8. 93 cm^3

9. a) Circular-based bin

b) Square-based bin

10. a) 1300.0 cm^3 **b)** 6.2 m^3

11. a) 856.2 cm^2 **b)** 24.2 m^2

12. Approximately 26.4 m^2

13. a) 1060 $in.^3$ **b)** 15 in. by 15 in. by 12 in.

c) 1820 $in.^3$

Chapter 1: Review, page 64

1. Answers may vary. For example:

a) Inch **b)** Foot

c) Yard

3. a) 42 ft. **b)** 8800 yd.

c) 75 in. **d)** 3 yd. 1 ft. 3 in.

4. 320 in., or 8 yd. 2 ft. 8 in.

6. Answers will vary depending on the conversion ratios used.

a) 8 ft. 7 in. **b)** 136 yd. 2 ft. 1 in.

c) 3 mi. 1282 yd. **d)** 1 ft. 2 in.

7. Answers will vary depending on the conversion ratios used.

a) 12.5 m **b)** 6.8 km

c) 48.3 cm **d)** 215.9 mm

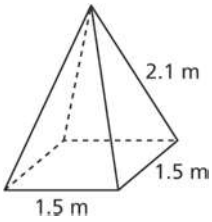
8. Answers will vary depending on the conversion ratio used. 670 750 strides

9. a) 75 $ft.^2$ **b)** 85 cm^2

c) 898 mm^2 **d)** 192 m^2

10. 160 $yd.^2$

11. a)



b) 2.0 m

c) 6 m^2

12. a) $8\frac{7}{10}$ in. **b)** 173 $in.^2$

13. 125.8 cm^2

14. 5810 $ft.^2$

15. a) 11 m^3 **b)** 8822 $in.^3$

c) 7 $ft.^3$ **d)** 221 mm^3

16. No; approximately 132.7 cm^3

17. 12 cm

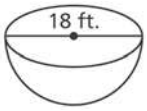
18. a) 24 $in.^3$ **b)** 6 in.

19. a) 2.1 m **b)** 2.3 cm

20. a) 254 $in.^2$, 382 $in.^3$

b) 133 m^2, 144 m^3

21.



a) 763 $ft.^2$ **b)** 1527 $ft.^3$

22. $4\frac{3}{5}$ in.

23. Approximately 98 cm^3

24. 523 $in.^3$

25. a) 480 cm^2, 595 cm^3 **b)** 108 $ft.^2$, 84 $ft.^3$

26. a) 113 981 cm^3 **b)** 11 878 cm^2

27. a) 8 cm **b)** 10 mm

Chapter 1: Practice Test, page 67

1. B

2. C

3. The volume of the right cylinder is 3 times the volume of the right cone.

4. a) 28.3 cm^3, 69.3 cm^2

b) 1215.8 m^3, 647.2 m^2

5. a) A ruler with inches marked

6. 5.8 cm

Chapter 2 Trigonometry, page 68

2.1 The Tangent Ratio, page 75

3. a) $\tan A = \frac{6}{7}$; $\tan C = \frac{7}{6}$

b) $\tan D = \frac{3}{2}$; $\tan F = \frac{2}{3}$

c) $\tan H = \frac{5}{4}$; $\tan J = \frac{4}{5}$

d) $\tan K = \frac{5}{7}$; $\tan M = \frac{7}{5}$

4. a) 14° **b)** 51°

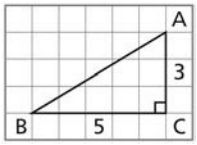
c) 68° **d)** 87°

5. a) 27° **b)** 45°

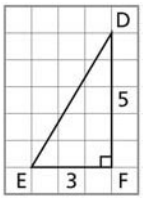
c) 61° **d)** 69°

6. Sketches will vary. For example:

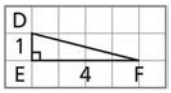
a)



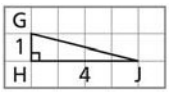
b)



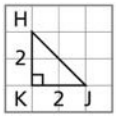
c)



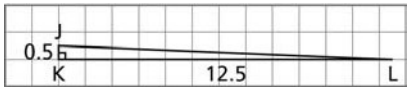
d)



e)



f)



