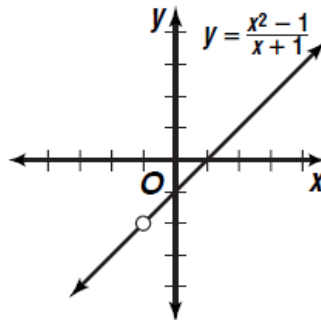


Chapter 5 Solutions

These answers are to be used to check against your solutions. Your homework should show all of your work, not just the answers!

Section 5.1 – Angles and Degrees

18. $-16^{\circ} 45'$
19. $168^{\circ} 21''$
20. $-183^{\circ} 28' 12''$
26. 233.421°
27. 173.410°
28. -405.272°
30. -1080°
31. 720°
32. 540°
33. -2700°
34. 810°
35. -2070°
36. 1440°
39. $113^{\circ} + 360k$; 473° or -247°
40. $217^{\circ} + 360k$; 577° or -143°
41. $-199 + 360k$; 161° or -559°
42. $-305^{\circ} + 360k$; 55° or -665°
44. 780° and -1020°
45. 40° ; Quadrant I
46. 80° ; Quadrant I
47. 220° ; Quad III
48. 339° ; Quad IV
49. 96° ; Quad II
50. 91° ; Quad II
51. 195° ; Quad III
52. 33° ; Quad IV
53. 32° Quad II
54. 23° Quad III
55. 60° ; Quad IV
56. 17° ; Quad II
57. 35° ; Quad IV
58. 20° , 160° , 200° , 340°
59. $1,944,000^{\circ}$ per minute
61. $17,100^{\circ}$
73. Point Discontinuity



Chapter 5 Solutions

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Section 5.2 – Trig Ratios

10. $\sin A = \frac{3}{5}$, $\cos A = \frac{4}{5}$, $\tan A = \frac{3}{4}$

33. $88^\circ 22' 12''$

11. $\sin A = \frac{5\sqrt{89}}{89}$, $\cos A = \frac{8\sqrt{89}}{89}$, $\tan A = \frac{5}{8}$

38. C

12. $\sin A = \frac{3}{10}$, $\cos A = \frac{\sqrt{91}}{10}$, $\tan A = \frac{3\sqrt{91}}{91}$

13. tangent

14. $\cot \theta = 3$

15. $\csc \theta = \frac{7}{3}$

16. $\cos \theta = \frac{9}{5}$

17. $\sin \theta = 0.4$

18. $\tan \theta = 1.333$

19. $\sec \theta = 8$

20. $\cos R = \frac{7}{24}$, $\sin R = \frac{\sqrt{527}}{24}$, $\tan R = \frac{\sqrt{527}}{7}$,
 $\sec R = \frac{24}{7}$, $\csc R = \frac{24\sqrt{527}}{527}$, $\cot R = \frac{7\sqrt{527}}{527}$

21. $\sin R = \frac{19}{20}$, $\cos R = \frac{\sqrt{39}}{20}$, $\tan R = \frac{19\sqrt{39}}{39}$,
 $\csc R = \frac{20}{19}$, $\sec R = \frac{20\sqrt{39}}{39}$, $\cot R = \frac{\sqrt{39}}{19}$

22. $\sin R = \frac{\sqrt{154}}{44}$, $\cos R = \frac{9\sqrt{22}}{44}$, $\tan R = \frac{\sqrt{7}}{9}$,
 $\csc R = \frac{2\sqrt{154}}{7}$, $\sec R = \frac{2\sqrt{22}}{9}$, $\cot R = \frac{9\sqrt{7}}{7}$

29. a) about 5.4 m/s

b) about 5.9 m/s

c) about 6.4 m/s , d) increase

Chapter 5 Solutions

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Section 5.3 – Unit Circle

14. 1

15. 0

16. undefined

17. -1

18. 0

19. -1

20. possible answer: 0° , or 180°

21. undefined

22. $\sin 45^\circ = \frac{\sqrt{2}}{2}$, $\cos 45^\circ = \frac{\sqrt{2}}{2}$, $\tan 45^\circ = 1$
 $\csc 45^\circ = \sqrt{2}$, $\sec 45^\circ = \sqrt{2}$, $\cot 45^\circ = 1$

