Multiple Choice. Choose the best answer. There is only one correct answer for each problem.
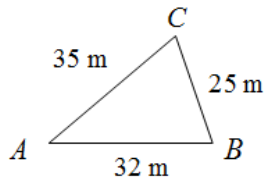
1. Use the *Law of Sines* to solve for side b in triangle ABC, given: $B = 100°, C = 25°, a = 15$
   a. $b = 18.0$
   b. $b = 7.7$
   c. $b = 10.1$
   d. $b = 14.3$

2. Find the area of the following triangle:
   a. 105 m^2
   b. 46 m^2
   c. $148{,}764 \text{ m}^2$
   d. 386 m^2

3. Use the Law of Cosines to solve for side a in triangle ABC, given: $A = 50°, b = 15, c = 30$
   a. 547
   b. 436
   c. 23.4
   d. 20.9

4. Find all solutions of the equation: $\cos^2 x - \cos x = 0$ in the interval $0 \le x < 360°$
   a. $0°$
   b. $90°, 270°$
   c. $0°, 90°$
   d. $0°, 90°, 270°$

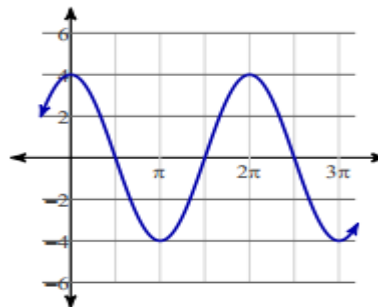5. Find all solutions of the equation: $\cos x = -\dfrac{1}{2}$ in the interval $0 \le x < 2\pi$

   a. $\dfrac{5\pi}{6}, \dfrac{7\pi}{6}$

   b. $\dfrac{\pi}{4}, \dfrac{5\pi}{4}$

   c. $\dfrac{2\pi}{3}, \dfrac{4\pi}{3}$

   d. $\dfrac{7\pi}{6}, \dfrac{11\pi}{6}$

6. Which of the following functions has an amplitude of 2 and a period of $\frac{\pi}{2}$?

    a. $f(x) = \frac{1}{2}\cos\left(\frac{x}{2}\right)$

    b. $f(x) = -2\cos(4x)$

    c. $f(x) = 2\cos(2x)$

    d. $f(x) = -\frac{1}{2}\cos(4x)$

7. Determine the function that best describes the following graph:

    a. $f(x) = 4\sin x$

    b. $f(x) = 4\cos x$

    c. $f(x) = \sin(4x)$

    d. $f(x) = \cos(4x)$

Free Response. Show all work.

8. In triangle ABC, $a = 53$ ft, $b = 224$ ft, and $A = 13°$. Find the area of triangle ABC. Round answer to the nearest whole number.

9. Use a graphing utility to find the solution(s) to the following equation in the interval [0°, 180°]. Sketch the graph.

$$2\sin^2 x = \cos(2x) + 1$$

10. Find all solutions of the following equations in the interval $0 \le x < 360°$

    a. $\csc x = \frac{2}{\sqrt{3}}$

    b. $\sqrt{3}\cot x = -1$

11. Write an equation for the transformed function $g(x)$ if the graph of $f(x) = \cos(x)$ is reflected on the x- axis, shifted up 3 and shifted to the left π units.
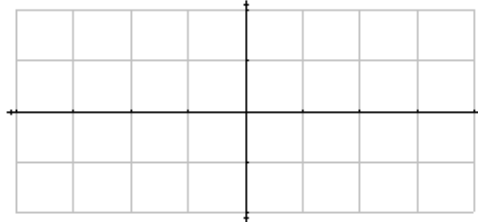
$$g(x) = \underline{\hspace{4cm}}$$

Graph two periods for the following function. State if there are any reflections. Find the amplitude and the period. Include scales on both axes.

12. $f(x) = -3 \sin\left(\frac{1}{2}x\right)$

Reflection? Yes No   Amplitude: _____   Period: _____
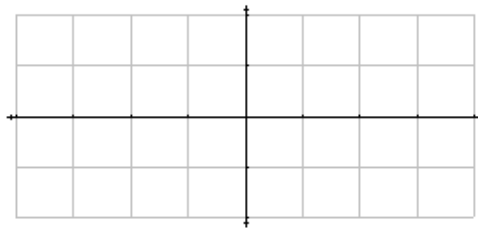
13. $g(x) = \cos(2x) + 1$

Reflection? Yes No   Amplitude: _____   Period: _____

14. Find all solutions of the following equations in the interval $0 \leq x < 2\pi$

a. $2\cos x + \sqrt{3} = 0$ b. $\tan x \sin x + \sin x = 0$

15. Find all solutions of the equation in the interval $0 \leq x < 360°$

$$2\sin^2 x - 1 = 0$$

16. Use the Law of Sines or Cosines to solve triangle ABC. Identify your given situation. Remember to draw and label the triangle first. Round all angle measures to the nearest degree and all side lengths to the nearest tenth. Box your answers. If there are two triangles, find both and list them in the space provided.

    a. $C = 46°, \ c = 16, \ a = 20$ b. $A = 58°, \ a = 11.4, \ b = 12.8$

Angle A = _____

Angle B = _____   Angle B = _____

Side b = _____   Angle C = _____

                                                Side c = _____

    c. $a = 5$ in., $b = 8$ in, and $c = 10$ in.

Angle A = _____

Angle B = _____

Angle C = _____

    d. Plane A takes off from the Kansas City Airport and flies to Denver, a distance of 532 miles. Plane B takes off from Kansas City and flies to Dallas, a distance of 461 miles. The angle formed by Denver-Kansas City-Dallas is 80.3°. What is the distance from Denver to Dallas? Use the Law of Sines or Law of Cosines and round answer to the nearest mile.