\frac{1}{3}$   
 b)  $0.\overline{3}$   
 c) 33¢, 33¢, 34¢, so total is \$1  
 d) e.g., Three friends buy a toy that costs \$2. How much should each pay? (66¢, 66¢, 67¢)
18. Explain how you can tell there is no equivalent fraction with a denominator that is a 10, 100, 1000, or so on.

### 3.10 Expressing Decimals as Fractions, p. 140

1. a)  $\frac{81}{500}$     b)  $\frac{7}{90}$     c)  $\frac{27}{99}$
2. a)  $\frac{3}{8} > \frac{1}{4}$     b)  $\frac{23}{100} > \frac{1}{7}$     c)  $\frac{211}{250} < \frac{22}{25}$
3. a)  $\frac{14}{99}$     c)  $\frac{7}{90}$     e)  $\frac{27}{99}$   
 b)  $\frac{273}{999}$     d)  $4\frac{17}{99}$     f)  $\frac{767}{999}$
4. a)  $0.416 > \frac{1}{4}$     c)  $0.\overline{6} = \frac{2}{3}$   
 b)  $0.52 > \frac{1}{2}$     d)  $0.6 < \frac{2}{3}$
5. a) C    b) D    c) A    d) B
6. e.g.,  $\frac{9}{20}$  is equivalent to 0.45, which is less than  $0.4\overline{5}$
7. e.g., 0.729 is equivalent to  $\frac{729}{1000}$

## Chapter Self-Test, p. 143

- a)** 14.79      **c)** 3.82  
**b)** 18.37      **d)** 786.63
- a)**  $>$       **b)**  $<$
- 2 videos
- \$1.37
- a)** 3.726      **c)** 120.52  
**b)** 22.2345      **d)** 2872.0905
- \$77.5¢/L
- a)** 4      **b)** 8.8
- a)** terminates      **c)** repeats  
**b)** terminates      **d)** repeats
- a)** 0.85      **c)**  $0.\overline{67}$   
**b)** 0.6875      **d)**  $0.\overline{285\ 714}$
- a)**  $\frac{33}{50}$       **b)**  $1\frac{1}{3}$       **c)**  $256\frac{179}{200}$       **d)**  $73\frac{25}{99}$

## Chapter Review, pp. 145–146

- a)** 374.1      **b)** 934.02
- 10.15 m
- a)** estimate e.g., 27; calculation 27.2  
**b)** estimate e.g., 6; calculation 6.76
- a)** 18.29      **b)** 29.899
- yes
- a)** 7.2, e.g., pencil and paper  
**b)** 129, e.g., calculator  
**c)** 22.8, e.g., calculator  
**d)** 0.54, e.g., hundred grid
- a)** e.g., Mariette has a bigger table even though it is 0.1 m shorter and 0.1 m wider. The fraction by which it is shorter is much smaller than the fraction by which it is wider.  
**b)** Mariette's table area  $0.32\text{ m}^2$ ; Julie's table area  $0.27\text{ m}^2$
- e.g., The answer will be less than both the numbers.
- a)** e.g., Yes, because if she buys single fares it will cost \$58.75, which is more than \$45.75.  
**b)** e.g., No, because if he buys single fares, it will cost \$42.30, which is less than \$45.75.
- 7.78 L
- 13, including the top one
- e.g., I estimated 100 pieces. The piece of string was about 25 m long, which is  $100 \times 0.25$ . An estimate of 100 pieces of string 0.25 m long seems appropriate.
- e.g., c), d), b), a); check: **a)** 12.3      **b)** 10.0  
**c)** 3.0      **d)** 3.0
- 2850 sheets of paper
- about 43
- a)** estimate e.g., 37; calculation 33.9  
**b)** estimate e.g., 3.3; calculation 3.4
- a)**  $\frac{4}{5}$       **b)**  $\frac{147}{200}$       **c)**  $\frac{23}{25}$       **d)**  $\frac{1}{4}$
- a)** terminates      **c)** repeats  
**b)** repeats      **d)** terminates
- a)** 0.44      **c)**  $0.8\overline{6}$   
**b)**  $0.8\overline{3}$       **d)** 0.375
- $\frac{2}{9}$ , 0.25, 0.252 525 ..., 0.2555 ...,  $\frac{13}{15}$
- a)**  $\frac{63}{100}$       **b)**  $\frac{7}{11}$
- e.g., Martin is painting a wall that is 2.4 m high by 3.6 m wide. There is a window in the wall that is 1.0 m high by 1.4 m wide. One small can of paint covers  $1.5\text{ m}^2$ . How many cans of paint does Martin need to paint the wall?  
Solution: Subtract the area of the window from the total area of the wall, and divide the result by the amount that a can of paint will cover. An expression for this is  $((2.4 \times 3.6) - (1.0 \times 1.4)) \div 1.5 = 4.8$ . Martin will need 5 cans of paint.

## Cumulative Review: Chapters 1–3, pp. 148–149

1. C      6. A, B      11. B      16. A, C, D  
2. D      7. A, B      12. A      17. C  
3. D      8. A      13. B      18. B  
4. B      9. A, C      14. A      19. B  
5. C      10. A, B, C, D      15. A      20. A

## Chapter 4, p. 151

### 4.1 Percents as Fractions and Decimals, pp. 156–157

1. a) 12      b) 4      c) 10      d) 15  
2.  $\frac{9}{25}$   
3. a) 1      b) 17      c) 33      d) 1  
4.  $\frac{7}{20}$   
5. a)  $\frac{11}{50}$       b)  $\frac{1}{20}$       c)  $\frac{3}{10}$       d)  $\frac{18}{25}$   
6. a) 0.03      b) 0.94      c) 1.00 or 1      d) 0.4  
7. 60%, 0.6,  $\frac{3}{5}$   
9% 0.09,  $\frac{9}{100}$   
3%, 0.03,  $\frac{3}{100}$   
44%, 0.44,  $\frac{11}{25}$   
24%, 0.24,  $\frac{6}{25}$   
50%, 0.5,  $\frac{1}{2}$   
100%, 1.0,  $\frac{1}{1}$   
12%, 0.12,  $\frac{3}{25}$   
8. a) C      b) D      c) A      d) B  
9. wool  $\frac{3}{5}$ , polyester  $\frac{3}{10}$ , nylon  $\frac{1}{10}$   
10. a) =      c) >      e) =  
b) >      d) >      f) <  
11. a) e.g.,  $\frac{1}{3}$       c) e.g.,  $\frac{2}{3}$   
b) e.g.,  $\frac{1}{7}$       d) e.g.,  $\frac{1}{10}$

12. a) blue 20%, white 32%, black 24%, red 24%  
b) blue  $\frac{1}{5}$ , white  $\frac{8}{25}$ , black  $\frac{6}{25}$ , red  $\frac{6}{25}$   
13. a) 20%, 80%      b)  $\frac{1}{5}, \frac{4}{5}$   
14. a) 15%      b) 38  
15. Explain how to compare two fractions with the same numerator.

### 4.3 Estimating Percents, p. 162

1. e.g.,  $\frac{10}{20}$   
2. a) e.g., 10      b) e.g., 20  
3. e.g.,  $\frac{9}{38}$  is close to  $\frac{10}{40}$ , which is 25%  
4. a) e.g., 10% of 27 is 2.7  
b) e.g.,  $\frac{1}{3}$  of 60 is 20  
c) e.g., 75% of 24 is 18  
d) e.g., 90% of 50 is 45  
5. a) e.g., greater      c) e.g., less  
b) e.g., about the same      d) e.g., greater  
6. a) e.g.,  $\frac{12}{24}$  is  $\frac{1}{2}$  or 50%  
b) e.g.,  $\frac{20}{80}$  is  $\frac{1}{4}$  or 25%  
c) e.g.,  $\frac{60}{300}$  is  $\frac{1}{5}$  or 20%  
d) e.g.,  $\frac{30}{150}$  is  $\frac{1}{5}$  or 50%  
7. a) e.g., greater      c) e.g., less  
b) e.g., less      d) e.g., less  
8. Not enough students have signed up.  
9. e.g., about 300 people  
10. e.g.,  $\frac{19}{26}$  is close to  $\frac{20}{25}$ , which is 80%, so you do not need an exact answer.  
11. Provide examples as to when a percent can be estimated and when it needs to be calculated exactly.

### 4.4 Using Percents to Make Comparisons, p. 165

1. a) 40%, 40%      b) equal records  
2. first day

3. Tom's punch
4. second day
5.  $\frac{47}{50}, \frac{28}{30}, \frac{37}{40}, \frac{23}{25}$
6. a) Tara \$2, Jolene \$2.10  
b) Tara  $\frac{2}{25}$ , Jolene  $\frac{7}{100}$   
c) Tara
7. small chance of rain, but may still rain  
(less than 50%, more than 0%)
8. e.g., in days, 10% of 365 is 36.5  
 $36.5 > 7$
9. The rates are the same.
10.  $\frac{3}{5} = 60\%$   
 $\frac{4}{6} = \frac{2}{3}$ , about 66%  
 $60\% < 66\%$ ;  
 $\frac{3}{5} = \frac{18}{30}$   
 $\frac{4}{6} = \frac{20}{30}$   
 $\frac{18}{30} < \frac{20}{30}$

### Mid-Chapter Review, pp. 166–167

1. a) 1¢    b) 72¢    c) 100¢    d) 40¢
2. a) <    b) =    c) >    d) >
3. a) 40%    b) 60%
4. a) e.g., 80%    c) e.g., 25%  
b) e.g., 40%    d) e.g., 50%
5. a) reasonable    c) not reasonable  
b) reasonable    d) reasonable
6. a) 10% of 40 and 5% of 40; \$6  
b) 1% of 40; \$2.40
7. 12 kg
8. science test
9. Tracy
10. the phone cards that are now \$10

### 4.5 Calculating with Percents, pp. 172–173

1. a)  $6 + 3 = 9$     b)  $\frac{15}{100} = \frac{3}{20}, \frac{3 \times 3}{20 \times 3} = \frac{9}{60}$
2. a) 225    b) 450
3. a) e.g., \$4.05    b) e.g., \$1.95
4. a) 10    c) 9    e) 30  
b) 18    d) 6    f) 110
5. a) 30    c) 70    e) 160  
b) 88    d) 16    f) 125
6. 5%
7. 48
8. e.g., 3793
9. a) \$1500    b) \$7500
10. yes, 20% tip
11. O: 1125, A: 1025, B: 250, AB: 100
12. 250
13. 66%

### 4.6 Solve Problems that Involve Decimals, pp. 177–178

1. a) \$3.50    b) \$2.80    c) \$6.29    d) 240
2. a) \$0.90    b) \$3.60
3. a) \$20.03    c) \$1.26  
b) \$51.93    d) \$296.79
4. \$44 635
5. \$191.21
6. \$331
7. 8%
8. a) \$21.60    b) \$24.41 (PST, GST)
9. a) e.g., with \$49.99: \$52.99, \$53.49, \$53.99  
b) e.g., because 1% of something that costs more is greater
10. e.g., Give an example of how to calculate sales tax on an item.



## 4.7 Solve Problems Using Logical Reasoning, pp. 182–183

- 25
- \$52
- a) 3      b) 12
- e.g., about 33.6 km each hour
- 624 students
- e.g., The computer that is 70% of \$1499 is about  $7 \times \$150 = \$1050$ . The computer that is 60% of \$1699 is about  $6 \times \$170 = \$1020$ ; this is the lower price.
- a) 15 L      b) 165 L      c) 24.75 L
- 18 years
- a) 18      b) e.g., 7
- a) e.g., about 45 s  
b) e.g., more than 100 s
- not the same price
- No, the raise was 5% of a smaller amount than the 5% reduction, so more was subtracted from the salary than was added to it.
- a) 14

## Chapter Self-Test, p. 185

- 82%,  $\frac{41}{50}$ , 0.82; 35%,  $\frac{7}{20}$ , 0.35; 7%,  $\frac{7}{100}$ , 0.07
- a) 6; 18      b) 4; 36
- a) 14      b) 70      c) 65      d) 20
- e.g., 1200
- \$22.80
- e.g., To determine 10% you just divide by 10; there are more calculations to determine 17%.
- a) 68%, 70%, 76%, 85%, 80%, 80%  
b)  $\frac{17}{25}$ ,  $\frac{21}{30}$ ,  $\frac{38}{50}$ ,  $\frac{32}{40}$ ,  $\frac{12}{15}$ ,  $\frac{51}{60}$
- a) \$5.37      b) \$2.40

## Chapter Review, pp. 187–188

- a) 11      b) 13      c) 33      d) 2

- 70%, 0.7,  $\frac{7}{10}$ ; 8%, 0.08,  $\frac{2}{25}$ ; 75%, 0.75,  $\frac{3}{4}$ ; 15%, 0.15,  $\frac{3}{20}$ ; 25%, 0.25,  $\frac{1}{4}$ ; 55%, 0.55,  $\frac{11}{20}$
- a) 20%      b) 75%      c) 90%      d) 25%
- a) 48%      b) 71
- a) e.g., 56      c) e.g., 200  
b) e.g., 190      d) e.g., 3
- a) e.g., 80% of 70      c) e.g., 40% of 500  
b) e.g., 95% of 200      d) e.g., 30% of 10
- e.g., greater
- e.g., 5% is half of 10%, which is easy to calculate.
- Sanjeev spent a greater percent:  $\frac{18}{30} = 60\%$ ,  $\frac{13}{20} = 65\%$ .
- a)  $>$       b)  $>$
- \$574
- a) 21      b) 50
- 330
- \$1200
- a) 15.8      c) \$524.40  
b) 73.12      d) \$52.98
- 80%
- a) e.g., Divide 284 by 4.  
b) e.g., 75% is  $3 \times 25\%$ , so 75% of 284 is  $3 \times 71 = 213$ .
- 60 t
- e.g., Step 1: Find 10% because it's easy. Step 2: Multiply by 3 to find 30%. Step 3: Find 2% because it's easy. Step 4: Multiply by 2 to find 4%. Step 5: Add 30% and 4% to get 34%.