23. $\sin 150^\circ = \frac{1}{2}$, $\cos 150^\circ = -\frac{\sqrt{3}}{2}$,
 $\tan 150^\circ = -\frac{\sqrt{3}}{3}$, $\csc 150^\circ = 2$,
 $\sec 150^\circ = -\frac{2\sqrt{3}}{3}$, $\cot 150^\circ = -\sqrt{3}$

24. $\sin 315^\circ = -\frac{\sqrt{2}}{2}$, $\cos 315^\circ = \frac{\sqrt{2}}{2}$,
 $\tan 315^\circ = -1$, $\csc 315^\circ = -\sqrt{2}$,
 $\sec 315^\circ = \sqrt{2}$, $\cot 315^\circ = -1$

25. $\sin 210^\circ = -\frac{1}{2}$, $\cos 210^\circ = -\frac{\sqrt{3}}{2}$,
 $\tan 210^\circ = \frac{\sqrt{3}}{3}$, $\csc 210^\circ = -2$
 $\sec 210^\circ = -\frac{2\sqrt{3}}{3}$, $\cot 210^\circ = \sqrt{3}$

26. $\sin 330^\circ = -\frac{1}{2}$, $\cos 330^\circ = \frac{\sqrt{3}}{2}$
 $\tan 330^\circ = -\frac{\sqrt{3}}{3}$, $\csc 330^\circ = -2$
 $\sec 330^\circ = \frac{2\sqrt{3}}{3}$, $\cot 330^\circ = -\sqrt{3}$

27. $\sin 420^\circ = \frac{\sqrt{3}}{2}$, $\cos 420^\circ = \frac{1}{2}$
 $\tan 420^\circ = \sqrt{3}$, $\csc 420^\circ = \frac{2\sqrt{3}}{3}$
 $\sec 420^\circ = 2$, $\cot 420^\circ = \frac{\sqrt{3}}{3}$

28. $\cot(-45^\circ) = -1$

29. $\csc(390^\circ) = 2$

30. $\sin \theta = -\frac{3}{5}$, $\cos \theta = -\frac{4}{5}$
 $\tan \theta = \frac{3}{4}$, $\csc \theta = -\frac{5}{3}$
 $\sec \theta = -\frac{5}{4}$, $\cot \theta = \frac{4}{3}$

34. $\sin \theta = -\frac{3\sqrt{34}}{34}$, $\cos \theta = \frac{5\sqrt{34}}{34}$
 $\tan \theta = -\frac{3}{5}$, $\cot \theta = -\frac{5}{3}$
 $\csc \theta = -\frac{\sqrt{34}}{3}$, $\sec \theta = \frac{\sqrt{34}}{5}$

35. $\sin \theta = \frac{15}{17}$, $\csc \theta = \frac{17}{15}$
 $\cos \theta = -\frac{8}{17}$, $\sec \theta = -\frac{17}{8}$
 $\tan \theta = -\frac{15}{8}$, $\cot \theta = -\frac{8}{15}$

37. Quadrant III or IV

38. $\sin \theta = -\frac{5}{13}$, $\csc \theta = -\frac{13}{5}$
 $\tan \theta = \frac{5}{12}$, $\cot \theta = \frac{12}{5}$
 $\sec \theta = -\frac{13}{12}$

39. $\sin \theta = \frac{1}{2}$
 $\cos \theta = -\frac{\sqrt{3}}{2}$, $\sec \theta = -\frac{2\sqrt{3}}{3}$
 $\tan \theta = -\frac{\sqrt{3}}{3}$, $\cot \theta = -\sqrt{3}$

