Name_____ Class _____ Date _____

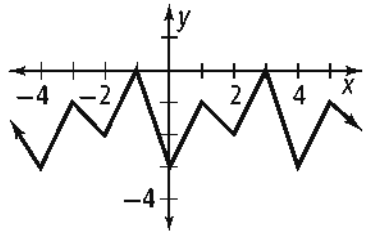
Extra Practice

Chapter 13

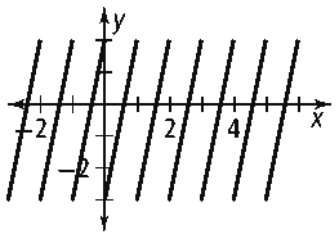
Lesson 13-1

Find the period and amplitude of each periodic function.

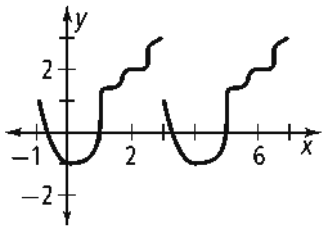
1.



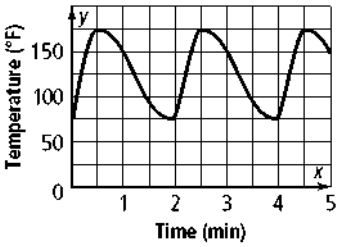
2.



3.



4. The graph at the right shows the temperature changes of a heating coil. Use the graph to find the amplitude and the period.



5. Describe four real-world situations that involve periodic changes. Explain how to find the amplitude and the period in each case.

Lesson 13-2

Sketch each angle in standard position.

6. 15°

7. −230°

8. 400°

9. −145°

10. 280°

11. −750°

Find the measure of an angle between 0° and 360° coterminal with each given angle.

12. −70°

13. −480°

14. 849°

Find the exact values of the cosine and sine of each angle. Then find the decimal values. Round your answers to the nearest hundredth.

15. 30°

16. 750°

17. −225°

Name _____ Class _____ Date _____

Extra Practice (continued)

Chapter 13

Lesson 13-3

Write each measure in radians. Express your answer in terms of π and as a decimal rounded to the nearest hundredth.

18. 100° **19.** 270° **20.** −45°

21. −550° **22.** 425° **23.** 10°

Write each measure in degrees. When necessary, round your answer to the nearest degree.

24. 5π radians **25.** −2 radians **26.** $\frac{5\pi}{6}$ radians

27. -3π radians **28.** $-\frac{13\pi}{10}$ radians **29.** 9 radians

30. Name two different times when the hands of a clock show each angle.

a. $\frac{\pi}{3}$ radians **b.** $\frac{4\pi}{3}$ radians

31. a. How much time passes as the minute hand of a clock sweeps $\frac{\pi}{4}$ radians?

b. How much time passes as the hour hand sweeps $\frac{\pi}{4}$ radians?

c. The hour hand of a clock is 3 in. long. What distance does the tip of the hour hand travel in 3.5 h? Round to the nearest tenth of an inch.

Lessons 13-4 through 13-6

Identify the amplitude or asymptotes, and the period for each function.

32. $y = 4 \sin 3x$ **33.** $y = \cos 4x$ **34.** $y = \frac{1}{3}\tan \pi x$

35. $y = 2\cos\frac{x}{4}$ **36.** $y = 3 \tan x$ **37.** $y = \frac{1}{9}\sin 5x$

Sketch the graph of one cycle of each function.