## Chapter 5, p. 191

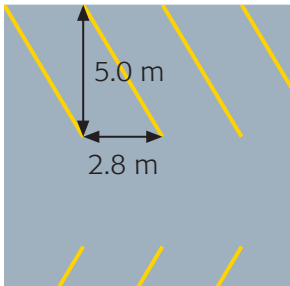
### 5.1 The Area of a Parallelogram, pp. 197–199

- A: base 3 cm, height 3 cm; B: base 10 cm, height 6 cm; C: base 16 cm, height 9 cm

2.  $23.4 \text{ cm}^2$
3. They have the same height and base.
4. Depends on parallelograms created.
5. **a)**  $20.63 \text{ m}^2$     **b)**  $15.00 \text{ m}^2$
6. e.g., **a)** A: base 2 cm, height 2 cm; B: base 7 cm, height 2 cm; C: base 8 cm, height 1 cm  
**b)** A:  $4 \text{ cm}^2$ ; B:  $14 \text{ cm}^2$ ; C:  $8 \text{ cm}^2$
7. **a)** 7 m      **c)** 7 cm      **e)** 7 m  
**b)**  $220 \text{ cm}^2$     **d)**  $4.4 \text{ m}^2$     **f)**  $896.5 \text{ cm}^2$
8. e.g., one parallelogram with base 36 cm and height 1 cm, one with base 12 cm and height 3 cm, one with base 9 cm and height 4 cm
9. e.g., base 12 cm, height 3 cm  
**a)** e.g., base 6 cm, height 3 cm  
**b)** e.g., base 12 cm, height, 6 cm
10. e.g., If the base and the height are sides, then the parallelogram should have right angles. I drew a rectangle.



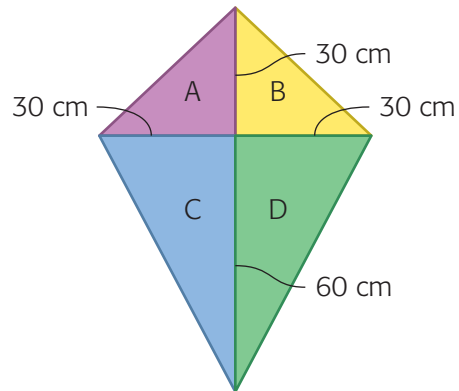
11. **a)** e.g.,



- b)** 1 space: area  $14 \text{ m}^2$ , cost \$17.50  
5 spaces: area  $70 \text{ m}^2$ , cost \$87.50  
10 spaces:  $140 \text{ m}^2$ , cost \$175.00  
15 spaces:  $210 \text{ m}^2$ , cost \$262.50
12. Explain how determining the area of a rectangle is different from determining the area of a parallelogram.

## 5.2 The Area of a Triangle, pp. 204–206

1. **a)**  $24 \text{ cm}^2$     **b)**  $12 \text{ cm}^2$     **c)**  $8 \text{ cm}^2$
2. **a)**  $18 \text{ cm}^2$     **c)**  $5.25 \text{ m}^2$   
**b)**  $270 \text{ cm}^2$     **d)**  $22.5 \text{ m}^2$
3. estimate, e.g., A:  $2 \text{ cm}^2$ , B:  $4 \text{ cm}^2$ , C:  $2 \text{ cm}^2$ , D:  $2 \text{ cm}^2$ ; calculation, A:  $2 \text{ cm}^2$ , B:  $4.5 \text{ cm}^2$ , C:  $2 \text{ cm}^2$ , D:  $2 \text{ cm}^2$
4. **a)**  $4.5 \text{ cm}^2$     **b)**  $1.9 \text{ cm}^2$
5. **a)** 24 cm    **b)** 3.4 m    **c)**  $18 \text{ cm}^2$     **d)** 50 cm
6. **a)**  $11.3 \text{ cm}^2$     **b)**  $6.1 \text{ cm}^2$
7.  $10 \text{ m}^2$
8. **a)**  $9.0 \text{ cm}^2$     **c)**  $4.5 \text{ cm}^2$   
**b)**  $4.5 \text{ cm}^2$     **d)**  $18.0 \text{ cm}^2$
9. **a)**  $12.8 \text{ m}^2$     **b)** \$107.52    **c)**  $128 \text{ m}^2$
10. **a)** 6 cm    **b)**  $12 \text{ cm}^2$
11.  $144.5 \text{ cm}^2$
12. **a)** 27 cm    **b)** 4 mm
13. e.g., This kite has an area of  $2700 \text{ cm}^2$ .



14.  $2 \text{ cm}^2$
15. e.g., yes, triangle of height 4 cm, base 2 cm and parallelogram of height 2 cm, base 2 cm
16. e.g., If you use the 5 cm side as the base for triangle A, then its height must be less than 4 cm, so it must cover less area than triangle B.

17. Explain why each triangle has three pairs of bases and heights, but each combination of base and height gives the same value for the area of the triangle.

#### 5.4 Calculating Circumference, pp. 211–213

- a) 16 cm      b) 14.8 cm
- a) 20 cm, 63 cm      b) 16 cm, 51.5 cm
- a) 14.1 cm      c) 20.1 cm      e) 22 mm  
b) 5.3 cm      d) 113.0 m      f) 12.6 cm
- a) 44 m      c) 39.6 cm      e) 145.1 m  
b) 122.5 cm      d) 56.5 cm      f) 0.31 m
- 251 cm
- a) 4.0 cm, 12.6 cm      b) 5.0 cm, 15.7 cm
- 9.6 cm
- 34.5 m
- clock: 18.0 cm, 56.5 cm; watch: 18 mm, 113 mm; tea bag: 3.8 cm, 11.9 cm; sewer cover: 31 cm, 195 cm; protractor: 11.8 cm, 37.1 cm; fan: 101 cm, 631 mm
- 4396 m
- 94.2 cm
- about 141.3 m
- about 10.5 cm
- about 28.9 m
- about 249.9 m
- about 50 m
- Explain the relationship between radius and circumference.

#### Mid-Chapter Review, pp. 214–215

- a)  $7 \text{ m}^2$       b)  $6.0 \text{ cm}^2$
- a)  $7 \text{ cm}^2$       b)  $8.1 \text{ m}^2$
- a) 82 cm      c) 54.0 cm  
b) 33.9 m      d) 9.4 km

- a) 47 cm      c) 63 cm      e) 138 cm  
b) 188 cm      d) 53 cm      f) 63 cm
- 4.2 cm, 13.2 cm

#### 5.5 Estimating the Area of a Circle, p. 219

- e.g., penny about  $3 \text{ cm}^2$ , nickel about  $3 \text{ cm}^2$ , quarter about  $4 \text{ cm}^2$ , two-dollar coin about  $6 \text{ cm}^2$
- e.g., about  $12 \text{ m}^2$
- e.g., about  $700 \text{ cm}^2$
- about  $20 \text{ m}^2$
- a) e.g., about  $5 \text{ m}^2$   
b) e.g., about  $200 \text{ m}^2$   
c) e.g., about  $80 \text{ mm}^2$
- e.g., About  $5 \text{ m}^2$  of the  $12 \text{ m}^2$  mat is covered by circles. That means about  $\frac{1}{2}$  of the mat is covered by circles.
- Explain why you like one method for estimating the area of a circle better than another.

#### 5.6 Calculating the Area of a Circle, pp. 223–224

- a)  $346.2 \text{ cm}^2$       c)  $531 \text{ cm}^2$   
b)  $154 \text{ cm}^2$       d)  $6.2 \text{ cm}^2$
- a)  $41.8 \text{ cm}^2$       c)  $22.9 \text{ cm}^2$   
b)  $13 \text{ cm}^2$       d)  $2.3 \text{ cm}^2$
- e.g., estimate: about 37 squares in the circle, so area is about  $37 \text{ cm}^2$ ; using a formula: radius is 3.5 cm, so area is  $3.5 \times 3.5 \times \pi = 38.5 \text{ cm}^2$
- e.g., a) I would measure the area of a plastic flying disc to see if a sticker will fit on it.  
b) I would measure the circumference of a basketball to see if it will fit in my gym bag.
- a)  $4.2 \text{ cm}^2$       b)  $2.1 \text{ cm}^2$
- a)  $52.8 \text{ cm}^2$       b)  $17.6 \text{ cm}^2$

7. a)  $1519.8 \text{ cm}^2$       b)  $379.9 \text{ cm}^2$   
 8. a)  $100.0 \text{ m}^2$     b)  $78.5 \text{ m}^2$     c)  $21.5 \text{ m}^2$   
 9.  $89.3 \text{ cm}^2$   
 10. a)  $251\,015.6 \text{ m}^2$       d)  $\$5300.63$   
      b)  $\$313\,769.50$       e)  $\$319\,070.13$   
      c)  $1927.5 \text{ m}$   
 11. e.g., The area will be 4 times larger.  
 12. e.g., Find the area of the big circle, find the area of the small circle in the middle, and subtract the area of the smaller circle from the larger.  
 13. Explain how to calculate the area of a circle (about  $8.0 \text{ cm}^2$ ) using circumference.

### 5.7 Solve Problems Using Diagrams, p. 229

- $3.7 \text{ m}^2$
- $72 \text{ m}^2$
- about 3.2 L
- $295 \text{ cm}^2$
- 24 ways
- 12
- 3 black cats with long hair, not short tails

### Chapter Self Test, pp. 231–232

- a)  $22.5 \text{ cm}^2$     b)  $21.0 \text{ m}^2$
- a)  $30 \text{ cm}^2$     b)  $8.8 \text{ cm}^2$     c)  $30 \text{ cm}^2$
- a)  $16 \text{ cm}^2$     b)  $20 \text{ cm}^2$
- a) area    b) area    c) circumference
- a)  $15.7 \text{ km}$     c)  $9.4 \text{ cm}$   
      b)  $163 \text{ cm}$     d)  $66 \text{ cm}$
- a)  $3 \text{ cm}^2$     c)  $25.5 \text{ cm}^2$   
      b)  $95 \text{ cm}^2$     d)  $120.8 \text{ cm}^2$
- a)  $225 \text{ m}^2$     b)  $176.6 \text{ m}^2$     c)  $48.4 \text{ m}^2$
- the piece with the larger circles

### Chapter Review, pp. 233–234

- a)  $5.4 \text{ cm}^2$     b)  $17.5 \text{ cm}^2$     c)  $49.5 \text{ m}^2$
- $2.5 \times 3.2 = 8 \text{ cm}^2$
- a) e.g.,  $\triangle A$ : height 5 cm, base 5 cm;  
       $\triangle B$ : height 5 cm, base 3 cm;  
       $\triangle C$ : height 5 cm, base 7 cm  
    b) e.g.,  $\triangle A$ :  $12.5 \text{ cm}^2$ ,  $\triangle B$ :  $7.5 \text{ cm}^2$ ,  
       $\triangle C$ :  $17.5 \text{ cm}^2$
- $4.6 \text{ cm}^2$
- $11.9 \text{ cm}$
- $22.0 \text{ cm}$
- a circle with radius of 3.5 cm
- $38.5 \text{ cm}^2$
- a)  $180^\circ$       b)  $125^\circ$

## Chapter 6, p. 237

### 6.2 Adding Integers Using the Zero Principle, pp. 245–247

- b) +2      d) +2      f) -10  
      c) -1      e) -6
- a) 0      b) 0
- a) (-5)      c) (-3)      e) (-3)  
      b) 0      d) (-2)      f) (+1)
- 1
- By the zero principle, the sum of any two opposite integers is 0.
- a) -5, -6, -7; add -1 to previous term  
      b) 1, 2, 3; add +1 to previous term
- a) (-1), (-1)    c) (-1), (+1), (-1), (-1)  
      b) (+1), (+1)    d) (-1), (-1), (-1)
- a) (+5)      b) (-4)
- a) >    b) =    c) >    d) =    e) <    f) <

10. e.g.,  
**a)**  $(+1) + (+1) + (+1) + (+1) + (-1) = (+3)$   
**b)**  $(-1) + (-1) + (-1) + (+1) = (-2)$   
**c)**  $(+1) + (+1) + (-1) + (-1) = 0$   
**d)**  $(+1) + (-1) + (+1) + (-1) + (-1) = (-1)$

11. e.g.,  $(-1) + (-2) + (-2) = (-5)$ ;  
 $(-6) + (-1) + (+2) = (-5)$ ;  
 $(3) + (-2) + (-6) = (-5)$

12. e.g., The three missing integers must add to zero, but with three integers you can get only +1 or -1.

13. **a)**  $(-6)$

**b)** e.g.,

-3	-10	-5
-8	-6	-4
-7	-2	-9

14. **a)** 0                      **b)** 0

15. **a)** true                  **b)** true                  **c)** false

### 6.3 Adding Integers that Are Far from Zero, pp. 250–251

1. **a)** 0                      **c)** -27                  **e)** +7  
**b)** -27                      **d)** +7
2. **a)** -70                    **c)** +30  
**b)** -30                      **d)** -70
3. **a)** +8                      **c)** -40                  **e)** -5  
**b)** -8                        **d)** -25                  **f)** +20
4. **a)** 10                    **b)** 20

5.

-1	-2	+3
+4	0	-4
-3	+2	+1

6. Heidi +16, Rana +14, Sonya +12, Indu -1, Meagan -9

7. **a)** -4                      **c)** -8                      **e)** -9  
**b)** -16                      **d)** +5                      **f)** +18

8. e.g.,  $(-20) + (+8)$  is the negative difference between 20 and 8, which is the opposite integer of  $20 - 8$ .

9. e.g.,  $(+20) + (-8)$  is the difference between 20 and 8, because it's taking 8 from 20, which is  $20 - 8$ .

10. Explain the addition of negative numbers  $(-28)$ .

### 6.4 Integer Addition Strategies, pp. 256–257

1. **a)** -30                      **b)** +2

2. e.g., The integers are the same, just in a different order.

