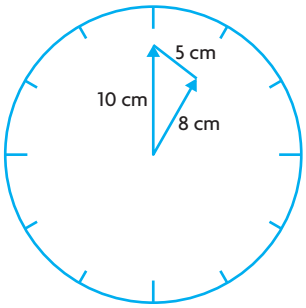
16. Answers will vary, e.g., Problem: The minute hand of a clock is pointing at the number 12 and is 10 cm long. The hour hand is 8 cm long. The distance between the tips of the hands is 5 cm. What time could it be? Answer: Use the cosine law to determine the angle formed by the hands, and then determine which number(s) the hour hand could be pointing at, keeping in mind that consecutive numbers on a clock form a 30° angle from the centre. (There are two possible times, depending on whether the hour hand is behind or ahead of the minute hand.)



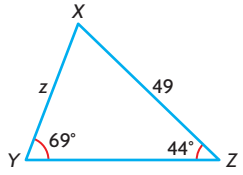
17. about 96 m
18. 50.0 cm^2

Chapter Review, page 453

1. No. e.g., $6^2 + 8^2 = 10^2$, so $\triangle ABC$ is a right triangle.
2. Part d) is not correct for acute triangles.
3. **a)** about 23.7 m **b)** about 62°
4. about 16°
5. $\angle C = 55°$, $a \doteq 9.4$ cm, $b \doteq 7.5$ cm
6. about 295 m
7. **a)** not a form of the cosine law; it should end with cos A
b) form of the cosine law
c) form of the cosine law
8. **a)** about 7.6 m **b)** about 68°
9. $\angle B \doteq 44°$, $\angle C \doteq 78°$, $a \doteq 12.2$ cm
10. about 58°
11. about 11 m
12. about 584 km
13. about 5.5 km, about N35°W

Chapter Self-Test, page 454

1. **a)** about 43° **b)** about 2.37 cm
2. $\angle R = 52°$, $p \doteq 25$ cm, $q \doteq 19$ cm
3. **a)** Answers will vary, e.g.,



b) $z \doteq 36$ units
4. about 117 km
5. about 502.1 m
6. about 11.6 cm
7. about 28.3 m^2
8. about 131 m
9. Answers may vary, e.g., if the angle is formed by the two given sides, use the cosine law. If not, use the sine law to determine a second angle, subtract the two angle measures from 180°, then use the sine or cosine law.

Cumulative Review Chapters 7–8, page 456

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

20. Option B is less costly. For Option A, the cost of cable down the cliff is \$276. The cost of underwater cable is $\frac{23}{\tan 14°}$, which adds up to \$3320.18. For Option B, the change in elevation from the station to the first tower is $\sin^{-1}\left(\frac{8}{39}\right) = 11.84°$, which means 3 extra supports are needed. This costs \$75. The cost of cable from the station to the subdivision is $17(39 + 34 + 33 + 61 + 23) = 3230$. The total cost is \$3305.

21. **a)** 52° **b)** 63°

Appendix A

A-1 Operations with Integers, page 461

1. **a)** 3 **b)** 25 **c)** −24 **d)** −10 **e)** −6 **f)** 6
2. **a)** < **b)** > **c)** > **d)** =
3. **a)** 55 **b)** 60 **c)** −7 **d)** 8 **e)** $\frac{15}{7}$ **f)** $\frac{1}{49}$
4. **a)** 5 **b)** 20 **c)** −9 **d)** 76 **e)** −12 **f)** −1
5. **a)** 3 **b)** −1 **c)** −2 **d)** 1 **e)** 8 **f)** $\frac{1}{4}$

A-2 Operations with Rational Numbers, page 462

1. **a)** $-\frac{1}{2}$ **b)** $\frac{7}{6}$ or $1\frac{1}{6}$ **c)** $\frac{2}{15}$ **d)** $\frac{775}{24}$ or $32\frac{7}{24}$ **e)** $\frac{16}{9}$ or $1\frac{7}{9}$ **f)** $\frac{2}{3}$
2. **a)** $\frac{1}{5}$ **b)** $\frac{3}{10}$ **c)** $\frac{1}{15}$ **d)** $-\frac{1}{18}$ **e)** $\frac{36}{5}$ or $7\frac{1}{5}$ **f)** $-\frac{2}{5}$