Chapter 5 Solutions

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Section 5.3 – continued

40. $\csc\theta = -5$

$$\cos\theta = \frac{2\sqrt{6}}{5}, \sec\theta = \frac{5\sqrt{6}}{12}$$

$$\tan\theta = -\frac{\sqrt{6}}{12}, \cot\theta = -2\sqrt{6}$$

41. $\cot\theta = \frac{1}{2}$

$$\sin\theta = \frac{2\sqrt{5}}{5}, \csc\theta = \frac{\sqrt{5}}{2}$$

$$\cos\theta = \frac{\sqrt{5}}{5}, \sec\theta = \sqrt{5}$$

48. $\sin\theta = \frac{3\sqrt{10}}{10}, \csc\theta = \frac{\sqrt{10}}{3}$

$$\cos\theta = -\frac{\sqrt{10}}{10}, \sec\theta = -\sqrt{10}$$

$$\tan\theta = -3, \cot\theta = -\frac{1}{3}$$

49. a) 76ft

b) 22 ft

c) 19ft

d) $\frac{1}{2}r + 4$

50. $\sin\theta = \frac{5}{7}$

51. 240° , Quad III

Chapter 5 Solutions

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Section 5.4 – Applying Trig

5. $a = 52.1$

6. $c = 41.1$

7. $a = 12.4$

10. $a = 4.5$

11. $a = 6.3$

12. $b = 21.2$

13. $c = 9.5$

14. $c = 76.9$

15. $a = 18.4$

16. $a = 8.6$

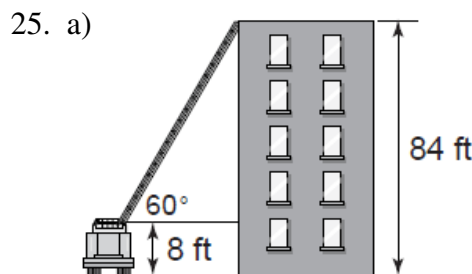
17. $a = 4.0$

18. $c = 32.9$

19. $m = 6, p = 8.5$

21. a) 9.9m
b) 6.7m
c) 48.8 m²

22. a) $a = 2.771$
b) 32 cm
c) 19.2 cm
d) 26.6 cm²



- b) 43.9 ft
c) 87.8 ft

26. a) 37,106.0 ft

b) 37,310.4 ft

27. 366.8 ft apart – no, the horn is not necessary

29. Markisha's kite is higher by about 7.2 ft

30. 131.7 ft

31. $\sin 120^\circ = \frac{\sqrt{3}}{2}$, $\csc 120^\circ = \frac{2\sqrt{3}}{3}$
 $\cos 120^\circ = -\frac{1}{2}$, $\sec 120^\circ = -2$
 $\tan 120^\circ = -\sqrt{3}$, $\cot 120^\circ = -\frac{\sqrt{3}}{3}$

32. $\sin(P) = \frac{2\sqrt{53}}{53}$, $\cos(P) = \frac{7\sqrt{53}}{53}$, $\tan(P) = \frac{2}{7}$

33. 43.260°

Chapter 5 Solutions

These answers are to be used to check against your solutions. Your homework should show all of your work, not just the answers!

Section 5.5 – Solving Right Triangles

15. 90°

16. $120^\circ, 300^\circ$

17. $30^\circ, 330^\circ$

18. $90^\circ, 270^\circ$

19. $225^\circ, 315^\circ$

20. $135^\circ, 315^\circ$

21. Example: $30^\circ, 150^\circ, 390^\circ, 510^\circ$

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

23. $\frac{2}{3}$

24. $\frac{5}{2}$

25. 1

26. $\frac{12}{5}$

27. $\frac{\sqrt{21}}{5}$

28. 59.0°

29. 34.8°

30. 42.8°

31. 52.7°

32. 65.1°

33. 36.5°

34. 36.9° and 53.1°

35. $48.8^\circ, 48.8^\circ$ and 82.4°

36. $b = 21.4$
 $B = 45.6^\circ$
 $A = 44.4^\circ$

37. $a = 5.6$
 $c = 9.8$
 $B = 55^\circ$

38. $A = 43^\circ$
 $a = 11.7$
 $c = 17.1$

39. $A = 42.1^\circ$
 $c = 5.7$
 $B = 47.9^\circ$

44. a) 39.4°
b) 788.5 ft

48. 1.2°

51. $y = 36.5$
 $Y = 130.5^\circ$
 $Z = 19.5^\circ$

52. distance = 3587.2 ft

53. $\sin(F) = \frac{4\sqrt{11}}{15}$, $\csc(F) = \frac{15\sqrt{11}}{44}$
 $\cos(F) = \frac{7}{15}$, $\sec(F) = \frac{15}{7}$
 $\tan(F) = \frac{4\sqrt{11}}{7}$, $\cot(F) = \frac{7\sqrt{11}}{44}$

Chapter 5 Solutions

These answers are to be used to check against your solutions. Your homework should show all of your work, not just the answers!