38. $y = 2 \cos x$ **39.** $y = 3 \sin 2x$ **40.** $y = \tan\frac{x}{2}$

41. $y = -\sin 3x$ **42.** $y = \cos 4x$ **43.** $y = -2 \tan \pi x$

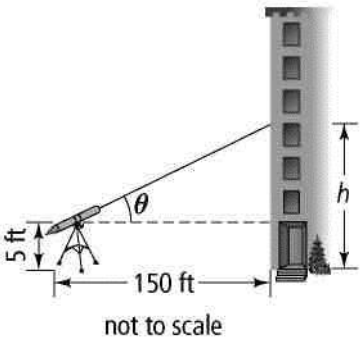
Name _____ Class _____ Date _____

Extra Practice (continued)

Chapter 13

44. Earthquakes under the ocean can sometimes cause a dangerous wave called a tsunami. You can model the motion of a tsunami with the function $f(x) = a \cos bx$. Write an equation that models a tsunami that travels at 120 ft/s, has a period of 20 s, and has an amplitude of 60 ft.

45. Owen is using a telescope to measure a tall building down the street. Through the telescope, Owen can see the point on the building that is h ft above ground. The relationship between the position of the telescope and the height can be modeled by $h = 150 \tan \theta + 5$. Owen changed the angle θ from 70° to 75°. How much higher is the point on the building that he can see now?



Lesson 13-7

Graph each function in the interval from 0 to 2π.

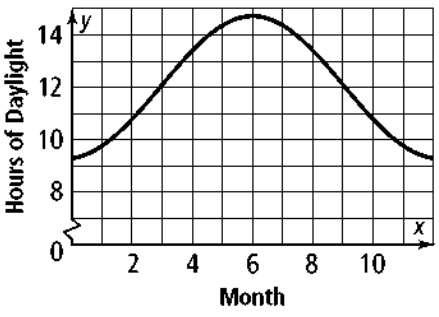
46. $y = -3 \cos (x + \pi) + 3$

47. $y = 2\sin\left(2x - \frac{\pi}{3}\right) - 2$

48. $y = -\sin\left(x - \frac{\pi}{4}\right) + 1$

49. $y = 3\cos\left(3x + \frac{\pi}{2}\right) - 1$

50. The graph at the right models the number of hours of daylight at a latitude of 40°N for a one-year period. The y-intercept is about 9.3 and the maximum is about 14.7. Each whole number on the x-axis corresponds to the beginning of a month (0 for January, 1 for February, and so on). Write an equation for the curve.

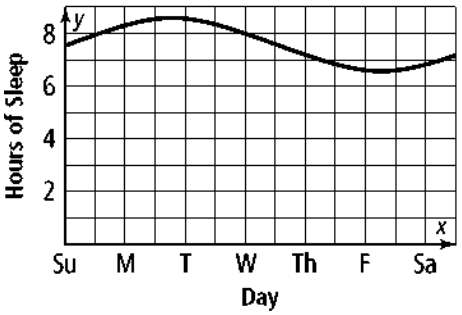


Name _____ Class _____ Date _____

Extra Practice (continued)

Chapter 13

51. The graph at the right approximates the number of hours of sleep that Kent gets each day in an average week. He usually gets at least 6.5 hours but no more than 8.5 hours of sleep on any given day. Write an equation that describes the graph.



Lesson 13-8

Evaluate each expression. Round your answer to the nearest thousandth.

52. cot 1

53. sec 4

54. csc (−0.8)

55. sec $(-\pi)$

56. $\cot \frac{3\pi}{2}$

57. $\csc \frac{\pi}{4}$

58. sec 1.1

59. cot 2

60. csc 2.5

Graph each function in the interval 0 to 2π.

61. $y = \cot 2\theta$

62. $y = \csc \frac{\theta}{2}$

63. $y = \sec 2\theta + 1$

64. Gillian is building a model bridge. The bridge has a support tower in the middle that rises 30 cm above the bridge surface. The model has support cables attached at the top of the tower, going down to the bridge surface. The length of a support cable can be modeled as $y = 30 \csc x$, where x is the angle the cable forms with the bridge surface.

a. Explain the meaning of the number 30 in the equation.

b. The model is 160 cm long and the tower is in the middle. What is a reasonable range for the function? Explain.

c. What is the angle at which a 60-cm cable is attached to the bridge?