A-3 Exponent Laws, page 463

1. **a)** 16 **b)** 1 **c)** 9 **d)** −9 **e)** −125 **f)** $\frac{1}{8}$
2. **a)** 2 **b)** 31 **c)** 9 **d)** $\frac{1}{18}$ **e)** −16 **f)** $\frac{13}{36}$
3. **a)** 9 **b)** 50 **c)** 4 194 304 **d)** $\frac{1}{27}$
4. **a)** x^8 **b)** m^9 **c)** y^7 **d)** a^{bc} **e)** x^6 **f)** $\frac{x^{12}}{y^9}$
5. **a)** x^5y^6 **b)** $108m^{12}$ **c)** $25x^4$ **d)** $\frac{4u^2}{v^2}$

A-4 The Pythagorean Theorem, page 465

1. **a)** $x^2 = 6^2 + 8^2$
b) $c^2 = 13^2 + 6^2$
c) $9^2 = y^2 + 5^2$
d) $8.5^2 = a^2 + 3.2^2$

2. **a)** 10 cm **b)** 14.3 cm **c)** 7.5 m **d)** 7.9 cm

3. **a)** 13.93 units **b)** 6 units **c)** 23.07 units **d)** 5.23 units

4. **a)** 11.2 m **b)** 6.7 cm **c)** 7.4 cm **d)** 4.9 m

5. 10.6 cm

6. 69.4 m

A-5 Evaluating Algebraic Expressions and Formulas, page 466

1. **a)** 28 **b)** -17 **c)** 1 **d)** $\frac{9}{20}$

2. **a)** $\frac{1}{6}$ **b)** $\frac{5}{6}$ **c)** $-\frac{17}{6}$ **d)** $-\frac{7}{12}$

3. **a)** about 82.4 cm^2
b) about 58.1 m^2
c) 10 m
d) about 4846.6 cm^3

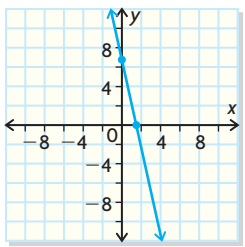
A-6 Determining Intercepts of Linear Relations, page 468

1. **a)** x-intercept: 3; y-intercept: 1
b) x-intercept: -7; y-intercept: 14
c) x-intercept: 6; y-intercept: -3
d) x-intercept: 3; y-intercept: 5
e) x-intercept: -10; y-intercept: 10
f) x-intercept: $-\frac{15}{2}$; y-intercept: 3

2. **a)** x-intercept: 7; y-intercept: -7
b) x-intercept: -3; y-intercept: 2
c) x-intercept: -3; y-intercept: 12
d) x-intercept: -10; y-intercept: 6
e) x-intercept: -7; y-intercept: $\frac{7}{2}$
f) x-intercept: 2; y-intercept: $\frac{-12}{5}$

3. **a)** x-intercept: 13
b) y-intercept: -6
c) x-intercept: 7
d) x-intercept: -10
e) y-intercept: $\frac{-3}{2}$
f) y-intercept: 8

4. **a)** x-intercept: 1.5; y-intercept: 6.75
b)

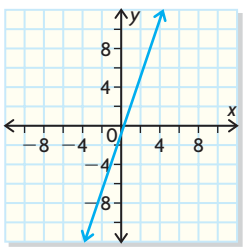


c) The foot of the ladder is on the ground 1.5 units from the wall. The top of the ladder is 6.75 units up the wall.