7. a) tan 60° > 1 **b)** tan 30° < 1

8. a) 36.4° **b)** 68.0°

9. b) i) ∠A ≐ 26.6°; ∠B ≐ 63.4°

ii) ∠D ≐ 63.4°; ∠F ≐ 26.6°

iii) ∠G ≐ 63.4°; ∠H ≐ 26.6°

c) No

10. a) 36.0° **b)** 49.1°

c) 20.3° **d)** 82.4°

11. a) 11° **b)** 14°

c) 6° **d)** 9°

12. Whitehorse

13. ∠P = ∠RQS ≐ 67.4°, ∠R = ∠PQS ≐ 22.6°

14. 22°

15. 20.6°; 69.4°

16. The side opposite the acute angle has the same length as the side adjacent to the angle.

17. 25°

18. 22°

19. 146°

20. 76°

21. ∠X ≐ 50.1°, ∠Y = ∠Z ≐ 64.9°

22. a) There is no least possible value; the tangent can be arbitrarily close to zero.

b) There is no greatest possible value; the tangent can be arbitrarily large.

23. a) 1; $\frac{1}{\sqrt{2}}$; $\frac{1}{\sqrt{3}}$; $\frac{1}{\sqrt{4}}$, or $\frac{1}{2}$; $\frac{1}{\sqrt{5}}$

b) $\frac{1}{\sqrt{100}}$, or $\frac{1}{10}$

2.2 Using the Tangent Ratio to Calculate Lengths, page 82

3. a) 2.5 cm **b)** 1.4 cm

c) 5.0 cm **d)** 7.5 cm

4. a) 2.2 cm **b)** 2.8 cm

c) 2.8 cm

5. a) 5.6 cm **b)** 4.1 cm

c) 3.8 cm

6. 22.8 m

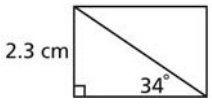
7. 3.8 m

8. 187 m

9. a) 3.6 cm **b)** 10.0 cm

10. Approximately 30 m

11. a)



b) 3.4 cm

12. 40.3 cm^2

13. Approximately 60 m

14. Approximately 58 m, assuming the balloon is directly over the store

15. ∠QRT = ∠SRT = 26.5°, ∠QRS = 53.0°,
∠QPT = ∠SPT = 56.3°, ∠QPS = 112.6°,
∠RQT = ∠RST = 63.5°,
∠PQT = ∠PST = 33.7°,
∠PQR = ∠PSR = 97.2°,
∠PTQ = ∠PTS = ∠QTR = ∠RTS = 90.0°
PQ = PS ≐ 3.6 cm, QR = SR ≐ 6.7 cm

16. a) Approximately 38.7°

b) Approximately 63.4°

2.3 Math Lab: Measuring an Inaccessible Height, page 86

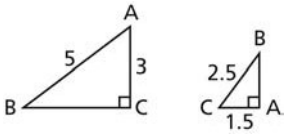
1. The sum of the angle shown on the protractor and the angle of inclination is 90°.
2. 13.5 m
3. 25 m

Chapter 2: Checkpoint 1, page 88

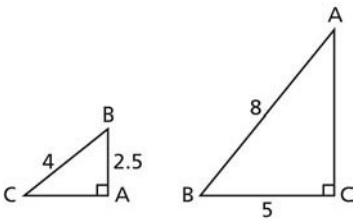
1. a) 14° **b)** 56°
c) 53°
3. 11.5°
4. a) 11.2 cm **b)** 7.3 cm
c) 11.7 cm
5. Approximately 23.7 m

2.4 The Sine and Cosine Ratios, page 95

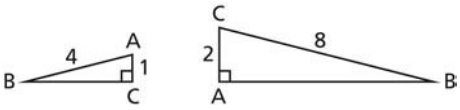
4. a) i) Opposite: GH; adjacent: AG; hypotenuse: AH
ii) Opposite: TK; adjacent: AK; hypotenuse: AT
b) i) sin A = 0.60; cos A = 0.80
ii) sin A = 0.28; cos A = 0.96
5. a) sin 57° ≐ 0.84; cos 57° ≐ 0.54
b) sin 5° ≐ 0.09; cos 5° ≐ 1.00
c) sin 19° ≐ 0.33; cos 19° ≐ 0.95
d) sin 81° ≐ 0.99; cos 81° ≐ 0.16
6. a) 14° **b)** 50°
c) 33° **d)** 39°
7. a) 34° **b)** 35°
c) 39° **d)** 33°
8. a) 41° **b)** 78°
c) 26° **d)** 66°
9. Sketches will vary. For example:
a)



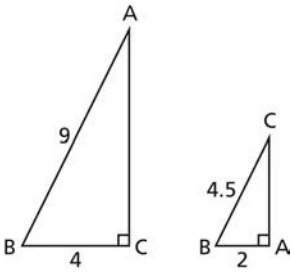
b)



