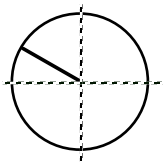
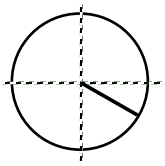
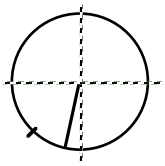
Chapter 3, Trigonometry Around the Unit Circle

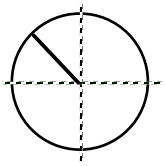
Focus Exercise Answers

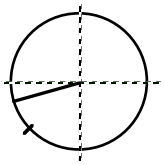
Section 3.1 The Unit Circle

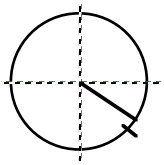
1.  $\widehat{\theta} = 30°$

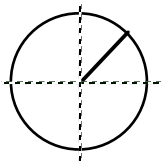
2.  $\widehat{\theta} = 30°$

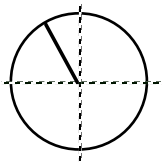
3.  $\widehat{\theta} = 80°$

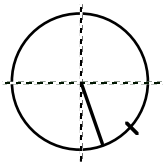
4.  $\widehat{\theta} = 45°$

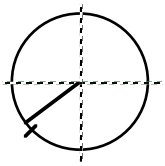
5.  $\widehat{\theta} = 15°$

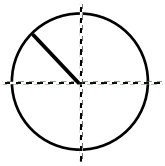
6.  $\widehat{\theta} = 35°$

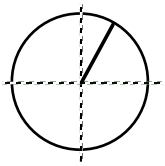
7.  $\widehat{\theta} = 45°$

8.  $\widehat{\theta} = 60°$

9.  $\widehat{\theta} = 70°$

10.  $\widehat{\theta} = 40°$

11.  $\widehat{\theta} = 45°$

12.  $\widehat{\theta} = 60°$

13. $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

14. $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

15. $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

16. $\left(\frac{-\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$

17. $\left(\frac{1}{2}, \frac{-\sqrt{3}}{2}\right)$

18. $\left(\frac{-\sqrt{3}}{2}, \frac{1}{2}\right)$

19. $\left(\frac{-1}{2}, \frac{-\sqrt{3}}{2}\right)$

20. $\left(\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$

21. $\left(\frac{-\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

22. $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

23. $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

24. $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

25. $\left(\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$

26. $\left(\frac{-1}{2}, \frac{-\sqrt{3}}{2}\right)$

27. $\left(\frac{-\sqrt{3}}{2}, \frac{1}{2}\right)$

28. $\left(\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$

29. $\left(\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$

30. $\left(\frac{1}{2}, \frac{-\sqrt{3}}{2}\right)$

31. $\left(\frac{-\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

32. $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

33. $\left(\frac{-\sqrt{3}}{2}, \frac{-1}{2}\right)$

34. $\left(\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$

35. $\left(\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)$

36. $\left(\frac{1}{2}, \frac{-\sqrt{3}}{2}\right)$

37. (1, 0)

38. (-1, 0)

39. (0, -1)

40. (0, 1)

41. (0, -1)

42. (-1, 0)