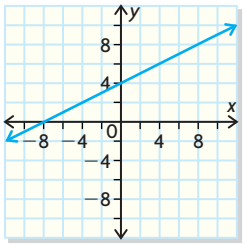
A-7 Graphing Linear Relations, page 470

1. **a)** $y = 2x + 3$
b) $y = \frac{1}{2}x - 2$
c) $y = -\frac{1}{2}x + 2$
d) $y = 5x + 9$

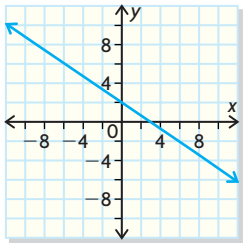
2. **a)**



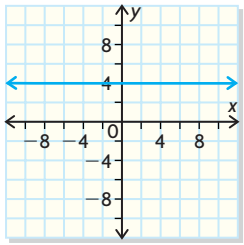
b)



c)

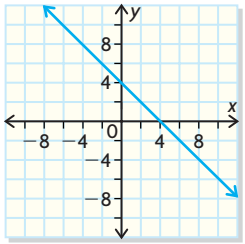


d)

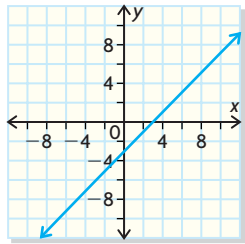


3. **a)** x-intercept: 10; y-intercept: 10
b) x-intercept: 8; y-intercept: 4
c) x-intercept: 5; y-intercept: 50
d) x-intercept: 2; y-intercept: 4

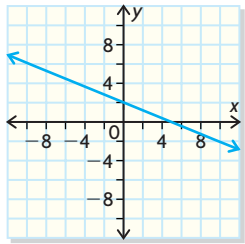
4. **a)** x-intercept: 4; y-intercept: 4



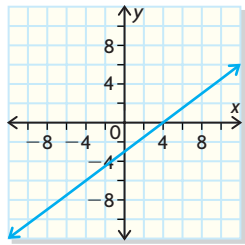
b) x-intercept: 3; y-intercept: -3



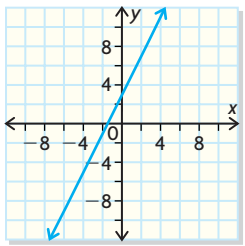
c) x-intercept: 5; y-intercept: 2



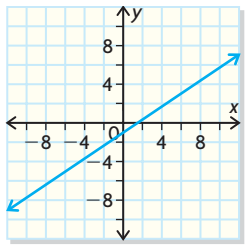
d) x-intercept: 4; y-intercept: -3



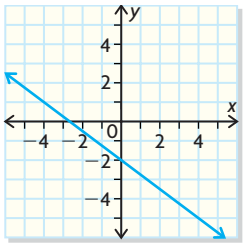
5. **a)**



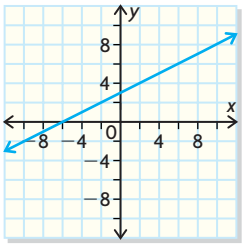
b)



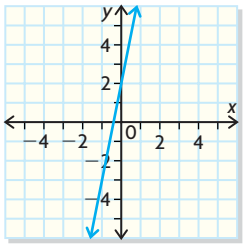
c)



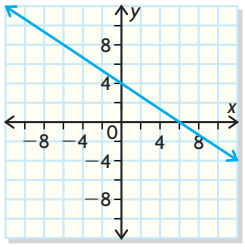
d)



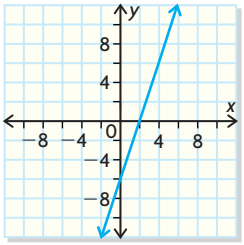
6. **a)**



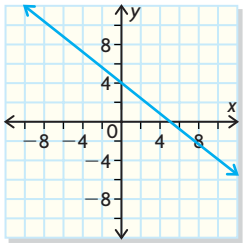
c)



b)



d)