3. +14

4. **a)** +6                      **b)** +6

- c)** e.g., order of addition doesn't change sum

5. **a)** -15    **b)** +2    **c)** +5    **d)** +10

6. e.g.,  $(+12) + (-20) + (-14) + (+10) + (+16) = (+4)$ ;  $(+15) + (+11) + (-16) + (-18) + (+12) = (+4)$

7. 345 m

8. **a)** +5, +9, +7, +8

- b)** e.g.,  $(+4) + (+1)$  and  $(-2) + (-3)$  add to 0

- c)** e.g., order of addition doesn't change sum

- d)** e.g., +14, -12, +11, -13

9. Explain why you prefer one method of adding integers over another (+22).

### Mid-Chapter Review, p. 260

1. **a)** (+3)                      **c)** (+1)                      **e)** (+5)

- b)** (-7)                      **d)** (-1)                      **f)** 0

2. **a)** (+3)    **b)** (-2)    **c)** (+10)    **d)** (+8)

3. **a)** e.g., Both are positive or, if one is negative, the other is positive, and it takes more counters to model the positive integer. ➔

- b) e.g., Both are negative or, if one is positive, the other is negative, and it takes more counters to model the negative integer.

4. 55 m

5. a) (+10) b) (-100) c) (-130) d) (-40)

6. a) (-30) b) (-41) c) (-44) d) (-34)

7. (+32)

8. step 3

### 6.5 Subtracting Integers Using Counters, pp. 264–266

1. a) (-6) b) (+1) c) (+5) d) (-1)

2. a) (-3)

- b) e.g., There are enough blue counters on the left to allow subtraction.

3. a) (+3)

- b) e.g., There are not enough blue counters on the left to allow subtraction.

4.  $(-4) - (-6) = (+2)$

5.  $(+6) - (-4) = (+10)$ ,  $(-4) - (+6) = (-10)$

6. A, B

7. a) (+2), (+3), (+4) b) (-9), (-8), (-7), (-6), e.g., If you subtract lesser and lesser integers from a positive or negative integer, then the answer gets greater and greater.

8. b) -9 d) +10 f) +7

c) +16 e) -3

9. a) +4 c) +16 e) -15

b) +5 d) -18 f) +5

10. a) (+3) b) (-5) c) (+1) d) (+7)

11. a) false, e.g.,  $(-2) - (-3) = (+1)$

b) false, e.g.,  $(+2) - (+3) = (-1)$

c) true, e.g.,  $(+2) - (-1) = (+3)$

d) false, e.g.,  $(-2) - (+3) = (-5)$

e) false, e.g.,  $(-2) - (-3) = (+1)$

12. Explain why subtracting an integer is like adding its opposite.

### 6.6 Subtracting Integers Using Number Lines, pp. 271–272

1. a) (-75) b) 0 c) -75

2. a) (+8) b) (-1)

3. a) (+70), (-70)

- b) e.g., The arrows for the subtractions point in opposite directions, but they have the same length.

4. a) +20 c) -2 e) +20

b) -40 d) +3 f) 0

5. a)  $(-5) - (-15)$  c)  $(-20) - (+35)$

b)  $(+15) - (+25)$  d)  $(-100) - (-145)$

6. e.g., One integer is 5 places to the left of the other.

7. a) -34 b) +7 c) -25 d) +23

8. b) -350 d) +700 f) -648

c) -130 e) +55

9. D

10. Explain why adding an opposite is like subtracting.

### 6.7 Solve Problems by Working Backward, p. 275

1. e.g., Start with 10. Add (+1). Subtract (-3). Add (-5). The result is 9. The quick way to figure out the original number is to add (-1), because  $(+1) - (-3) + (-5) = (-1)$ .

2. Subtract (+2). Add (-1). Subtract (-2). The original number is 3.

3. -2

4. e.g., Start with the original number. Add (+5). Subtract (-2). Subtract (+4). Subtract (+3).

5. 64 kg
6. \$320.00
7. e.g.,



8. e.g., Janet is training for a race. Every week she runs 3 km more than the previous week. During her 7th and final week of training, Janet runs 24 km. How far did she run in the first week? (6 km)

### Chapter Self-Test, p. 276

1. a) (+1)    b) (-2)    c) (+2)    d) (-15)
2. a) (+1)    b) (+1)    c) (-7)
3. a) (+2) - (+5)    b) (-10) - (-40)
4. a) (-3)    b) (-13)    c) (-9)    d) (-4)
5. Sam took out \$67.
6. a) The larger integer value is 12, and positive, so adding a smaller negative number will give a positive integer (right of 0) and the difference between 12 and 4 is 8, so 8 units to the right.  
b) Subtracting a positive number from a negative number always gives a larger negative number, to the left of 0, and the sum of 15 and 23 is 38.

### Chapter Review, p. 278

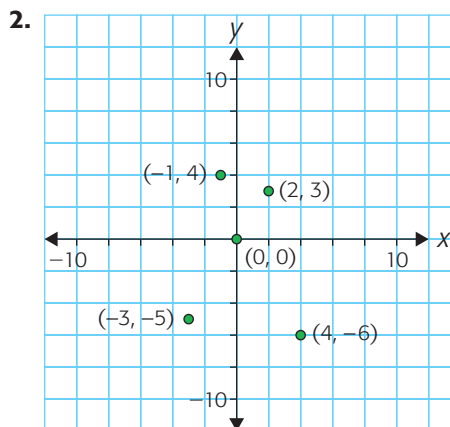
1. e.g.,  $(-2) = (-4) + (+2)$ ,  
 $(-2) = (-1) + (-1)$ ,  
 $(-2) = (+7) + (-9)$
2. Polly took out \$10.
3. a) (-36)    b) (-45)
4. ■ + (+1) is greater because a positive integer is added, so the value is increased, while ■ - (+1) is less because a positive integer is subtracted.

5. C greatest, B least
6. e.g., Alike: both can be modelled with number lines or counters; subtracting an integer is like adding the integer with the opposite sign. Different: the order of the integers matters in subtraction but does not matter in addition; addition involves combining two amounts and subtraction involves determining the difference between two amounts.
7. a) (+5)    b) (-5)    c) (-1)    d) (-2)
8. (-9) and (-4)
9.  $-30^{\circ}\text{C}$

## Chapter 7 2-D Geometry, p. 281

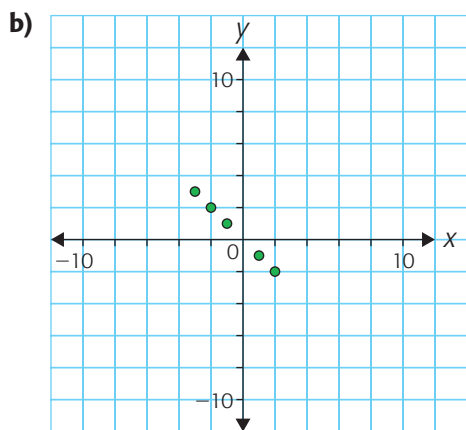
### 7.2 Comparing Positions on a Grid, pp. 288-289

1. A(-2, 3), B(2, 2), C(1, -4), D(-2, 0), E(-3, -4)



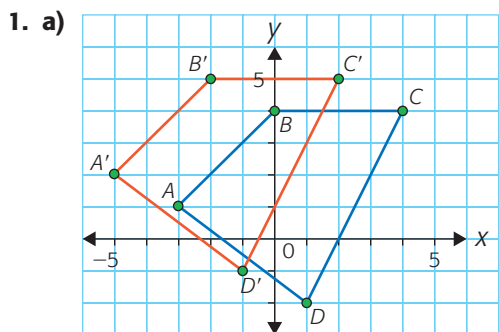
3. a) 3 units    b) 10 units    c) 7 units
4. a) right angle scalene triangle  
b) parallelogram
5. a) below,  $-5 < -3$     b) above,  $-1 > -3$
6. a) (-11, 28)    b) (-15, -28)
7. a) e.g., (-3, 3), (-2, 2), (-1, 1), (1, -1), (2, -2)





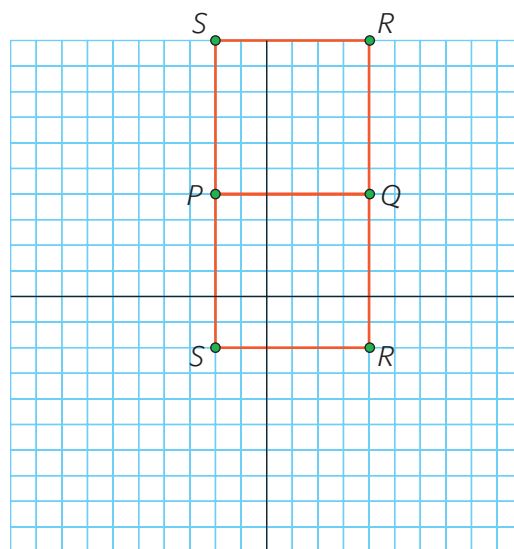
- c) a line      d) moves to right
- e.g.,  $(-2, -3)$  and  $(-8, 2)$
  - e.g.,  $(-8, -3)$ ,  $(-9, -8)$ ,  $(-6, -8)$
  - $(3, 2)$ ,  $(3, -2)$ ,  $(-3, 2)$ ,  $(-3, -2)$
  - e.g., Point  $(3, -4)$  is 7 units to the right of and 7 units lower than point  $(-4, 3)$ .

### 7.3 Translations and Reflections, pp. 293–295



- $A'(-5, 1)$ ,  $B'(-2, 5)$ ,  $C'(2, 5)$ ,  $D'(-1, -1)$
- $P'(6, 2)$ ,  $Q'(4, 0)$ ,  $R'(2, 5)$
- $A'(-4, 1)$ ,  $B'(1, -5)$ ,  $C'(4, 3)$ ,  $D'(-2, 3)$
  - $A'(4, -1)$ ,  $B'(-1, 5)$ ,  $C'(-4, -3)$ ,  $D'(2, -3)$
- yes

- 2 units right, 5 units up
  - $B'(5, 5)$ ,  $C'(4, 9)$
- $X'(3, -6)$ ,  $Y'(3, -2)$ ,  $Z'(6, 1)$
- 5 units to left, 4 units up
  - 4 units to left, 5 units down
  - 9 units to left, 1 unit down
- $P'(2, 1)$ ,  $Q'(6, 3)$ ,  $R'(4, 6)$
- right 2, down 3
  - $E(-10, -2)$ ,  $F(0, 1)$
- e.g., The directions that move  $B$  to  $B'$  are not the same that move  $A$  to  $A'$ .
- e.g.,  $R(4, -2)$ ,  $S(-2, -2)$  or  $R(4, 10)$ ,  $S(-2, 10)$
  - e.g.,



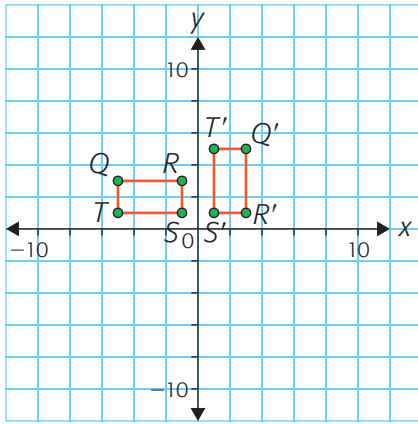
- e.g., down 6
- Explain where a figure could be after a transformation.

### 7.4 Rotations, p. 299

- $(2, 0)$
  - counterclockwise,  $90^\circ$
- $D'(-3, 2)$ ,  $E'(-5, 1)$ ,  $F'(-1, -1)$



3. a), b)



c) e.g., It was rotated  $90^\circ$ , not  $180^\circ$ .

4. 9:07:30,  $180^\circ$

5. a) e.g.,  $X(2, 1)$ ,  $Y(-1, 2)$ ,  $Z(-1, -2)$

b)  $X'(2, 1)$ ,  $Y'(5, 0)$ ,  $Z'(5, 4)$

6. a)  $A'(4, -2)$ ,  $B'(1, -2)$ ,  $C'(-3, 1)$ ,  $D'(0, 1)$

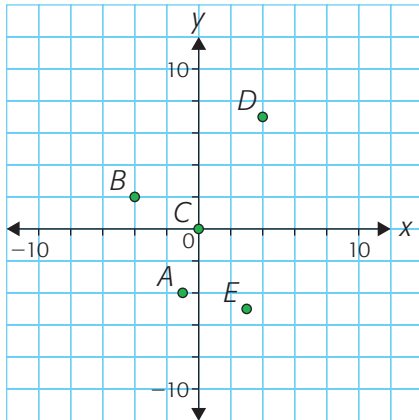
b)  $180^\circ$  clockwise

7. e.g., Label vertices, determine a centre of rotation, and choose a direction and degree of rotation; check the vertices all have negative coordinates.

### Mid-Chapter Review, p. 301

1. e.g.,  $A(6, 6)$ ,  $B(7, 3)$ ,  $C(3, 1)$ ,  $D(2, 5)$   
translate left 4 and down 4 to  $A'(2, 2)$ ,  
 $B'(-3, -1)$ ,  $C'(-1, -3)$ ,  $D'(-2, 1)$

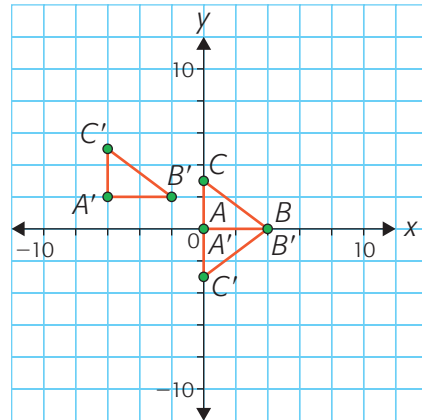
2.



