Chapter 14 Mid-Chapter Quiz

Lessons 14-1 through 14-4

1. Find the amplitude and period of $y = \frac{3}{4}\sin\frac{1}{2}\theta$. Then graph the function. (Lesson 14-1)

POPULATION **For Exercises 2–4 use the following information.**

The population of a certain species of deer can be modeled by the function $p = 30{,}000 + 20{,}000\cos\left(\frac{\pi}{10}t\right)$, where p is the population and t is the time in years. (Lesson 14-1)

2. What is the amplitude of the population and what does it represent?

3. What is the period of the function and what does it represent?

4. Graph the function.

5. **MULTIPLE CHOICE** Find the amplitude, if it exists, and period of $y = 3\cot\left(-\frac{1}{4}\theta\right)$. (Lesson 14-1)

A $3; \frac{\pi}{4}$

B $3; 4\pi$

C not defined; 4π

D not defined; $\frac{\pi}{4}$

For Exercises 6–9, consider the function $y = 2\cos\left[\frac{1}{4}\left(\theta - \frac{\pi}{4}\right)\right] - 5$. (Lesson 14-2)

6. State the vertical shift.

7. State the amplitude and period.

8. State the phase shift.

9. Graph the function.

10. **PENDULUM** The position of the pendulum on a particular clock can be modeled using a sine equation. The period of the pendulum is 2 seconds and the phase shift is 0.5 second. The pendulum swings 6 inches to either side of the center position. Write an equation to represent the position of the pendulum p at time t seconds. Assume that the x-axis represents the center line of the pendulum's path, that the area above the x-axis represents a swing to the right, and that the pendulum swings to the right first. (Lesson 14-2)

Find the value of each expression. (Lesson 14-3)

11. $\cos\theta$, if $\sin\theta = \frac{4}{5}$; $90° < \theta < 180°$

12. $\csc\theta$, if $\cot\theta = -\frac{2}{3}$; $270° < \theta < 360°$

13. $\sec\theta$, if $\tan\theta = \frac{1}{2}$; $0° < \theta < 90°$

14. **SWINGS** Amy takes her cousin to the park to swing while she is babysitting. The horizontal force that Amy uses to push her cousin can be found using the formula $F = Mg\tan\theta$, where F is the force, M is the mass of the child, g is gravity, and θ is the angle that the swing makes with it's resting position. Write an equivalent expressing using $\sin\theta$ and $\sec\theta$. (Lesson 14-3)

15. **MULTIPLE CHOICE** Which of the following is equivalent to $\frac{1 - \sin^2\theta}{1 - \cos^2\theta} \cdot \tan\theta$? (Lesson 14-3)

F $\tan\theta$

G $\cot\theta$

H $\sin\theta$

J $\cos\theta$

Verify that each of the following is an identity. (Lesson 14-4)

16. $\tan^2\theta + 1 = \frac{\tan\theta}{\cos\theta \cdot \sin\theta}$

17. $\frac{\sin\theta \cdot \sec\theta}{\sec\theta - 1} = (\sec\theta + 1)\cot\theta$

18. $\sin^2\theta \cdot \tan^2\theta = \tan^2\theta - \sin^2\theta$

19. $\cot\theta(1 - \cos\theta) = \frac{\cos\theta \cdot \sin\theta}{1 + \cos\theta}$

20. **OPTICS** If two prisms of the same power are placed next to each other, their total power can be determined using the formula $z = 2p\cos\theta$ where z is the combined power of the prisms, p is the power of the individual prisms, and θ is the angle between the two prisms. Verify the identity $2p\cos\theta = 2p(1 - \sin^2\theta)\sec\theta$. (Lesson 14-4)