Section 5.6 – Law of Sines

12. $A = 30^\circ$
 $a = 19.6$
 $b = 38.6$

13. $C = 120^\circ$
 $a = 8.8$
 $c = 18.1$

14. $C = 65^\circ$
 $a = 12$
 $b = 10.1$

15. $A = 93.9^\circ$
 $b = 3.4$
 $c = 7.2$

16. $B = 76^\circ$
 $a = 13.5$
 $b = 20.7$

17. $b = 97.8$

20. $K = 8.7 \text{ u}^2$

21. $K = 5.4 \text{ u}^2$

22. $K = 13,533.9 \text{ u}^2$

23. $K = 25.0 \text{ u}^2$

25. $K = 234.8 \text{ cm}^2$

26. $K = 192.6 \text{ in}^2$

27. $K = 70.7 \text{ ft}^2$

30. Courtyard = $213,987.7 \text{ ft}^2$

31. a) 3.6 miles
b) 1.4 miles

32. 807.7 ft

33. a) 227.7 miles
b) 224.5 miles

37. $\csc\theta = -6$
 $\cos\theta = \frac{\sqrt{35}}{6}, \sec\theta = \frac{6\sqrt{35}}{35}$
 $\tan\theta = -\frac{\sqrt{35}}{35}, \cot\theta = -\sqrt{35}$

38. $83^\circ + 360k^\circ$

Chapter 5 Solutions

These answers are to be used to check against your solutions. Your homework should show all of your work, not just the answers!

Section 5.7 – Ambiguous Case

13. 0 solutions

14. 1 solution

15. 0 solutions

16. 2 solutions

18. no solution

19. 2 solutions

$$B = 71.1^\circ, C = 50.9^\circ, c = 23.9$$

$$B' = 108.9^\circ, C' = 13.1^\circ, c' = 6.9$$

20. 1 solution

$$B = 90^\circ, C = 60^\circ, c = 6.9$$

21. 2 solutions

$$A = 78.2^\circ, B = 31.8^\circ, b = 13.5$$

$$A' = 101.5^\circ, B' = 8.2^\circ, b' = 3.6$$

26. no solution

27. 1 solution

$$A = 27.2^\circ, B = 105.8^\circ, b = 21.1$$

28. 2 solutions

$$A = 73.3^\circ, C = 66.7^\circ, a = 62.6$$

$$A' = 26.7^\circ, C' = 113.3^\circ, a' = 29.3$$

31. Perimeter 1 = 63.9 units

$$\text{Perimeter 2} = 41.0 \text{ units}$$

32. $A = 70.9^\circ, B = 55^\circ, C = 54.1^\circ$

33. About 100.6°

40. Area = 305.2 in^2

41. About 185.6 m

Chapter 5 Solutions

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Section 5.8 – Law of Cosines

10. about 46.1 ft

35. 55° Quad IV

11. $B = 44.2^\circ$, $C = 84.8^\circ$, $a = 7.8$

38. A

12. $A = 44.4^\circ$, $B = 57.1^\circ$, $C = 78.5^\circ$

13. $A = 34.1^\circ$, $B = 44.4^\circ$, $C = 101.5^\circ$

14. $A = 71.6^\circ$, $C = 45.4^\circ$, $b = 15.0$

15. $A = 51.8^\circ$, $B = 70.9^\circ$, $C = 57.3^\circ$

16. $A = 66.9^\circ$, $B = 33.8^\circ$, $c = 23.0$

17. 13.8°

18. 91.7 cm and 44.6 cm

19. $K = 11.6 \text{ u}^2$

20. $K = 107.8 \text{ u}^2$

21. $K = 290.5 \text{ u}^2$

22. $K = 690.1 \text{ u}^2$

23. $K = 11,486.3 \text{ u}^2$

24. $K = 66.1 \text{ u}^2$

25. a) $d = 68.1 \text{ in}$
b) $K = 1247.1 \text{ u}^2$

26. a) 211.2 cm^2
b) 110.2° , 69.8° , 110.2° , and 69.8°

27. 342.3 ft

33. 2 solutions

34. 39.2°