3. a)  $C(0, 0)$       c)  $D(4, 7)$

b)  $B(-4, 2)$     d)  $E(3, -5)$

4. a), b), c)  $A'(-6, 2)$ ,  $B'(-2, 2)$ ,  $C'(-6, 5)$ ;  
 $A'(0, 0)$ ,  $B'(2, 0)$ ,  $C'(0, -3)$

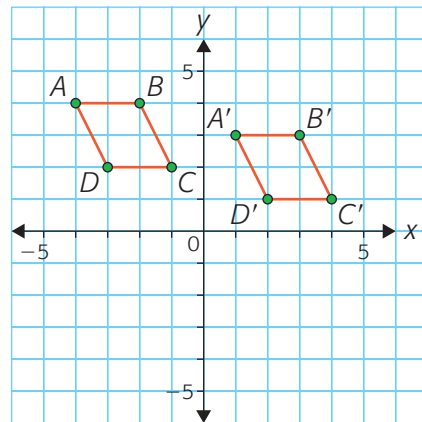


5. a) reflection about y-axis

b)  $180^\circ$  rotation about point  $(0, 0)$ ,  
translation of 7 to the right and 6 down

### 7.5 Communicate About Transformations, p. 305

1. a), b), c) e.g.,  $A(-4, 4)$ ,  $B(-2, 4)$ ,  $C(-1, 2)$ ,  
 $D(-3, 2)$  was translated 5 units right and  
1 unit down to create  $A'B'C'D'$ .



2. e.g., First, the shape was reflected in the x-axis, then it was rotated  $90^\circ$  ccw about the point  $(0, -6)$ .


3. e.g., reflect across y-axis, rotate  $90^\circ$  cw around point  $(0, 5)$ , translate down 1 unit and right 1 unit

- Use your knowledge of parallelograms and transformations, and use correct mathematical terminology.

## 7.6 Perpendicular Bisectors, pp. 313–314

- Each perpendicular bisector will be at the midpoint of, and at right angles to, each line segment.
- b)
- Each perpendicular bisector will be at the midpoint of, and at right angles to, each line segment.
- c) The circle goes through each vertex of the triangle.
- a) when the construction is small enough to be done or modelled on paper or flexible material  
b) when the construction is on a large scale such as drafting or designing  
c) when a protractor is available for the application and the situation is small enough to use the protractor  
d) Use a transparent mirror when the construction is too large to use paper folding or a protractor
- c) e.g., Fold the paper along the line segment. If point  $A$  is on top of point  $B$ , then it is the perpendicular bisector.

## 7.7 Parallel Lines, p. 318

- $AB$  and  $XY$  are parallel.
- e.g., Draw line segment  $AB$ , 6 cm long. Draw lines that are at right angles from  $A$  and  $B$  using a protractor. Locate points  $C$  and  $D$  on these lines that are the same distance from  $AB$  using a ruler. Connect  $C$  and  $D$ .  $CD$  is parallel to  $AB$ .
- a) It keeps the distance between the two lines equal.  
b) Use it to draw lines at right angles. 

- It uses reflection to form perpendicular lines; the second is parallel to the original.
- Mark several points the same distance apart on a line using a ruler. Connect the points with the straight edge of the ruler.

- a) e.g., The slanted lines in the window are parallel.  
b) The bars of the horse jump are parallel.
- e.g., The opposite lines in the key of the court are parallel. The opposite outside boundaries of the court are made of two sets of parallel lines. The centre line is a perpendicular bisector to the long edge of the court boundary. The basketball hoop is placed on the bisector of the short edge of the court boundary. The sides of the wooden strips in the floor of the school gym are parallel.
- e.g., Trace, then use a transparent mirror.

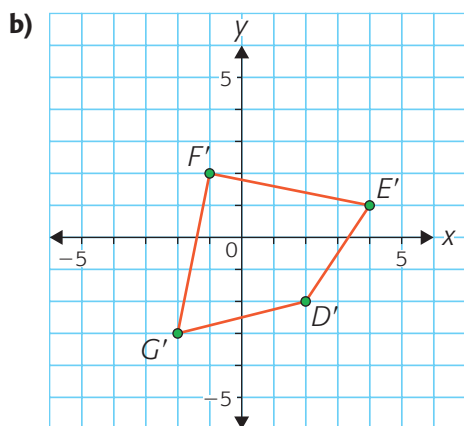
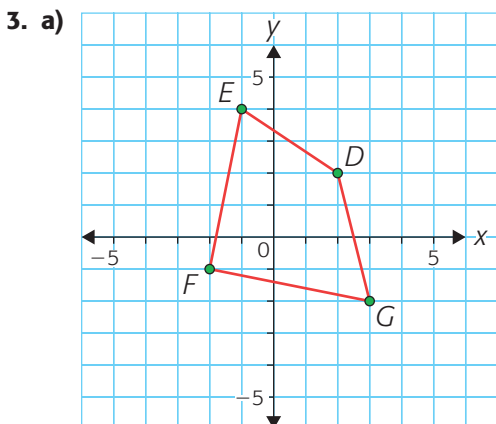
## 7.8 Angle Bisectors, pp. 319–322

- b) and c)
- The bisector will be at  $40^\circ$ .
- e.g., an angle of  $40^\circ$  bisected at  $20^\circ$
- e.g., an angle of  $120^\circ$  bisected at  $60^\circ$
- a) e.g., an angle of  $90^\circ$  bisected at  $45^\circ$  with a protractor  
b) an angle of  $160^\circ$  bisected at  $80^\circ$  by folding  
c) an angle of  $200^\circ$  bisected at  $100^\circ$  using a compass and ruler
- c) The angle bisectors intersect at the same point.
- a) e.g., The lines running to the centre of the photograph bisect the vertices of the pentagon.  
b) e.g., In each blue parallelogram, the white lines bisect the small angles.  
c) e.g., Each spoke bisects the angle formed by the two neighbouring spokes.

8. Bisect a  $60^\circ$  angle in several ways.

### Chapter Self-Test, p. 324

1. a) Brandon  $(-2, -4)$ , Pine Dock  $(3, 3)$ ,  
Winnipeg  $(3, -4)$   
b) 5 units      c) 7 units  
2. c)  $X''(-5, 0)$ ,  $Y''(-5, -1)$ ,  $Z''(1, -1)$

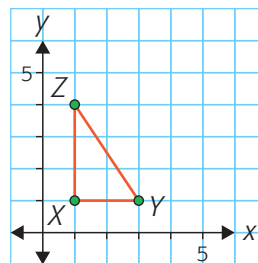


- c)  $D'(2, -2)$ ,  $E'(4, 1)$ ,  $F'(-1, 2)$ ,  $G'(-2, -3)$   
4. e.g., cw  $90^\circ$  about origin or ccw  $270^\circ$  about origin  
5. e.g., Use a protractor and a ruler to determine lines at  $A$  and  $B$  perpendicular to  $AB$  and a ruler to determine points on those lines that are the same distance from  $AB$ .  
6. e.g., an angle of  $30^\circ$  bisected at  $15^\circ$ , an angle of  $90^\circ$  bisected at  $45^\circ$ , an angle of  $150^\circ$  bisected by an angle of  $75^\circ$

### Chapter Review, pp. 327–328

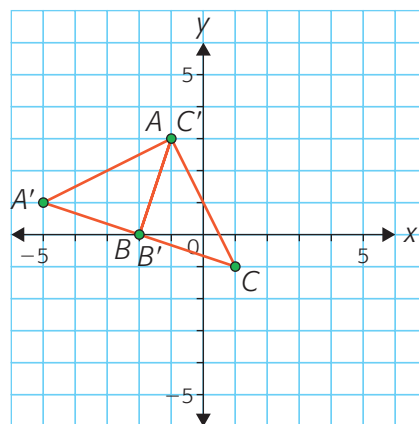
1. a)  $(14, 0)$  has greatest 1st coordinate  
b)  $(-14, 0)$  has least 1st coordinate  
c)  $(0, -14)$  has least 2nd coordinate  
d)  $(0, 14)$  has greatest 2nd coordinate  
2. c)  $A'(0, 2)$ ,  $B'(-3, 1)$ ,  $C'(-3, -2)$ ,  $D'(1, -1)$   
e)  $A''(-2, 3)$ ,  $B''(-5, 2)$ ,  $C''(-5, -1)$ ,  
 $D''(-1, 0)$

3. a) e.g.,



- b) e.g., 6 units down, 6 units left;  
 $X'(-5, -5)$ ,  $Y'(-3, -5)$ ,  $Z'(-5, -2)$   
c) e.g., reflection in  $x$ -axis;  $X''(-5, 5)$ ,  
 $Y''(-3, 5)$ ,  $Z''(-5, 2)$

4. a), b)



5. e.g., reflect in base of triangle, rotate  $180^\circ$  cw about centre of base, reflect in a horizontal line followed by a translation  
6. b) e.g., translate left 1 unit, reflect in  $y$ -axis, translate down 4 units  
7. Each perpendicular bisector will be at the midpoint of, and at right angles to, each line segment.

8. e.g., telephone poles, railroad tracks, gymnastic parallel bars
9. e.g., draw parallel lines using protractor and ruler
10. Each angle bisector will divide each angle in half.
11. e.g., Translations: The two red rectangles are translations of each other.

Reflections: The two yellow triangles are reflections of each other across a vertical line through the centre of the square.

Rotations: The blue shapes are rotations of one blue shape around the centre of the square.

Perpendicular bisectors: The vertical line segment in the centre is the perpendicular bisector of the bases of the orange triangles.

Parallel line segments: The horizontal line segment in the centre is parallel to the sides of the green rectangles.

Angle bisectors: The diagonal line segments on the blue shapes bisect the  $90^\circ$  angles between the green and red rectangles.

## Cumulative Review: Chapters 4–7, pp. 330–331

- |      |       |          |          |
|------|-------|----------|----------|
| 1. C | 6. A  | 11. C    | 16. D    |
| 2. D | 7. A  | 12. C    | 17. D    |
| 3. C | 8. D  | 13. A    | 18. A    |
| 4. C | 9. C  | 14. A, D | 19. A, D |
| 5. C | 10. B | 15. D    |          |

## Chapter 8, p. 333

### 8.1 The Range of a Set of Data, pp. 338–339

1. a) 18    b) 1435    c) 19.1    d) 130

2. 27.2 cents
3. e.g., 10, 12, 13, 15, 25
4. 15 days
5. a) 1694 g  
b) e.g., The size of an animal's brain is related to the size of the animal.
6. a) 747; 747  
b) The range for each class is the same.  
c) Describe what the range does and does not reveal about the sets of data.

### 8.2 The Median and Mode of a Set of Data, pp. 343–345

1. a) median 234.5, mode 230  
b) median 60.8, no mode
2. median 18, mode 18
3. e.g., 10, 10, 10, 14, 16, 18
4. a) 3    b) 54    c) 76%    d) 268
5. a) 8 and 9    c) 7.1  
b) 18    d) F and G
6. a) 196    b) 125.5  
c) e.g., Gretzky scored more points for the Oilers than for the Kings. You would expect this because when you compare individual years, he mostly scored more for Edmonton.
7. e.g., mode, because data is non-numerical
8. a) 72    b) no, only that it is 19 or greater
9. one of 75, 82, 99, or 102
10. a) gold: modes 0, 2, 7, median 2; silver: mode 1, median 3; bronze: mode 1, median 3  
b) e.g., median, because modes are mostly not near most values
11. mode 5, median 10; explain which represents the data better

### 8.3 The Mean of a Set of Data, pp. 350–351

- a)** 19.9      **b)** 19.9
- a)** 6      **b)** 460
- 108 790
- a)** 9.7      **b)** 9.3  
**c)** e.g., the two new ages were low
- a)** 130      **b)** 107  
**c)** e.g., median because it is in the middle of the data
- e.g., mode tells which shoe size is most common; mean is likely to represent the temperature best
- 7 values
- 20 h
- the student who read 12 books because the mean with 12 removed is 2
- a)** 20 167 new subscribers  
**b)** e.g., to know if its advertising is working
- no, e.g., 48 is the mean of this set: 50, 22, 46, 55, 55, 60.
- 74
- e.g, Natalia's sales total is \$2 more than the mean for Eric's class. When Natalia moves to Eric's class and you divide up the extra \$2 over all of the other students, it raises the mean by that fraction.  
In Natalia's class, the mean was higher by \$2 than her sales total. When you take away her sales, the total is less, but it is also divided over one less student. The result will be a mean that is a fraction of \$2 greater.
- yes

### Mid-Chapter Review, p. 353

- 16 kg
- 342 m
- B

- median 4.5, modes 2.7, 4.9
- 75 cm plant
- a)** mean 10.8 s, median 10.8 s  
**b)** e.g., No, times tend to get better as athletes improve.
- 8 values
- \$67

### 8.5 Outliers, pp. 360–361

- a)**  

**b)** 2  
**c)** mean 16, median 16, mode 14  
**d)** mean 17, median 16.5, mode 14
- e.g., 257 g without the outlier mass of 54 g
- a)** e.g., \$200 000  
**b)** mean \$64 375, median \$42 500, mode \$35 000  
**c)** mean \$55 333, median \$35 000, mode \$35 000  
**d)** e.g., Use the mean with the outlier to show the average salary is high.  
**e)** e.g., Use the mean with the outlier to show there is a big range between her salary and the average.
- e.g., The low mark is not typical of his work.
- a)** 97, 89  
**b)** e.g., the mean without the outlier because it is a better indicator of his dad's usual score
- mean with all values 138, mean without outlier of 25 :150; median 150, mode 150; e.g., Mean without outlier, median, and mode all indicate goal is reached, but mean with outlier is lower; it indicates goal is not reached

7. e.g., The mean of all the lifespans is 2.7 years, but without the outlier of 12 it is 1.7 years, which is a better average because most of the lifespans are from 1 to 2 years.
8. Explain when it is appropriate to calculate a mean including an outlier, and when it is not.