A-8 Expanding and Simplifying Algebraic Expressions, page 471

1. **a)** variable: x; coefficient: 5
b) variable: a; coefficient: -13
c) variable: c; coefficient: 7
d) variable: m; coefficient: -1.35
e) variable: y; coefficient: $\frac{4}{7}$
f) variable: x; coefficient: $\frac{5}{8}$

2. **a)** $a, -3a, 12a; 5x, -9x$
b) $c^2, 13c^2; 6c, -c, 1.25c$
c) $3xy, -3xy; 5x^2y, 9x^2y, 12x^2y$
d) $x^2, -x^2; y^2, -y^2; 2xy, -4xy$

3. **a)** binomial **d)** monomial
b) monomial **e)** binomial
c) trinomial **f)** trinomial

4. **a)** $-2x - 5y$ **c)** $-9x - 10y$
b) $-4x^3 + 11x^2$ **d)** $-2m^2n - p$

5. **a)** $6x + 15y - 6$ **c)** $3m^4 - 2m^2n$
b) $5x^3 - 5x^2 + 5xy$ **d)** $4x^7y^7 - 2x^6y^8$

6. **a)** $8x^2 - 4x$ **c)** $-13m^5n - 22m^2n^2$
b) $-34h^2 - 23h$ **d)** $-x^2y^3 - 7xy^3 - 12xy^4$

A-9 Solving Linear Equations Algebraically, page 472

1. **a)** $x = 9$ **c)** $m = 3$ **e)** $y = 6$
b) $x = 0.8$ **d)** $m = -4$ **f)** $r = \frac{23}{10}$

2. **a)** 6 cm **b)** 16 m

3. **a)** $x = 100$ **c)** $m = \frac{2}{3}$ **e)** $y = \frac{7}{18}$
b) $x = 20$ **d)** $y = 21$ **f)** $m = -\frac{6}{5}$

4. 147 student, 62 adult

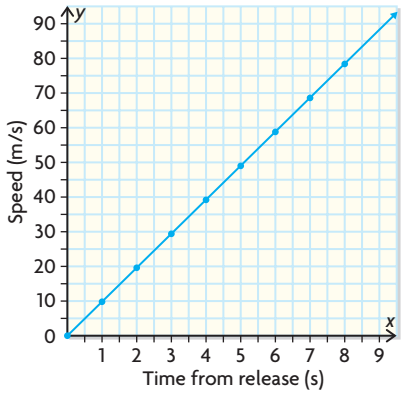
A-10 First Differences and Rate of Change, page 474

1. **a)** **i)**

Time (s)	Speed (m/s)	First Difference
0	0.0	
		9.8
1	9.8	
		9.8
2	19.6	
		9.8
3	29.4	
		9.8
4	39.2	
		9.8
5	49.0	
		9.8
6	58.8	
		9.8
7	68.6	
		9.8
8	78.4	

ii) linear

iii)

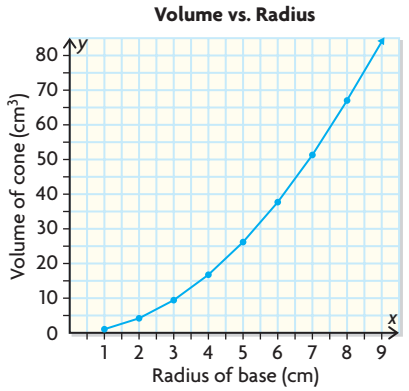


b) **i)**

Radius (cm)	Volume (cm^3)	First Difference
1	1.047	
		3.142
2	4.189	
		5.236
3	9.425	
		7.330
4	16.755	
		9.425
5	26.180	
		11.519
6	37.699	
		13.614
7	51.313	
		15.708
8	67.021	

ii) nonlinear

iii)

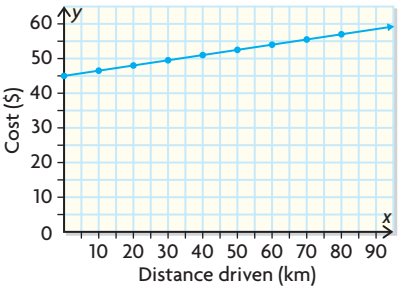


c) i)