Section 3.2 Sine and Cosine in the Unit Circle

1. $-\frac{\sqrt{3}}{2}$	**2.** $-\frac{\sqrt{3}}{2}$	**3.** $+\frac{1}{2}$	**4.** $-\frac{\sqrt{2}}{2}$
5. $-\frac{\sqrt{2}}{2}$	**6.** $+\frac{\sqrt{2}}{2}$	**7.** -1	**8.** $-\frac{1}{2}$
9. $-\frac{1}{2}$	**10.** $+\frac{1}{2}$	**11.** 0	**12.** $-\frac{\sqrt{3}}{2}$
13. $+1$	**14.** 0	**15.** $-\frac{\sqrt{3}}{2}$	**16.** $+\frac{\sqrt{2}}{2}$
17. $+1$	**18.** $-\frac{1}{2}$	**19.** $+\frac{\sqrt{2}}{2}$	**20.** $-\frac{1}{2}$
21. $+\frac{1}{2}$	**22.** $-\frac{\sqrt{3}}{2}$	**23.** 0	**24.** $-\frac{\sqrt{2}}{2}$
25. $+\frac{\sqrt{3}}{2}$	**26.** $+\frac{\sqrt{2}}{2}$	**27.** $+\frac{\sqrt{3}}{2}$	**28.** -1
29. $+\frac{\sqrt{3}}{2}$	**30.** $+\frac{\sqrt{3}}{2}$	**31.** -1	**32.** $-\frac{1}{2}$
33. $+\frac{\sqrt{2}}{2}$	**34.** $-\frac{1}{2}$	**35.** $+\frac{\sqrt{2}}{2}$	**36.** 0
37. $\theta = 210°$	**38.** $\theta = 45°$	**39.** $\theta = 300°$	**40.** $\theta = 300°$
41. $\theta = 135°$	**42.** $\theta = 210°$	**43.** $\theta = 135°$	**44.** $\theta = 30°$
45. $\theta = 120°$	**46.** $\theta = 240°$	**47.** $\theta = 330°$	**48.** $\theta = 225°$
49. $\theta = 90°, 270°$	**50.** $\theta = 270°$	**51.** $\theta = 0°, 180°$	**52.** $\theta = 0°$
53. $\theta = 180°$	**54.** $\theta = 90°$		

55. No. Because the sine is the *y*-value of a point on the unit circle (radius is 1, centered at the origin), *y* can never be more than 1 unit from 0 (zero)

56. No. Because the cosine is the *x*-value of a point on the unit circle (radius is 1, centered at the origin), *x* can never be more than 1 unit from 0 (zero)

Section 3.3 Other Trig Functions in the Unit Circle

1.	$-\sqrt{3}$	**2.**	$+\sqrt{3}$	**3.**	$-\frac{\sqrt{3}}{3}$	**4.**	-1
5.	$-\frac{2\sqrt{3}}{3}$	**6.**	-2	**7.**	$+1$	**8.**	-1
9.	$-\frac{2\sqrt{3}}{3}$	**10.**	$+\frac{2\sqrt{3}}{3}$	**11.**	undefined	**12.**	0
13.	undefined	**14.**	0	**15.**	$+\sqrt{3}$	**16.**	$-\sqrt{2}$
17.	$+1$	**18.**	$+\frac{\sqrt{3}}{3}$	**19.**	$+\sqrt{2}$	**20.**	-2
21.	$+\frac{\sqrt{3}}{3}$	**22.**	$-\sqrt{3}$	**23.**	-1	**24.**	$-\sqrt{2}$
25.	$-\frac{\sqrt{3}}{3}$	**26.**	$+1$	**27.**	$+\frac{2\sqrt{3}}{3}$	**28.**	0
29.	$-\sqrt{2}$	**30.**	$+\sqrt{3}$	**31.**	-1	**32.**	-2
33.	$+1$	**34.**	$+\frac{\sqrt{3}}{3}$	**35.**	$+\sqrt{2}$	**36.**	undefined
37.	$\theta = 210°$	**38.**	$\theta = 45°$	**39.**	$\theta = 300°$	**40.**	$\theta = 300°$
41.	$\theta = 210°$	**42.**	$\theta = 225°$	**43.**	$\theta = 150°$	**44.**	$\theta = 45°$
45.	$\theta = 135°$	**46.**	$\theta = 330°$	**47.**	$\theta = 120°$	**48.**	$\theta = 300°$
49.	$\theta = 270°$	**50.**	$\theta = 0°$	**51.**	$\theta = 90°, 270°$	**52.**	$\theta = 0°, 180°$