## 8.6 Communicate about Data, pp. 364–365

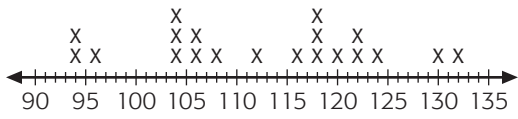
1. e.g., If the school had ordered the median number of white milk cartons for each day last week, then there would have been two days when there wouldn't have been enough white milk. If the school had ordered the mean number of white milk cartons, there would have been three days when there wouldn't have been enough milk. So it is better to use the median, 61, for white milk. If the school had ordered the median number of chocolate milk cartons for each day last week, then there would have been two days when there wouldn't have been enough chocolate milk. If the school had ordered the mean number of white milk cartons, it is the same; there would have been two days when there wouldn't have been enough milk. So you can use either the mean or the median. I'd use the mean, 56, because it is higher.
2. a) mean 13, median 14, mode 14  
b) If Roger were to watch 2 h of TV each day, then he would be watching 14 h of TV each week. This is the median and the mode, so he is correct.
3. a) Asha's team: 85  
b) Peter's team: 86  
c) Winnie's team: 85  
d) Choose which value you think best represents the results and justify your choice.

4. b) e.g., Both the median and the mean are greater for Western and Northern Canada than they are for Eastern Canada.

## Chapter Self-Test, p. 367

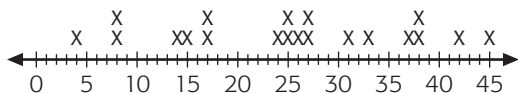
1. 45 cm, 138 cm
2. a) 44, no mode      b) 153, 148
3. no, e.g., The median of 5, 6, 7, 8, 12, 13, 15, 21 is 10.
4. no, e.g., This set of values has no mode: 12, 15, 17.
5. 124
6. 1500; 499 is not an outlier, so it wouldn't affect the mean much; 1 is an outlier, but 1500 is much farther away from the data than 1 is, so it would affect the mean more.
7. a) median 25.5, mean 26, modes 27, 33  
b) one of the modes  
c) e.g., mean or median since the modes are greater than most of the temperatures

## Chapter Review, pp. 369–370

1. a) 79      b) 6
2. a) 4, 4      b) 106.5, 115
3. a)
 
  
b) 38      c) 112
4. means: 8, 11; medians: 8, 11; e.g., the means and medians are the same
5. a) median  
b) e.g., mean or median  
c) e.g., mode, median, or mean
6. mean, e.g., to compare this year's temperature with next year's; mode, e.g., stores need to know which size to order in greatest quantity

7. a) 99  
 b) e.g., Use the mean without the outlier, because the outlier is unlikely to happen very often, and including it will have a strong effect on the mean.

8. a) e.g.,



- b) e.g., mean or median both represent the typical middle value
9. a) mean: 100, mode: 92, median: 92  
 b) Median or mode, because her scores were improving, and 92 represents her most recent scores better.
10. e.g., mode, because there are many more \$5 cards than any other kind

## Chapter 9, p. 373

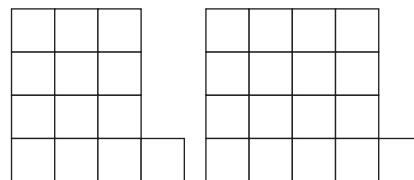
### 9.1 Writing a Pattern Rule, pp. 380–382

1. e.g.,  $T = n + 4$
2. a) same: number of yellow squares; changes: number of blue squares  
 b) Each figure has one yellow square; number of blue squares is twice the figure number.  
 c) e.g.,  $2n + 1$       d) 2, 1
3. a) 6, 7, 8  
 b) e.g., number of triangles in a figure is 3 more than the figure number  
 c) e.g.,  $T = 3 + n$
4. Anne: In shape  $n$ , there are  $n$  blocks above the orange block and  $n$  blocks to the right of it; the orange block is 1, making  $n + 1 + n$  blocks in total. Sanjay: In shape  $n$ , there are  $n$  green blocks placed vertically (up and down) and  $(n + 1)$  orange placed horizontally (from side to side), making  $n + (n + 1)$  blocks in total. ↻

Robert: In shape  $n$ , there are  $2n$  green blocks placed in an “L” shape to the left of the only orange block, making  $2n + 1$  blocks in total.

5. a) e.g.,  $T = (n + 1) + (n + 1) + 2$ , where  $T$  represents the number of tiles in figure number  $n$ .  
 b) e.g.,  $T = 2n + 4$   
 c) 4 in both cases; 2 in both cases  
 d) e.g., because the total number of tiles in each figure is the same

6. a)



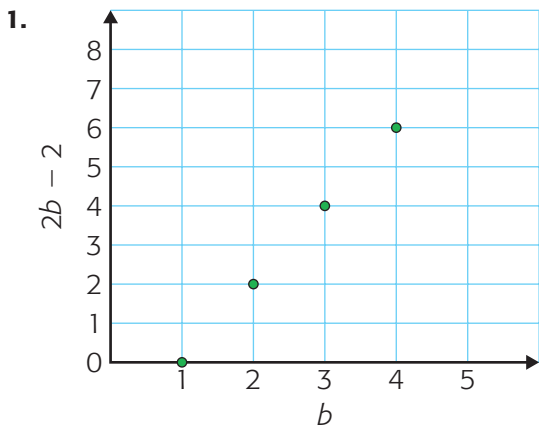
- b) e.g.,  $T = 4n - 3$   
 c)  $-3, 4$   
 d) e.g., numerical coefficient: if figure number increases by 1, number of blocks increases by 4; constant term: pattern starts off with 3 fewer blocks than the figure number multiplied by the numerical coefficient
7. Substitute 257 for  $T$  and solve for  $n$ .  
 a) yes, 128      b) no
8. a) e.g., The constant term describes the part of the pattern that stays the same.  
 b) e.g., The numerical coefficient describes the part of the pattern that changes.

### 9.2 Evaluating an Expression to Solve a Problem, pp. 387–388

1. a) 30      b) 24      c) 6      d) 21  
 2. e.g.,  $12h + 35$   
 3. a) 9      b) 40      c) 27      d) 8  
 4. a) e.g.,  $8t - 2$       b) 30 reps  
 5.  $6(b - 1) + 3 = 6((4) - 1) + 3 = 6(3) + 3 = 18 + 3 = 21$   
 6. a) e.g.,  $4p$       c) e.g.,  $2h + 5$   
 b) e.g.,  $3h$       d) e.g.,  $10h$

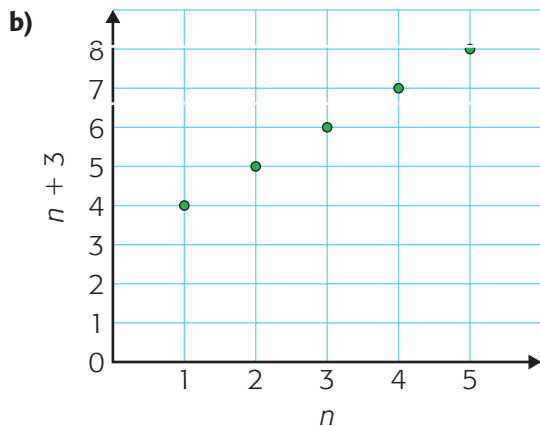
7. **A.** blue tiles    **C.** green tiles  
**B.** purple tiles    **D.** yellow tiles
8. **a)**  $8b + 50$   
**b)** \$170
9. **a)** \$25, \$27, \$29, \$31, \$33, \$35  
**b)** e.g.,  $25 + 2t$   
**c)** \$59
10. **a)**  $56 - 3c$     **b)** \$41
11. **a)** 9, 11    **b)**  $v = 2n + 1$     **c)** 17
12.  $1000 + 30g$ ; explain why the pattern rule is useful.

### 9.4 Linear Relations and Their Graphs, pp. 395–397



2. **a)**

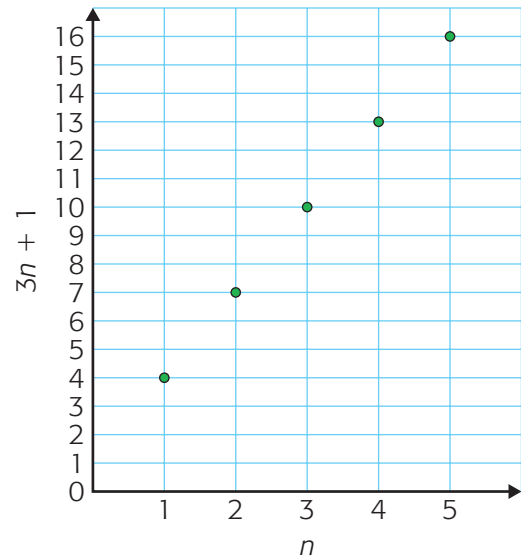
$n$	1	2	3	4	5
$n + 3$	4	5	6	7	8



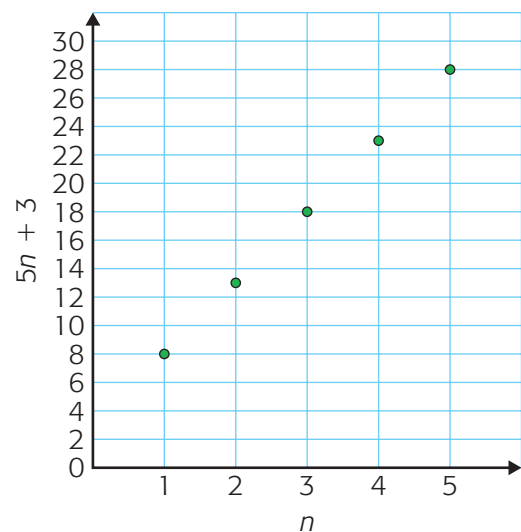
3.

$n$	1	2	3	4	5
<b>a)</b> $3n + 1$	4	7	10	13	16
<b>b)</b> $5n + 3$	8	13	18	23	28
<b>c)</b> $3n + 5$	8	11	14	17	20

4. For 3.a)

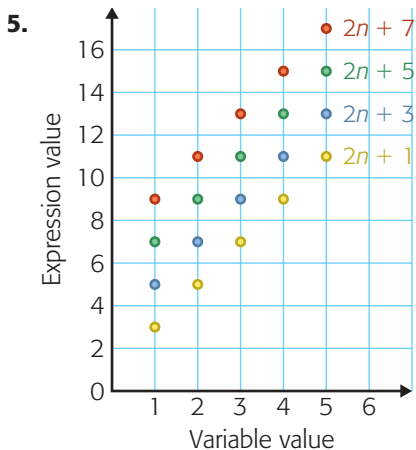
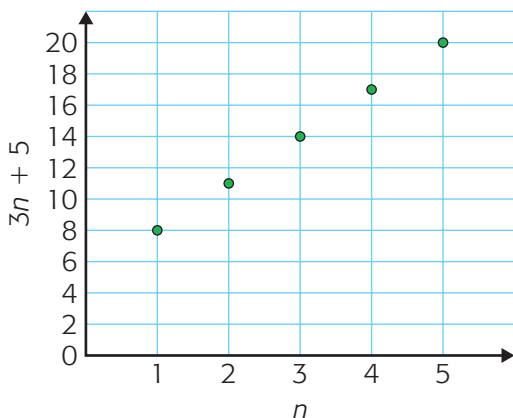


For 3.b)

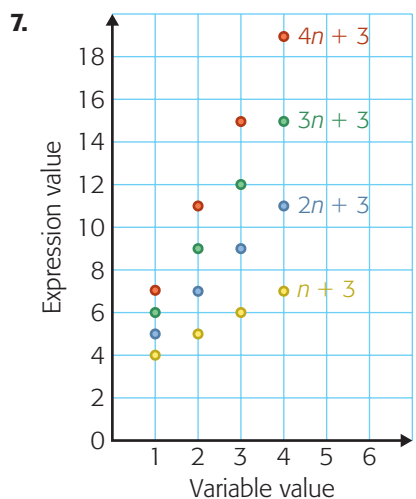




For 3.c)



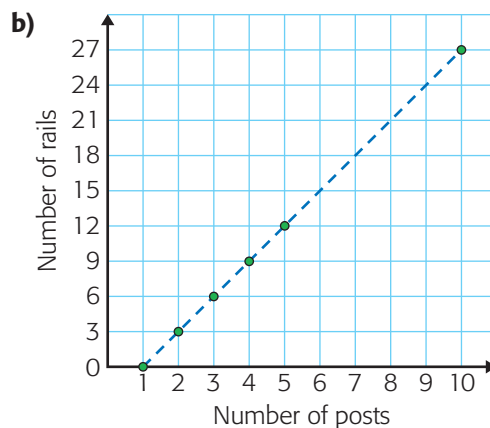
6. e.g., alike: parallel, or all go up the same way; different: at different heights



8. e.g., alike: all start at same variable value; all are linear; different: not parallel, they spread out

9. A. Graph B    B. Graph C    C. Graph A

10. a) e.g.,  $r = 3p - 3$

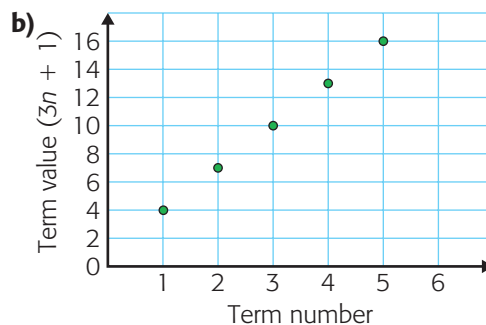


c) 27 rails

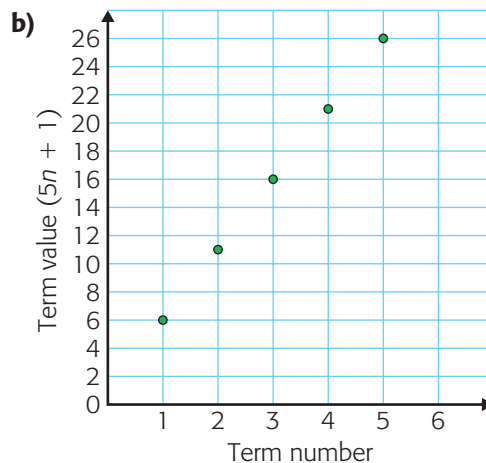
11. a)  $r = 4p - 4$ , coefficient and constant are both 4 in new fence, but 3 in old fence

b) e.g., graph for question 10 not as steep

12. a) e.g.,  $t = 3n + 1$

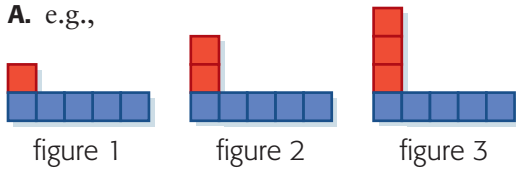


13. a) e.g.,  $v = 5p + 1$

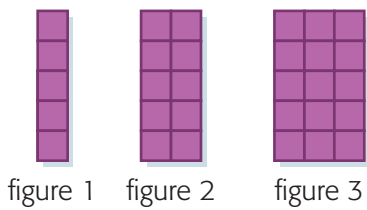


14. a) e.g., the relationship between number of paving stones and the number of border pieces  
 b) e.g.,  $b = 2t + 1$   
 c) e.g., the length of each border piece is equal to the length of a side of a paving stone

