Lesson 14 Practice Problems

1. These equations model the vertical position, in feet above the ground, of a point at the end of a windmill blade. For each function, indicate the height of the windmill and the length of the windmill blades.

   a. $y = 5\sin(\theta) + 10$

   b. $y = 8\sin(\theta) + 20$

   c. $y = 4\sin(\theta) + 15$

2. Which expression takes the same value as $\cos(\theta)$ when $\theta = 0, \frac{\pi}{2}, \pi$, and $\frac{3\pi}{2}$?

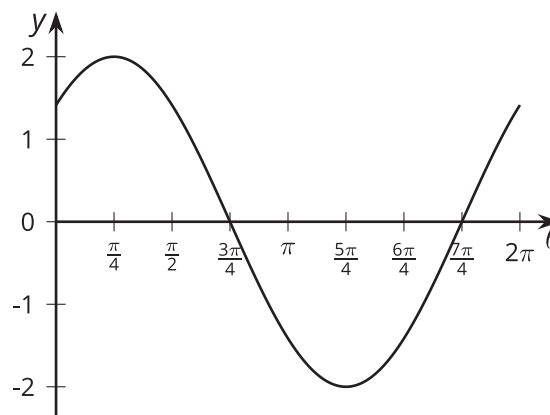   A. $\sin\left(\theta - \frac{\pi}{2}\right)$

   B. $\sin\left(\theta + \frac{\pi}{2}\right)$

   C. $\sin(\theta + \pi)$

   D. $\sin(\theta - \pi)$

3. Here is a graph of a trigonometric function.

   Which equation does the graph represent?

   A. $y = 2\sin(\theta)$

   B. $y = 2\cos\left(\theta + \frac{\pi}{4}\right)$

   C. $y = 2\sin\left(\theta - \frac{\pi}{4}\right)$

   D. $y = 2\cos\left(\theta - \frac{\pi}{4}\right)$

4. The vertical position v of a point at the tip of a windmill blade, in feet, is given by $v(\theta) = 11 + 2\sin\left(\theta + \frac{\pi}{2}\right)$. Here θ is the angle of rotation.

    a. How long is the windmill blade? Explain how you know.

    b. What is the height of the windmill? Explain how you know.

    c. Where is the point P when $\theta = 0$?

5.   a. Explain how to use a unit circle to find a point P with x-coordinate $\cos\left(\frac{23\pi}{24}\right)$.

    b. Use a unit circle to estimate the value of $\cos\left(\frac{23\pi}{24}\right)$.
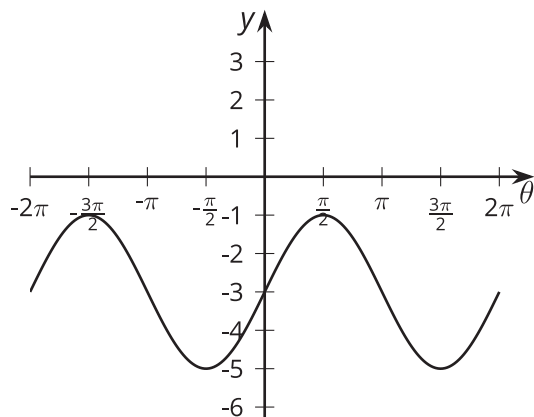
(From Unit 6, Lesson 5.)

6.   a. What are some ways in which the tangent function is similar to sine and cosine?

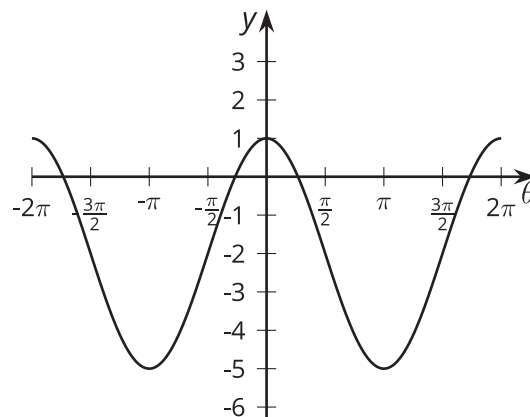   b. What are some ways in which the tangent function is different from sine and cosine?

(From Unit 6, Lesson 12.)

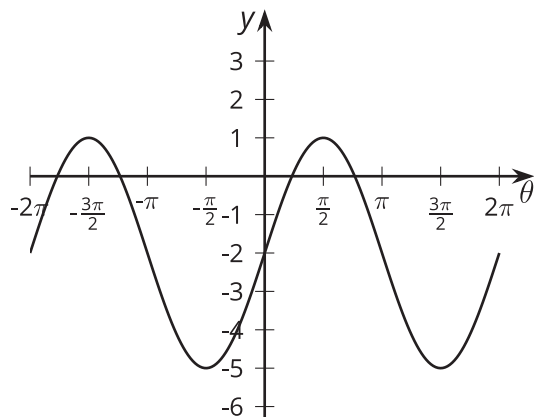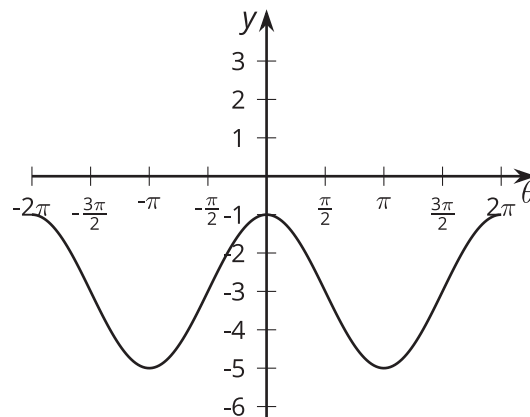7. Match the trigonometric expressions with their graphs.

Graph 1

Graph 2

Graph 3

Graph 4

A. $3\cos(\theta) - 2$

B. $2\cos(\theta) - 3$

C. $3\sin(\theta) - 2$

D. $2\sin(\theta) - 3$

1. Graph 1

2. Graph 2

3. Graph 3

4. Graph 4

(From Unit 6, Lesson 13.)