Section 3.4 Radian Measures

1.	$\frac{5\pi}{6}$	**2.**	$\frac{5\pi}{9}$	**3.**	$\frac{11\pi}{20}$	**4.**	$\frac{2\pi}{15}$
5.	$\frac{5\pi}{2}$	**6.**	$\frac{10\pi}{3}$	**7.**	$220°$	**8.**	$27°$
9.	$42°$	**10.**	$75°$	**11.**	$+\frac{\sqrt{2}}{2}$	**12.**	$+\frac{\sqrt{3}}{2}$
13.	$+\sqrt{3}$	**14.**	-2	**15.**	$+1$	**16.**	-2
17.	0	**18.**	undefined	**19.**	0	**20.**	$-\sqrt{2}$
21.	$-\frac{2\sqrt{3}}{3}$	**22.**	$+\frac{\sqrt{3}}{3}$	**23.**	$+\frac{\sqrt{3}}{3}$	**24.**	$-\frac{\sqrt{2}}{2}$

25. $-\frac{\sqrt{3}}{2}$ **26.** $+\frac{1}{2}$ **27.** $+\frac{1}{2}$ **28.** $+1$

29. $-\sqrt{2}$ **30.** $-\frac{\sqrt{3}}{3}$ **31.** -2 **32.** 0

33. 0 **34.** -1 **35.** $-\frac{2\sqrt{3}}{3}$ **36.** $-\sqrt{2}$

37. $+\sqrt{3}$ **38.** -1 **39.** $+\frac{1}{2}$ **40.** $-\frac{1}{2}$

Section 3.5 Putting it All Together

1. $\frac{\sqrt{2}}{2}$ **2.** $\frac{\sqrt{3}}{2}$ **3.** $\sqrt{3}$ **4.** -2

5. 1 **6.** -2 **7.** 0 **8.** Undefined

9. 0 **10.** $-\sqrt{2}$ **11.** $-\frac{2\sqrt{3}}{3}$ **12.** $\frac{\sqrt{3}}{3}$

13. $\frac{\sqrt{3}}{3}$ **14.** $-\frac{\sqrt{2}}{2}$ **15.** $-\frac{\sqrt{3}}{2}$ **16.** $\frac{1}{2}$

17. $\frac{1}{2}$ **18.** 1 **19.** $-\sqrt{2}$ **20.** $-\frac{\sqrt{3}}{3}$

21. -2 **22.** 0 **23.** 0 **24.** -1

25. $-\frac{2\sqrt{3}}{3}$ **26.** $-\sqrt{2}$ **27.** $\sqrt{3}$ **28.** -1

29. $-\frac{1}{2}$ **30.** $-\frac{1}{2}$ **31.** $t = \frac{\pi}{4}$ **32.** $t = \frac{\pi}{3}$

33. $t = \frac{3\pi}{4}$ **34.** $t = \frac{4\pi}{3}$ **35.** $t = \frac{7\pi}{6}$ **36.** $t = \frac{7\pi}{4}$

37. $t = \frac{5\pi}{2}$ **38.** $t = \frac{17\pi}{6}$ **39.** $t = \frac{17\pi}{6}$ **40.** $t = \frac{7\pi}{4}$

41. $t = \frac{-\pi}{6}$ **42.** $t = \frac{8\pi}{3}$ **43.** $t = -\frac{\pi}{2}$ **44.** $t = -\frac{\pi}{2}$

45. $t = 0$ **46.** $t = -\frac{\pi}{2}$ **47.** $t = \frac{\pi}{2}$ **48.** $t = -\pi$

49. **a)** -2 **b)** $2\sqrt{2}$

50. **a)** 1 **b)** $-\frac{\sqrt{2}}{2}$

51. **a)** $\frac{2\sqrt{3}}{3}$ **b)** $-\sqrt{2}$

52. **a)** $-\frac{\sqrt{3}}{3}$ **b)** $\sqrt{3}$