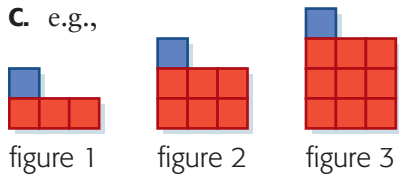
15. a) A. e.g.,



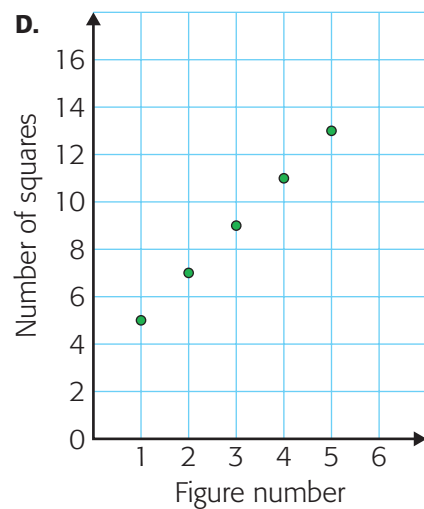
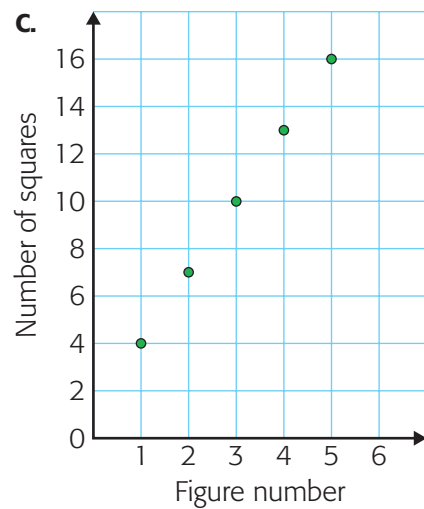
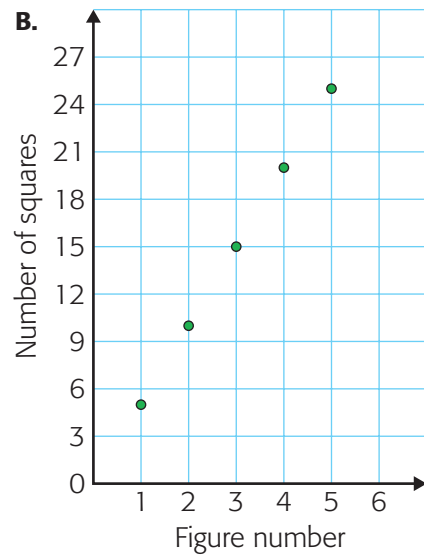
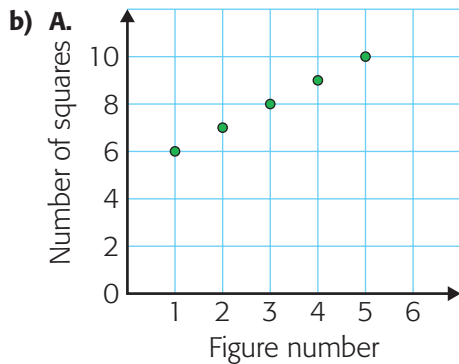
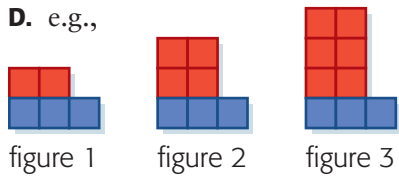
B. e.g.,



C. e.g.,



D. e.g.,



c) **A.** e.g., The numerical coefficient is 1, so each time the figure number goes up by 1, the graph goes up by 1 and the number of squares goes up by 1. The constant term is 5, the graph meets vertical axis at 5, and each figure in geometric pattern has 5 dark squares along the bottom.

**B.** e.g., The numerical coefficient is 5, so each time the figure number goes up by 1, the graph goes up by 5 and the number of squares goes up by 5. The constant term is 0, the graph meets the vertical axis at 0, and each figure in the geometric pattern does not have a constant number of squares at the bottom.

**C.** e.g., The numerical coefficient is 3, so each time the figure number goes up by 1, the graph goes up by 3 and the number of squares goes up by 3. The constant term is 1, so the graph meets the vertical axis at 1, and each figure in the geometric pattern has 1 dark square on the top.

**D.** e.g., The numerical coefficient is 2, so each time the figure number goes up by 1, the graph goes up by 2 and the number of squares goes up by 2. The constant term is 3, the graph meets the vertical axis at 3, and each figure in the geometric pattern has 3 dark squares along the bottom.

16. Explain what effect different parts of an expression have on the graph of the expression.

### Mid-Chapter Review, pp. 399–400

1. e.g.,  $s = 3n$

2. a)

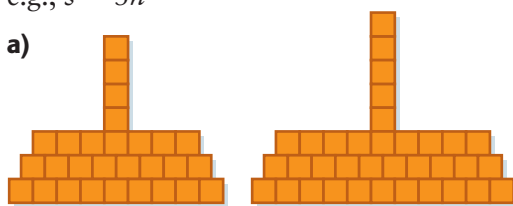


figure 4

figure 5



b) e.g.,  $7n$       c) 70

3. a)  $s = 2n + 3$ ;  $s = (n + 1) + (n + 1) + 1$

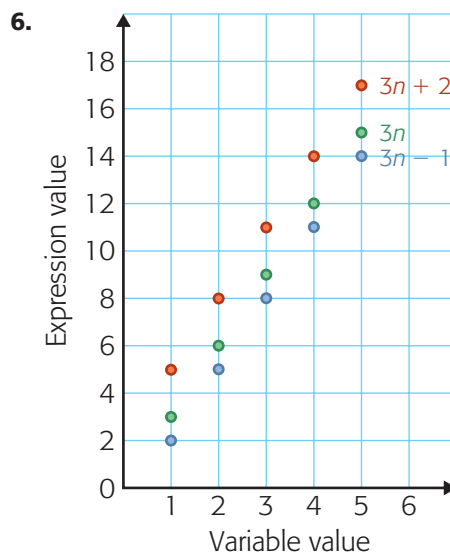
b) constant term 3, numerical coefficient 2

c) e.g., constant term says to add 3 to variable multiplied by the numerical coefficient; numerical coefficient says that each time the figure number goes up by 1, the number of tiles goes up by 2

4. a) e.g.,  $2b + 3$

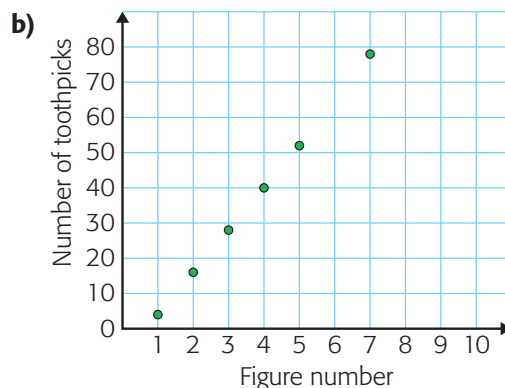
b) \$19

5. Hours worked: 1, 2, 3, 4, 5, 6, 7, 8;  
Dollars earned: 5, 6, 7, 8, 9, 10, 11, 12



7. e.g., alike: parallel, all go up the same way;  
different: at different heights

8. a) e.g.,  $t = 12n - 8$



c) 76 toothpicks

## 9.5 Solving Equations Using Mental Math, pp. 403–405

- a)**  $n = 7$       **c)**  $P = 7$       **e)**  $x = 27$   
**b)**  $w = 33$       **d)**  $n = 6$       **f)**  $y = 28$
- a)**  $4n + 3 = 43$       **b)**  $n = 10$   
**c)**  $4n + 3 = 4(10) + 3 = 40 + 3 = 43$
- a)**  $b = 12$       **c)**  $z = 22$       **e)**  $m = 20$   
**b)**  $q = 15$       **d)**  $w = 200$       **f)**  $n = 40$
- a)**  $m = 10$       **c)**  $n = 4$   
**b)**  $a = 8$       **d)**  $n = 7$
- a)** e.g., 6 plus what number gives 16?  
Subtract 6. What number multiplied by 5 gives 10? Divide by 5.  
**b)** e.g., Substitute answer into original equation, and check that both sides are equal.
- yes
- a)**  $n + 2$       **b)**  $24 = n + 2$       **c)** 22  
**d)** 24 (two horizontally, 22 more vertically)  
**e)** 21 (two horizontally, 19 more vertically)
- a)**  $28 = 4 + 2n$       **b)**  $n = 12$
- a)**  $4 + 2n = 30$       **b)**  $n = 13$
- a)** e.g.,  $c = 2 + d$       **c)**  $d = 7$   
**b)**  $9 = 2 + d$
- a)**  $25 = 4 + 3d$       **b)**  $7 = d$
- a)**  $2n - 1 = 7$   
**b)** e.g., Zach could add 1 to 7 to get double the number. Next, to find the number, Zach must divide double the number by 2.
- 33 squares
- 49 triangles, with 1 toothpick left over
- Explain how to solve for the variable.

## 9.6 Solving Equations Using Models and Drawings, pp. 409–410

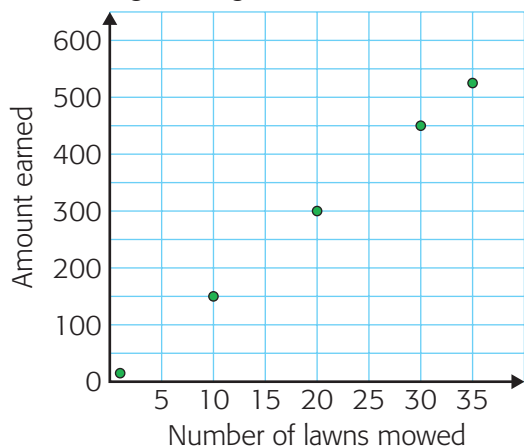
- a)**  $p = 24$       **b)**  $w = 3$       **c)**  $z = (+3)$

- a)**  $p = 2$       **c)**  $x = (+11)$       **e)**  $x = (+4)$   
**b)**  $h = 3$       **d)**  $c = 12$       **f)**  $y = (+1)$
- a)** e.g.,  $c = 2n + 7$   
**b)**  $2n + 7 = 73$   
**c)** figure 33
- a)**  $n + 19 = 35, n = 16$   
**b)**  $8n = 192, n = 24$   
**c)**  $9n - 16 = 47, n = 7$
- a)** e.g.,  $a = 73 - 5w$   
**b)**  $58 = 73 - 5w$   
**c)** 3 weeks
- a)**  $C = 4n + 1$       **b)** 6      **c)** no
- figure 12
- a)** e.g.,  $6i + 1$       **b)**  $61 = 6i + 1$       **c)** 10
- Explain when you would solve an equation using concrete materials and when you would use a drawing.

## 9.7 Solving Equations by Graphing, pp. 414–416

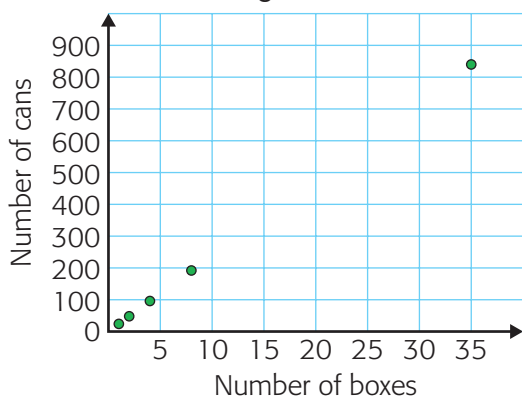
- 7
- a)** Figure: 1, 2, 3; Number of tiles: 3, 4, 5  
**b)** e.g.,  $s = n + 2$   
**c)**  $n + 2 = 22$   
**d)**  $n = 20$
- a)** Figure: 1, 2, 3; Number of counters: 5, 8, 11  
**b)** e.g.,  $3n + 2$   
**c)**  $3n + 2 = 23$   
**d)**  $n = 7$
- a)** Week number: 1, 2, 3, 4, 5; Amount: \$10, \$15, \$20, \$25, \$30  
**b)** e.g.,  $5w + 5$       **e)** 19 weeks  
**c)**  $5w + 5 = 60$       **f)** \$105  
**d)** 11 weeks
- a)** figure 32      **b)** figure 48
- a)** 6      **b)** 5      **c)** 4

7. a) Mowing Earnings at \$15 for Each Lawn



- b)  $15n - 100$     c)  $n = 35$ ; 35 lawns

8. a) Packing Cans in Boxes



- b) about 30 boxes  
 c)  $24b$   
 d) 31 boxes  
 e) e.g., with counters or a diagram

9. Explain how to solve an equation by looking at the graph of the relation.

9.8 Communicate the Solution of an Equation, p. 420

1. e.g., Subtract 1 from both sides. There are 3  $c$ 's on one side and 3 groups of 3 on the other side, so one  $c$  is equal to 3.

2. e.g., Step 1: Start a pan balance with 4 containers on the left pan and 12 counters on the right pan. Step 2: Group the counters on the right into 4 groups of 3. There are 4 containers on the left pan and 4 groups on the right pan, so each container is worth 3.