Distance (km)	Cost ($)	First Difference
0	45.00	
10	46.50	1.50
20	48.00	1.50
30	49.50	1.50
40	51.00	1.50
50	52.50	1.50
60	54.00	1.50
70	55.50	1.50
80	57.00	

ii) linear

iii)

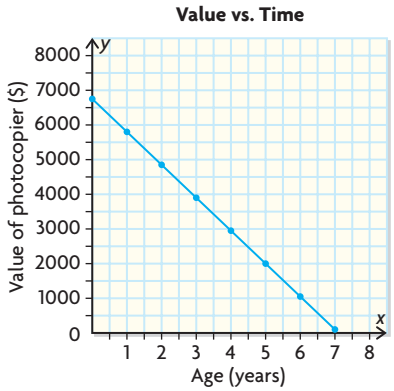


d) i)

Age (years)	Value ($)	First Difference
0	6750	
1	5800	−950
2	4850	−950
3	3900	−950
4	2950	−950
5	2000	−950
6	1050	−950
7	100	

ii) linear

iii)

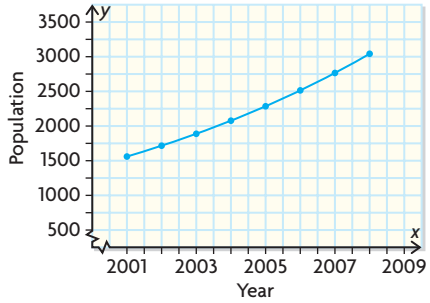


e) i)

Year	Population	First Difference
2001	1560	
2002	1716	156
2003	1888	172
2004	2077	189
2005	2285	208
2006	2514	229
2007	2765	251
2008	3042	277

ii) nonlinear

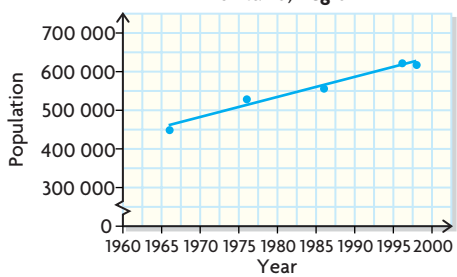
iii)



2. a) 9.8 m/s²
b) nonlinear
c) $1.50/km
d) −$950/year
e) nonlinear

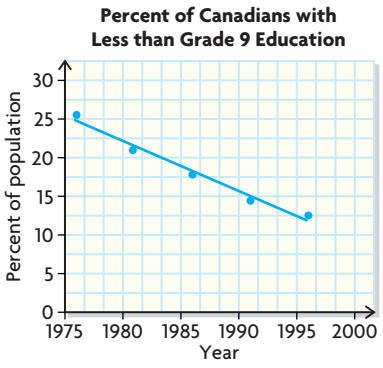
A-11 Creating Scatter Plots and Lines or Curves of Good Fit, page 476

1. a) i)



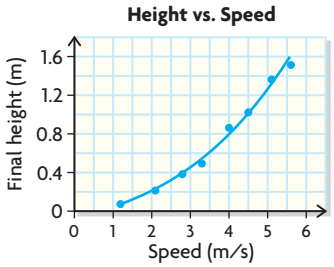
ii) The data display a strong positive correlation.

b) i)



ii) The data display a strong negative correlation.

2. a)

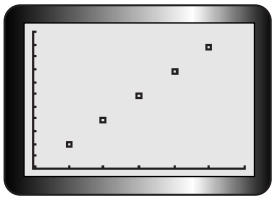


b) The motion sensor's measurements are consistent since the curve goes through several of the points.