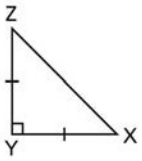
c)



d)



10. a) ∠C ≐ 16.3°, ∠D ≐ 73.7°
b) ∠F ≐ 63.9°, ∠H ≐ 26.1°
c) ∠J ≐ 38.0°, ∠K ≐ 52.0°
d) ∠P ≐ 49.3°, ∠Q ≐ 40.7°
11. 1.3°
12. 79.4°
13. 61°
14. 31°
15. a) i) 0.1736… **ii)** 0.3420…
iii) 0.6427… **iv)** 0.7660…
v) 0.8660… **vi)** 0.9848…
16.



The opposite and adjacent sides of an acute angle have the same length, so $\frac{\text{opposite}}{\text{hypotenuse}} = \frac{\text{adjacent}}{\text{hypotenuse}}$.
17. 40°
18. a) i) 1 **ii)** 0
iii) 0 **iv)** 1

2.5 Using the Sine and Cosine Ratios to Calculate Lengths, page 101

3. a) 3.1 cm **b)** 1.5 cm
c) 1.5 cm **d)** 3.7 cm
4. a) 1.7 cm **b)** 3.2 cm
c) 5.4 cm **d)** 7.9 cm
5. a) 25.3 cm **b)** 8.0 cm
c) 7.7 cm **d)** 12.4 cm

6. 29.7 m

7. a) 48.3 m

b) The surveyor could use the tangent ratio or the Pythagorean Theorem.

8. 4.0 km

9. 2813 m

10. 18.3 cm by 4.6 cm

11. a) 423 cm **b)** 272 cm

12. a) **i)** 21.0 cm **ii)** 15.1 cm

13. 186 mm

14. a) Approximately 139 ft.

b) 17 407 ft.^{2}

Chapter 2: Checkpoint 2, page 104

1. a) 30° **b)** 48°

c) 56°

2. 13°

3. a) **i)** 0.9848… **ii)** 0.9396…

iii) 0.8660… **iv)** 0.7660…

v) 0.6427… **vi)** 0.5

vii) 0.3420… **viii)** 0.1736…

4. a) 4.2 cm **b)** 2.7 cm

c) 14.0 cm

5. Approximately 3.2 km

2.6 Applying the Trigonometric Ratios, page 111

3. a) Sine **b)** Tangent

c) Cosine **d)** Tangent

4. a) 4.6 cm; cosine **b)** 4.7 cm; tangent

c) 11.8 cm; sine **d)** 14.5 cm; cosine

5. a) Pythagorean Theorem **b)** Sine ratio

c) Pythagorean Theorem **d)** Pythagorean Theorem

6. a) $\angle T = 57°$, TU $\doteq$ 23.0 cm, VU $\doteq$ 19.2 cm

b) $\angle Y = 43°$, WY $\doteq$ 8.7 cm, XY $\doteq$ 6.3 cm

c) ZB $\doteq$ 11.3 cm, $\angle B \doteq 60.3°$, $\angle Z \doteq 29.7°$

d) $\angle E = 61°$, CD $\doteq$ 12.0 cm, CE $\doteq$ 6.6 cm

7. a) 1147 cm **b)** 1144 cm

8. 173 ft.

9. a) 68 km **b)** 31°

10. a) 4° **b)** 15.0 m

11. a) 31° **b)** 118°

12. a) 13.5 cm; 7.8 cm^2 **b)** 28.9 cm; 47.5 cm^2

13. 7.3 cm

14. a) 3 in.^{2} **b)** 15 in.^{3}

15. 36 cm

16. 15.6 cm; 11.6 cm^2

2.7 Solving Problems Involving More than One Right Triangle, page 118

3. a) 6.0 cm **b)** 6.0 cm

c) 4.3 cm **d)** 3.6 cm

4. a) 5.7 cm **b)** 4.9 cm

c) 5.7 cm

5. a) 93.2° **b)** 123.7°

c) 11.1° **d)** 15.0°

6. 15 m, 19 m

7. 51°, 65°, 65°

8. a) 19 ft. **b)** 21 ft.