3. a)  $4c + 1 = 9$ ; 2    c)  $7 = 2c + 3$ ; 2  
 b)  $3b + 2 = 14$ ; 4  
 4. a)  $x = 2$     c)  $z = 4$     e)  $b = (-11)$   
 b)  $x = 4$     d)  $a = 50$     f)  $b = 4$

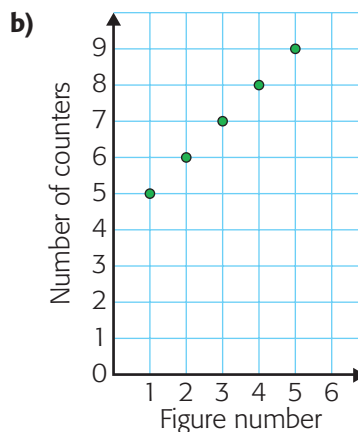
5. Discuss the importance of clarity.

Chapter Self-Test, p. 421

1. e.g.,  $s = 2n + 3$   
 2. a) e.g.,  $6p + 10$     c) 16 books  
 b)  $10 + 6p = 106$   
 3. 52  
 4.  $a = 3$   
 5.  $n = 15$   
 6. figure 41  
 7. a)  $x = 13$     c)  $p = 3$   
 b)  $n = (+7)$     d)  $r = 50$

Chapter Review, p. 424

1. e.g.,  $t = 2n + 3$   
 2. a) e.g.,  $5b + 25$     b) \$70  
 3. a) e.g.,  $c = n + 4$

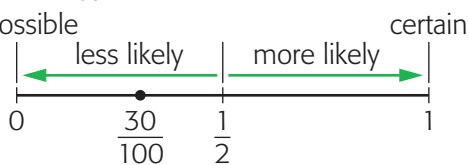


- c) 9 counters
4. a)  $25x + 300 = 900$     b)  $x = 24$   
 c) Substitute 24 into original equation.
5. a)  $x = 6$     c)  $w = 3$     e)  $w = 8$   
 b)  $a = 5$     d)  $c = -8$     f)  $x = 5$
6.  $n = 8$ ; e.g., I located the point with a vertical coordinate equal to 20.

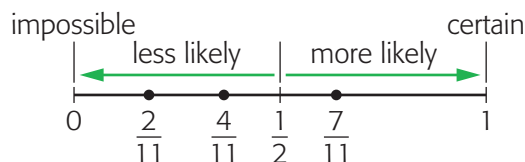
## Chapter 10, p. 427

### 10.2 Representing Probabilities as Fractions and Percents, pp. 433–435

1.  $\frac{12}{30}$ , 40%, 12:30
2. e.g.,  
 a) 3:20,  $\frac{3}{20}$ , 15%    c) 11:20,  $\frac{11}{20}$ , 55%  
 b) 10:20,  $\frac{10}{20}$ , 50%    d) 4:20,  $\frac{4}{20}$ , 20%
3. a) 30:100;  $\frac{30}{100}$   
 b) impossible



4. e.g., a) prediction 90%; experimental probability 85%  
 b) prediction  $\frac{1}{6}$ ; experimental probability  $\frac{1}{5}$   
 c) prediction 50%; experimental probability 30%
5. a)  $\frac{1}{2}$     b)  $\frac{1}{2}$
6. a)  $\frac{1}{4}$ , 25%    c)  $\frac{0}{4}$ , 0%  
 b)  $\frac{2}{4}$ , 50%    d)  $\frac{3}{4}$ , 75%
7. a)  $\frac{4}{11}$     b)  $\frac{7}{11}$     c)  $\frac{2}{11}$



8. a)  $\frac{1}{15}$ , 1:15    c)  $\frac{8}{15}$ , 8:15    e)  $\frac{3}{15}$ , 3:15  
 b)  $\frac{1}{15}$ , 1:15    d)  $\frac{7}{15}$ , 7:15    f)  $\frac{15}{15}$ , 15:15
9. odd number, even number, number less than 20
10. a) 33%    c) 42%    e) 92%  
 b) 50%    d) 25%    f) 17%
11. e.g., a) a coin landing heads  
 b) a spinner that is divided into four equal parts, one of which is blue, landing on blue  
 c) selecting an even prime number from 1 to 31  
 d) selecting a marble that is not red from a bag with 1 red marble, 2 green marbles, and 3 blue marbles  
 e) selecting a green marble from a bag with only yellow marbles  
 f) rolling a number less than 7 on a regular die
12. a)  $\frac{1}{10}$     c) e.g., ten 8s  
 b) 10%    d) e.g., fraction form
13. a) Winning is impossible.  
 b) Winning is certain.  
 c) Winning and losing are equally likely.

### 10.3 Probability of Independent Events, pp. 438–439

1. Spinning a spinner and tossing a coin, because spinning the spinner and tossing the coin do not affect each other.
2. a)  $\frac{5}{36}$     b)  $\frac{6}{36}$     c)  $\frac{2}{36}$
3. a)  $\frac{6}{36}$     b)  $\frac{10}{36}$     c)  $\frac{6}{36}$
4. a) Yes; it lists the possible outcomes of each spin and all possible combinations of the two spins combined.  
 b) e.g., There are 3 rows and 3 possibilities in each row, so there are 3 groups of 3, or  $3 \times 3 = 9$ .  
 c)  $\frac{5}{9}$     d)  $\frac{8}{9}$

5. a)  $\frac{4}{36}$                       b)  $\frac{26}{36}$   
 c) The first roll does not affect the second roll.
6. a)  $\frac{1}{24}$                       b)  $\frac{5}{24}$                       c)  $\frac{3}{24}$
7. a) e.g., Roll a die, then toss a coin.  
 b) e.g., Roll a die, then toss a coin if the roll was even, or roll the die again if the roll was odd.

### Mid-Chapter Review, p. 442

1. a)  $\frac{1}{9}$ , 11%                      c)  $\frac{2}{36}$ , 6%                      e)  $\frac{36}{36}$ , 100%  
 b)  $\frac{18}{36}$ , 50%                      d)  $\frac{16}{36}$ , 44%                      f)  $\frac{0}{36}$ , 0%
2. a) rolling a number less than 4  
 b) rolling an even number  
 c) rolling a 6
3. a)  $\frac{3}{12}$ , 25%                      b) e.g., 13 times
4. a) yes–yes, yes–no, yes–maybe, no–yes, no–no, no–maybe, maybe–yes, maybe–no, maybe–maybe  
 b)  $\frac{3}{9}$  or 33%                      c)  $\frac{4}{9}$  or 44%
5. a) 1–1, 1–2, 1–3, 1–4; 2–1, 2–2, 2–3, 2–4; 3–1, 3–2, 3–3, 3–4; 4–1, 4–2, 4–3, 4–4  
 b) The outcome of the first roll does not affect the outcome of the second roll.  
 c)  $\frac{4}{16}$  or 25%

### 10.4 Solve Problems Using Organized Lists, p. 447

1. a) 10 combinations  
 b) 5 combinations  
 c)  $\frac{5}{10}$
2. a) The following combinations of “win, tie, loss” all are worth 29 points:  
 5, 1, 1; 5, 0, 4;  
 4, 3, 0; 4, 2, 3; 4, 1, 6; 4, 0, 9;  
 3, 4, 2; 3, 3, 5; 3, 2, 8; 3, 1, 11; 3, 0, 14;  
 2, 6, 1; 2, 5, 4; 2, 4, 7; 2, 3, 10; 2, 2, 13;  
 2, 1, 16; 2, 0, 19;



- 1, 8, 0; 1, 7, 3; 1, 6, 6; 1, 5, 9; 1, 4, 12; 1, 3, 15; 1, 2, 18; 1, 1, 21; 1, 0, 24;  
 0, 9, 2; 0, 8, 5; 0, 7, 8; 0, 6, 11; 0, 5, 14; 0, 4, 17; 0, 3, 20; 0, 2, 23; 0, 1, 26; 0, 0, 29
- b) The probability that Nathan’s team had more losses than ties is 27 out of 37.

3. a) 100, 200, 300, 400, 600, 900  
 b)  $\frac{2}{6}$
4.  $\frac{1}{16}$
5. Create a problem that can be solved with an organized list.

### 10.5 Using Tree Diagrams to Calculate Probability, pp. 450–451

(Note: for reasons of space, the tree diagrams are shown as combinations.)

1.  $\frac{8}{36}$
2. a) purple-1, purple-2, purple-3, purple-4, purple-5, purple-6; orange-1, orange-2, orange-3, orange-4, orange-5, orange-6; yellow-1, yellow-2, yellow-3, yellow-4, yellow-5, yellow-6; green-1, green-2, green-3, green-4, green-5, green-6  
 b)  $\frac{23}{24}$
3. a) \$50-\$50, \$50-\$100, \$50-\$200, \$50-\$1000; \$100-\$50, \$100-\$100, \$100-\$200, \$100-\$1000; \$200-\$50, \$200-\$100, \$200-\$200, \$200-\$1000; \$1000-\$50, \$1000-\$100, \$1000-\$200, \$1000-\$1000  
 b)  $\frac{14}{16}$                       c)  $\frac{7}{16}$                       d)  $\frac{4}{16}$
4. a) 1-1, 1-2, 1-3, 1-4; 2-1, 2-2, 2-3, 2-4; 3-1, 3-2, 3-3, 3-4; 4-1, 4-2, 4-3, 4-4  
 b)  $\frac{6}{16}$                       c)  $\frac{3}{16}$                       d)  $\frac{2}{16}$
5. a) 6 outfits  
 b)  $\frac{4}{6}$   
 c) yes, if it doesn't matter which shirt goes with which shorts

6. a) Doug's experiment: red-red, red-red, red-red, red-yellow, red-yellow, red-green; red-red, red-red, red-red, red-yellow, red-yellow, red-green; red-red, red-red, red-red, red-yellow, red-yellow, red-yellow, red-green; yellow-red, yellow-red, yellow-red, yellow-yellow, yellow-yellow, yellow-green; yellow-red, yellow-red, yellow-red, yellow-yellow, yellow-yellow, yellow-green; green-red, green-red, green-red, green-yellow, green-yellow, green-green
- b)  $\frac{6}{36}$
- c) The events in Doug's experiment are independent because one does not affect the other; the events in Anna's experiment are not independent because the outcome of the second draw is affected by the outcome of the first draw.
7. a) 1-1, 1-2, 1-3, 1-4, 1-5, 1-6; 2-1, 2-2, 2-3, 2-4, 2-5, 2-6; 3-1, 3-2, 3-3, 3-4, 3-5, 3-6; 4-1, 4-2, 4-3, 4-4, 4-5, 4-6
- b)  $\frac{6}{24}$
8. Describe the relationship between the number of possible outcomes for the first event, the number of possible outcomes for the second event, and the total number of branches in the tree.

## 10.6 Comparing Theoretical and Experimental Probabilities, pp. 456–457

1. a)  $\frac{10}{16}$   
 b) e.g.,  $\frac{15}{20}$ , which is close to  $\frac{10}{16}$   
 c) e.g.,  $\frac{53}{80}$ , which is even closer to  $\frac{10}{16}$
2. a)  $\frac{3}{6}$       b) e.g.,  $\frac{42}{80}$ , which is close to  $\frac{3}{6}$
3. a)  $\frac{4}{36}$       b) e.g.,  $\frac{6}{36}$   
 c) because the results of a die throw in an experiment are random  
 d) depends on class data
4. a)  $\frac{6}{36}$       b) e.g.,  $\frac{7}{20}$   
 c) e.g., Use the spinner idea from example 3 but make each colour correspond to a number on a die, unless you can find a two-die probability program on the computer.
5. a)  $\frac{1}{4}$   
 b) e.g., The outcome of the first draw does not affect the outcome of the second draw.  
 c) e.g.,  $\frac{2}{5}$ , which is close to the theoretical probability.
6. e.g., Do not put each block back in the bag once it is removed, so the second outcome is now affected by the first outcome.
7. a)  $\frac{16}{25}$       b) e.g.,  $\frac{15}{25}$   
 c) e.g., The experimental probability got closer to the theoretical probability.
8. a)  $\frac{6}{24}$       b) e.g.,  $\frac{7}{24}$   
 c) e.g., They are close in value.
9. a) Mykola may have made an error in his calculation of theoretical probability.  
 b) Mae may have used a faulty model for her experiment; suggest one that should work.

## Chapter Self-Test, pp. 459–460

1. a)  $\frac{6}{10}$ , 6:10, 60%  
 b)  $\frac{15}{30}$ , 15:30, 50%  
 c)  $\frac{8}{20}$ , 8:20, 40%
2. a)  $\frac{7}{25}$       b)  $\frac{2}{25}$       c)  $\frac{8}{25}$       d)  $\frac{10}{25}$
3. a) 25%      b) 40%      c) 5%
4. In experiment A, you return the first card to the deck before selecting the second card, so the first selection does not affect the second selection. In experiment B, the first card selected cannot be selected the second time, so the first selection affects the second selection.
5. a)  $\frac{2}{36}$       c)  $\frac{10}{36}$       e)  $\frac{7}{36}$   
 b)  $\frac{5}{36}$       d)  $\frac{12}{36}$       f)  $\frac{6}{36}$



6. a) 1-1, 1-2, 1-3, 1-4, 1-5; 2-1, 2-2, 2-3, 2-4, 2-5; 3-1, 3-2, 3-3, 3-4, 3-5; 4-1, 4-2, 4-3, 4-4, 4-5; 5-1, 5-2, 5-3, 5-4, 5-5

b)  $\frac{5}{25}$                       c)  $\frac{19}{25}$

7. e.g., It might be split into ninths with the numbers 1, 2, 3, 4, 5, 6, 7, 8, and 9. Tossing a coin has 2 possible outcomes and the spinner would have 9 possible outcomes. The number of combined outcomes would be  $9 \times 2 = 18$ .

8. a) e.g.,  $\frac{16}{20}$  or 80%                      b)  $\frac{27}{36}$  or 75%

c) e.g., The experimental probability is greater.

d) e.g., The experimental rolls are random so it might just be that it was random chance that the probabilities do not match. Also, the dice might be bad, which would affect the outcome.