A-12 Interpolating and Extrapolating, page 478

1. Answers may vary, e.g.,
a) about 53 m; 54 m **b** about 77 m; about 79 m

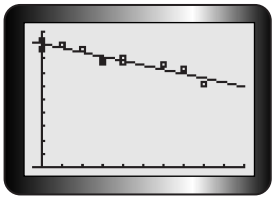
2. a)



b) Answers may vary, e.g., about 24.5 m/s; 34.3 m/s; 46.55 m/s
c) Answers may vary, e.g., about 58.8 m/s; 88.2 m/s; 98.0 m/s

3. Interpolation is more reliable because extrapolation relies on the assumption that the trends in the data will continue.

4. a)



Answers may vary, e.g.,
b) about 3%
c) about 72%
d) about 13 days absent

5. Answers may vary, e.g., about 82 m; about 24 m/s

A-13 Transformations of Two-Dimensional Figures, page 480

1. a) different position **b)** flipped
2. a) reflection **b)** translation
3. a) reflection in a vertical line
b) reflection in a horizontal line
c) reflection in a horizontal line and in a vertical line
d) Answers may vary, e.g., reflection in a horizontal or vertical line, then reflection in the opposite direction, or no reflection
4. a) $(x + 1, y - 5)$
b) $(x + 6, y - 2)$
c) $(x + 7, y + 1)$
5. a) $J'(-2, 0)$, $K'(-2, -3)$, $L'(1, -3)$
b) $J'(-4, -5)$, $K'(-4, -2)$, $L'(-1, -2)$
c) $J'(4, 5)$, $K'(4, 2)$, $L'(1, 2)$
6. a) reflected in the x-axis **b)** reflected in the y-axis

A-14 Ratios, Rates, and Proportions, page 482

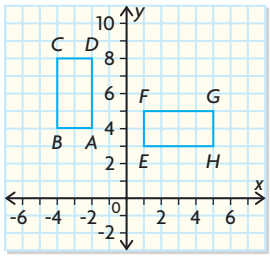
1. a) 4:5 **b)** 5:3 **c)** 6:1 **d)** 7:3 **e)** 4:7
2. a) 4:5 **b)** 3:5 **c)** 1:3 **d)** 2:15 **e)** 1:2 **f)** 10:13
3. a) 4.0 m **b)** 18.0 m **c)** 24.5 m **d)** 48.4 m **e)** 27.0 m
4. a) 80 beats/min **b)** 80 km/h **c)** about \$4.95/kg **d)** 45 words/min
5. a) 8 **b)** 63 **c)** 32 **d)** 10 **e)** 12 **f)** 40 **g)** 52 **h)** 2
6. a) 4 **b)** 9 **c)** 10 **d)** 4; 24 **e)** 15; 3
7. a) 2.8 **b)** 10.8 **c)** 67.86 **d)** 177.69 **e)** 4.62 **f)** 63 **g)** 66.67 **h)** 3.8
8. 1015
9. 1.4 L

A-15 Properties of Triangles and Angle Relationships, page 484

1. a) $x = 70°, y = 50°, z = 110°$
b) $x = 115°, y = 65°, z = 65°$
c) $x = 20°, y = 160°, z = 160°$
d) $x = 50°, y = 60°, z = 70°$
e) $x = 80°, y = 60°, z = 60°$
f) $x = 54°, y = 54°, z = 126°$
g) $x = 60°, y = 120°, z = 120°$
h) $x = 30°, y = 40°, z = 50°$
2. a) ST, RS, TR; $\angle R$, $\angle T$, $\angle S$
b) NL, LM, MN; $\angle M$, $\angle N$, $\angle L$
The longest side is across from the greatest angle. The shortest side is opposite the least angle.

A-16 Congruent Figures, page 485

1.



$ABCD$ and $EFGH$ are congruent because all the corresponding sides and angles are equal.

2. JK and SP, KL and PQ, LM and QR, MJ and RS; $\angle J$ and $\angle S$, $\angle K$ and $\angle P$, $\angle L$ and $\angle Q$, $\angle M$ and $\angle R$
3. $x = 20°$, $y = 25$ cm, $z = 5$ cm