9. 35 m, 58 m

10. Approximately 126°, approximately 54°

11. 4.5 m

12. a) 53 m **b)** 29 m

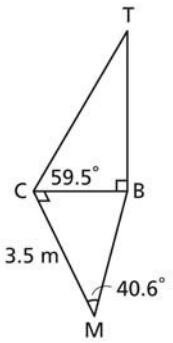
c) 50 m

13. a) 5.0 m **b)** 51.3°

c) 2.4 m

14. a) 23 m **b)** 20 m

16. a)

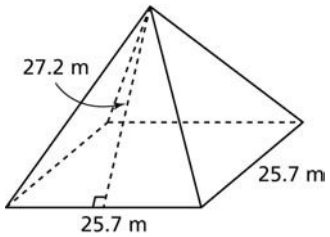


b) 5.1 m

17. a) 98.1°, 51.7°, 105.1°, 105.1°

b) 100 mm

18. a)



b) 24.0 m

19. a) 5.4 cm **b)** 33.9°

20. Approximately 8.3 m

21. Approximately 18 in.

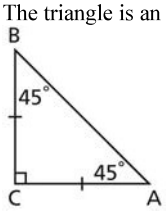
Chapter 2: Review, page 124

1. a) 35° **b)** 65°

2. a) $\tan 20° < 1$ **b)** $\tan 70° > 1$

3. 6°

4. The triangle is an isosceles right triangle.



5. a) **i)** 3.7 cm
ii) 3.0 cm

b) Could also use trigonometric ratios
i) Approximately 4.2 cm
ii) Approximately 4.0 cm

6. 327 m

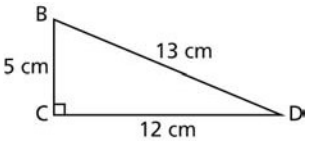
7. a) 11.7 cm **b)** 13.0 cm

8. 17.5 m

9. 30 m

11. a) 73°; cosine **b)** 28°; sine

12.



a) **i)** $\frac{5}{13}$ **ii)** $\frac{12}{13}$
iii) $\frac{5}{13}$ **iv)** $\frac{12}{13}$

b) $\sin D = \cos B$; $\sin B = \cos D$

13. 64.2°

14. 36.9°

15. a) 3.9 cm; cosine
b) 4.4 cm; sine
c) 4.7 cm; sine
d) 4.5 cm; cosine

16. 6.0 km

17. 1.6 cm by 2.8 cm

18. a) CE ≐ 5.0 cm, ∠E ≐ 57.3°, ∠C ≐ 32.7°
b) ∠H = 52°, GH ≐ 2.7 cm, FH ≐ 4.3 cm
c) ∠K = 63°, JM ≐ 3.9 cm, KM ≐ 2.0 cm

19. 85.9°

20. a) 35.5 cm; 52.1 cm^2
b) 13.0 cm; 10.2 cm^2

21. a) 3.2 m **b)** 8.2 m

22. a) 13.6 cm **b)** 11.3 cm
c) 21.0°

23. 2316 ft.

Chapter 2: Practice Test, page 127

1. B

2. C

4. ∠D = 27.0°, DE ≐ 6.9 cm, EF ≐ 3.5 cm

5. 203 cm

6. 75.5 m

Cumulative Review Chapters 1 and 2, page 130

1. a) 23 yd. 1 ft. **b)** $59.76

2. 276 km

4. Answers will vary depending on the conversion ratios used.
a) 823 cm **b)** 279 400 m
c) 3 mi. **d)** 5 ft. 3 in.

5. Answers will vary depending on the conversion ratio used. The road above The Narrows is higher by approximately 5 ft., or 1.5 m.

6. a) 342 m^2 **b)** 208 $ft.^2$

7. 192 $ft.^3$

8. Approximately 6 yd.

9. No

10. a) Hemisphere; 138 $in.^2$
b) Sphere; 3824 $in.^3$

11. 191 m^2, 170 m^3

12. 4478 $in.^2$

13. 222.1 mm^2, 239.6 mm^3

14. a) 31.0° **b)** 62.5°

15. 26 yd.

16. 201 ft.

17. a) 61.9° **b)** 68.4°

18. 22°

19. 50 ft. by 94 ft.

20. a) ∠S = 24.0°, RT ≐ 6.4 m, RS ≐ 14.4 m
b) ∠M = 46.0°, MN ≐ 7.1 cm, MP ≐ 10.3 cm

21. 59°

22. $x = 20.0$ cm; $y \doteq 40.0$ cm;
∠PRQ = 46.4°; ∠PRS = 133.6°;
∠PSR = 31.7°; ∠QPR = 43.6°;
∠QPS = 58.3°; ∠QRS = 180.0°;
∠RPS = 14.7°