9. a) e.g., selecting an 11  
 b) e.g., selecting a card less than 12  
 c) e.g., selecting an even number  
 d) e.g., selecting a 9 or a 10  
 e) e.g., selecting a 2, 4, 6, or 8  
 f) e.g., selecting a card greater than 3

### Chapter Review, pp. 461–462

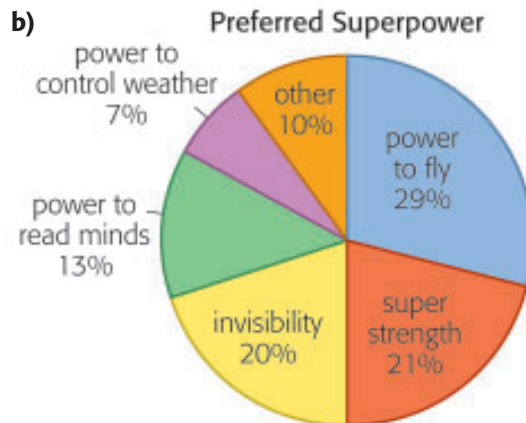
1. a)  $\frac{1}{2}$ , 50%                      c)  $\frac{10}{100}$ , 10%  
 b)  $\frac{90}{100}$ , 90%                      d)  $\frac{11}{100}$ , 11%
2. a) e.g., selecting a multiple of 4  
 b) e.g., selecting 120  
 c) e.g., selecting a number less than 101
3. a) e.g., One spin doesn't affect the results of the other.  
 b) e.g., They are not represented by an equal number of sections on the spinner.
4. a)  $\frac{3}{30}$                       b)  $\frac{0}{30}$
5. a) 7%                      b) 29%
6. a)  $\frac{15}{36}$ , or 42%                      b)  $\frac{12}{36}$ , or 33%

- c) e.g., The experimental probability is based on actual results, while the theoretical probability is based on possible results.

## Chapter 11, p. 465

### 11.1 Interpreting Circle Graphs, pp. 471–472

1. **A:** all ages, **B:** 12–17
2. e.g., Bring lots of apple pies and cherry pies, and half as many lemon pies and other flavours.
3. 74
4. a) e.g., don't know how much they charge  
 b) no, total number of pages unknown, so can only compare the percents
5. e.g., Newspaper 1: news, 30; sports, 24; advertising, 48; entertainment, 12; other, 6
6. a) 10%

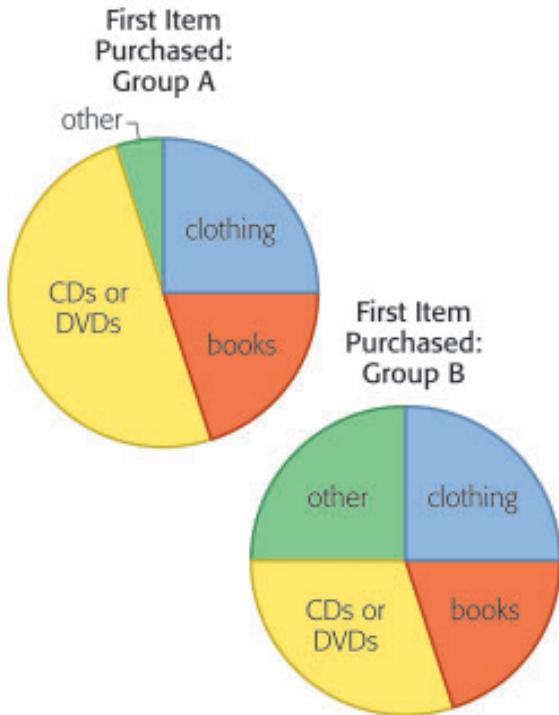


7. a) e.g., Which superpower was most popular? What two choices make up half of the responses? What percent of the graph do super strength and invisibility make up?  
 b) e.g., power to fly; power to fly and super strength; 41%

8. Describe what circle graphs do and do not show.

### 11.3 Constructing Circle Graphs, pp. 478–479

1. a) Group A: 25%, 20%, 50%, 5%; Group B: 25%, 20%, 30%, 25%  
 b) e.g., I created sections of the right sizes using the tick marks.

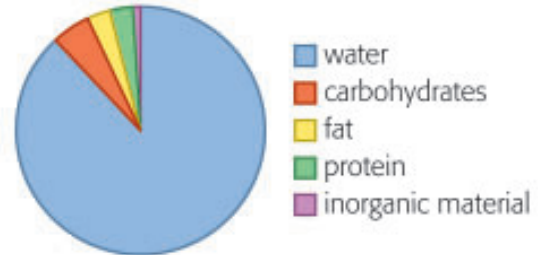


- c) e.g., **First Item Purchased**

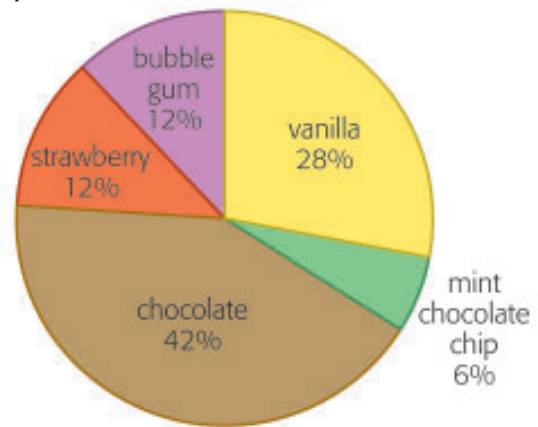


2. a) about 33%, 120°  
 b) 50%, 180°  
 c) about 13%, 48°  
 d) about 3%, 12°

### 3. Composition of Milk

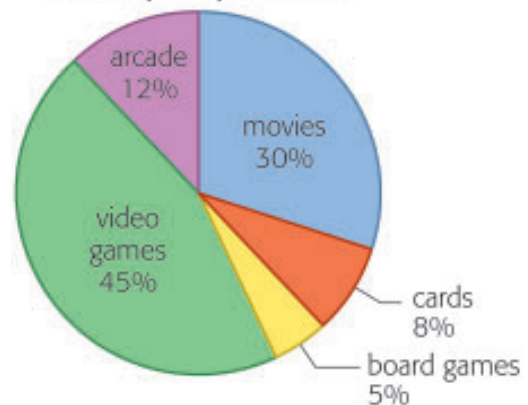


4. a) 101°, 22°, 151°, 43°, 43°  
 b) **Ice Cream Sales**



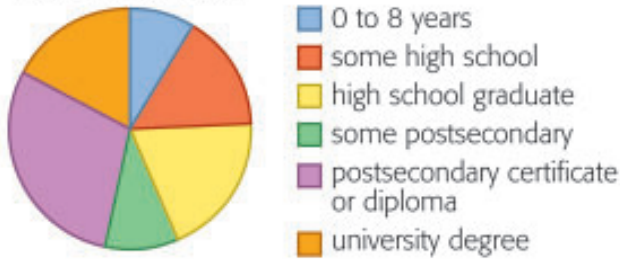
- c) e.g., What percent of ice cream sold had no chocolate in it? 52%

### 5. Birthday Party Activities



6. a), b)

Canadian Level of Education



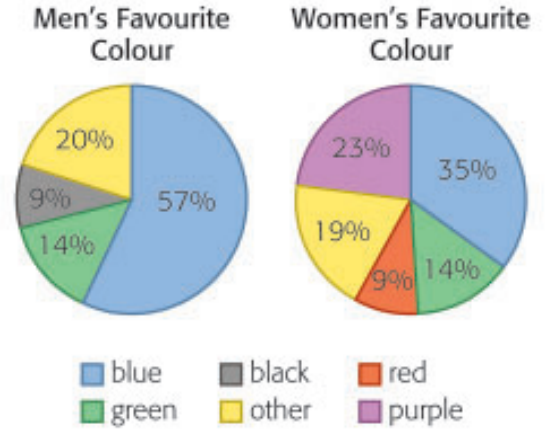
c) e.g., It probably calculated each value as a percent of the 25.5 thousand (by dividing each value by the total), and then calculated the central angle for each section (by multiplying the percent by  $360^\circ$ ).

7. Explain how to check that your circle graph is correct.

### 11.4 Communicate about Circle Graphs, p. 483

- e.g., disagree, because more of the class said strawberries or blueberries than any other fruit.
- e.g., How many meals did you eat? What is the total number of servings of food you had?
- e.g., Hot dogs and hamburgers make up half of the graph, so they are popular choices of food, but s'mores make up the largest section, and are the most popular choice of food at a cookout. If I were to plan a cookout, half the graph is hot dogs and hamburgers, so I would make sure there are lots of s'mores available. Since 9% said corn on the cob, I would bring a small amount so those people are happy, too.

4. e.g., I found these circle graphs of men's and women's favourite colours. Most men and women like blue best, and green the same amount, but more women like purple than men do.



5. e.g., You could ask about the data, such as if any possible categories are missing, or how responses were grouped in categories, and about what the graph might mean in your life or someone else's.

### Chapter Self-Test, pp. 486–487

1. a) Languages Spoken by Mothers



\*Includes Cree, Punjabi, Japanese, Korean, and more.

b) e.g., English is the most widely spoken language, followed by Chinese and French, which are equal, and Ukrainian.

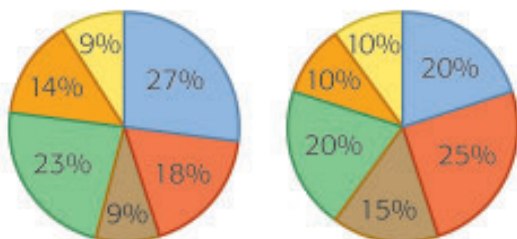
2. e.g., Comedies are the most popular type of show at Theatre 1, so there should be more of them at Theatre 2. Also, Theatre 2 should start showing romance films and cut down on the number of adventure and horror movies.

3. **Human Body Mass**



4. a) 228      b) 24

5. a) **First Handful**      **Second Handful**



**Third Handful**



- b) blue:  $36^\circ$ , red:  $90^\circ$ , brown:  $72^\circ$ , green:  $54^\circ$ , orange:  $36^\circ$ , yellow:  $72^\circ$

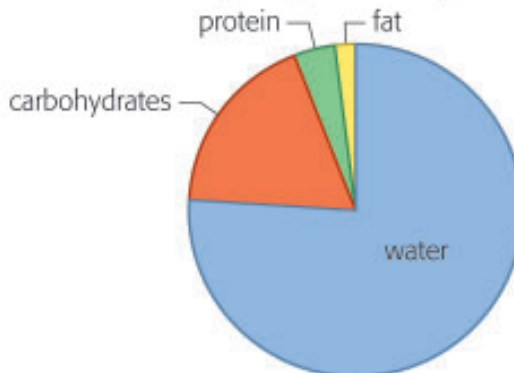
**Chapter Review, pp. 489–490**

1. a) 280      b) 3240  
 c) e.g., motorcycle, scooter, skateboard, inline skates, working at home
2. a) e.g., It allows her to compare percents and see what fraction each colour is of the total number of cars.

b) **Car Colours in a Parking Lot**



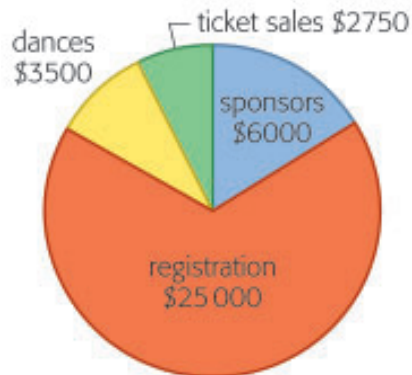
3. a) **Yogurt Ingredients by Mass**



- b) e.g., About what fraction of the yogurt is water?  $\frac{3}{4}$

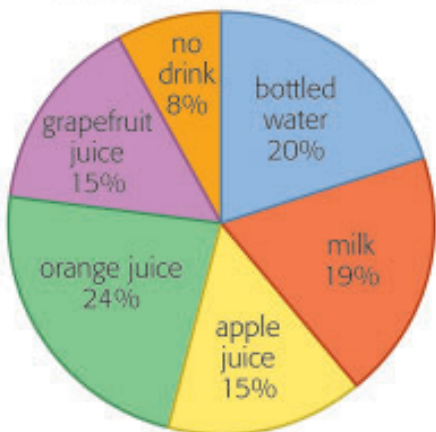
4. a) \$37 250

b) **Club Revenue for the Season**



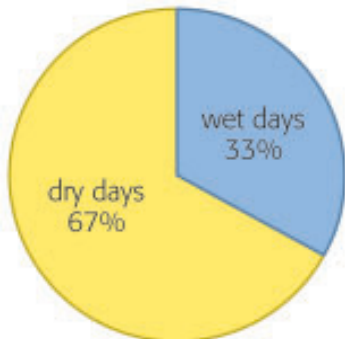
- c) 16%
  - d) Revenue from ticket sales is a little less than half of the revenue from sponsors.
  - e) registration, dances, ticket sales
5. a) Grade 7
- b) e.g., After a survey of the Grade 7 and 8 students in the school, I have learned that orange juice, water, and milk are the three most popular drinks for lunchtime. The circle graph shows that nearly  $\frac{2}{3}$  of students prefer one of these drinks. So, I think these three drinks are the most important to offer at lunchtime.

Lunchtime Drink Choices



6. a) e.g., I read online that Winnipeg has 119 wet days (some rain or snow) and 246 dry days in a typical year.

A Typical Year in Winnipeg



- b) e.g., There are about twice as many dry days as wet days; the section in the graph showing dry days is twice the size of the section showing wet days.
- c) e.g., I know this because the section in the graph is about twice as large and 67% is almost double 33%.

**Cumulative Review: Chapters 8–11, pp. 492–493**

- |      |         |       |
|------|---------|-------|
| 1. C | 6. B    | 11. C |
| 2. D | 7. B    | 12. B |
| 3. C | 8. B    | 13. D |
| 4. A | 9. B, C | 14. C |
| 5. C | 10. D   |       |

