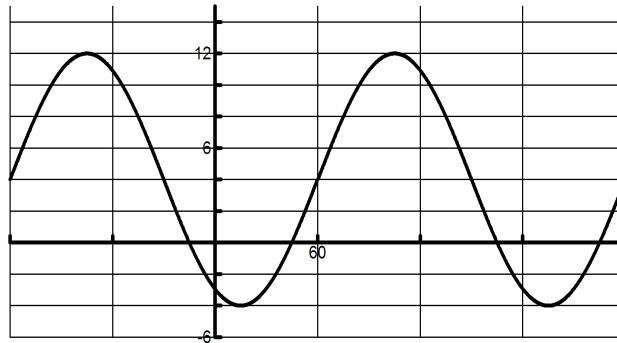


## Trigonometry

### Test #1

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10. What is the reference angle for  $\theta = 305^\circ$ ?
11. What is the amplitude of  $f(x) = \frac{2}{3}\sin(4x)$ ?
12. What is the period of  $f(x) = \frac{1}{2}\cos\frac{3}{2}(\theta - 180^\circ)$ ?
13. What is the horizontal translation of the graph of  $g(x)$  with respect to  $f(x) = \sin(x)$  if  $g(x) = 3\sin 2(\theta + 90^\circ)$ .
14. Describe the complete transformation of  $g(x) = \sin(x)$  to  $f(x) = \sin(x)$  if  $g(x) = 5\sin 2(\theta - 75^\circ) + 21$ .
15. Name one vertical asymptote of  $g(x) = \csc(\theta)$ .
17. Sketch  $\theta = 300^\circ$  in standard position and give **exact values** for all six trig functions of this angle.
18. Name two angles between  $-720^\circ$  and  $720^\circ$  that are co-terminal with  $\theta = -192^\circ$ .
19. What is  $\sin(\theta)$  for an angle whose terminal side contains the point  $(-9, -7)$ ?
20. In what quadrant is the terminal side of  $\theta$  if  $\tan(\theta) < 0$  and  $\cos(\theta) > 0$ ?
21. Give the general equation [use  $\sin(x)$ ] for the sinusoid pictured below?



### Test #2

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0. Convert the angle  $\theta = 300^\circ$  into radians. Give an exact value, that is, your answer should include  $\pi$ .
1. Solve  $x = \arccos(0.2)$  algebraically for the first 3 positive values of  $x$ . Indicate the value of  $n$  that you used to find each value of  $x$ .
2. Write the equation of a sinusoid that has a maximum of  $-6$  at  $\theta = -90^\circ$  and a minimum of  $-12$  at  $\theta = -180^\circ$ .
4. The point  $(-3, -4)$  is on the terminal side of angle  $x$ . What are the exact values of the six trig functions of  $x$ ? In other words, what is  $\sin(x)$ ,  $\cos(x)$ , etc. *Be careful with signs.*

6. **Sam's Ferris Wheel.** Sam is on a Ferris wheel that is 50 feet in diameter and makes one revolution every 40 seconds. The center of the wheel is 30 feet above the ground.
- Write a sinusoidal equation that models Sam's height above the ground assuming that Sam is at the lowest point at  $t = 0$ .
  - Using your equation from (a), find the Sam's height after he has been on the Ferris wheel for 27 minutes. *Watch your units.*
  - When is the third time that Sam is at the top of the Ferris wheel? *Think – this is easier than it looks.*

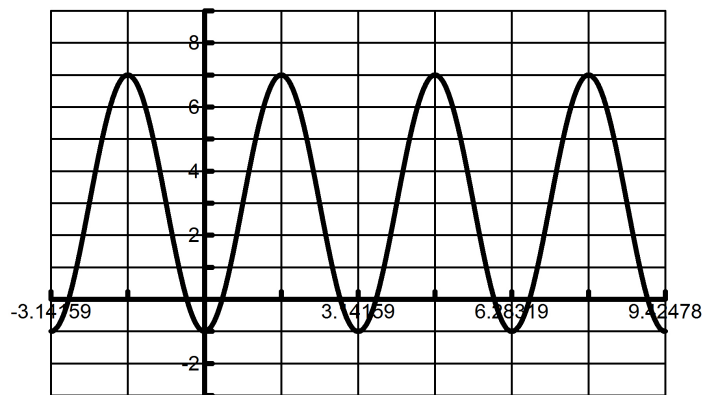
For each of the sinusoids in #8-10, name the

(a) amplitude, (b) phase displacement, (c) location of sinusoidal axis, and (d) period

8.  $f(x) = -3.5 \sin 2\left(x - \frac{\pi}{3}\right) - 1$

9.  $f(\theta) = 2 + 12 \cos \frac{1}{3}(\theta + 15^\circ)$

10.



- Write an equation for the graph shown in #10.
- A sinusoid with amplitude 4 has a minimum value of 5. What is its maximum value?
  - 7
  - 9
  - 11
  - 13
  - 15
- The graph of  $y = \csc(x)$  has the same set of asymptotes as which of the following graphs.
  - $y = \sin(x)$
  - $y = \tan(x)$
  - $y = \cot(x)$
  - $y = \sec(x)$
  - $y = \csc(2x)$

**Review for Test #3**

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- For each of the following angles, find two angles between  $[-720^\circ, 720^\circ]$  or  $[-4\pi, 4\pi]$  as appropriate that are co-terminal with the given angle. For each angle, name the reference angle.
  - $137^\circ$
  - $-256^\circ$
  - $\frac{5\pi}{12}$
  - $\frac{-7\pi}{2}$

5. Prove the following trig identities.

(a)  $\sin^3 x + \sin x \cos^2 x = \sin x$

(b)  $\frac{1 + \tan^2 x}{\csc^2 x} = \tan^2 x$

(c)  $\frac{[(\sec x - 1)(\sec x + 1)]}{\sin^2 x} = \sec^2 x$

(e)  $\frac{1}{\sec x - 1} + \frac{1}{\sec x + 1} = 2 \cot x \csc x$

(f)  $\frac{\cos t}{1 - \sin t} = \frac{1 + \sin t}{\cos t}$

(g)  $\sin^2 x \cos^3 x = (\sin^2 x - \sin^4 x) \cos x$

6. Solve each of the following trig functions in the interval  $[0, 2\pi)$

(a)  $\frac{\cos^3 x}{\sin x} = \cot x$

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

(c)  $2 \cos x \sin x - \cos x = 0$

(d)  $\sqrt{2} \tan x \cos x - \tan x = 0$

7. For each of the following, find exact answers in radians.

(a)  $\sin^{-1} \sin\left(-\frac{\pi}{6}\right)$

(b)  $\tan^{-1}\left(\tan\left(\frac{\pi}{3}\right)\right)$

(c)  $\cos\left(\sin^{-1}\left(\frac{1}{2}\right)\right)$

(d)  $\sin^{-1}(\sin(\pi))$

(e)  $\cos(\tan^{-1}(\sqrt{3}))$

(f)  $\cos^{-1}\left(\cos\left(\frac{7\pi}{4}\right)\right)$

9. Two sides of a scalene triangle are 12 and 17, what are the two possible values of the angle in the triangle that is in between the two sides?

10. Two sides of a scalene triangle are 10 and 21. The angle in between these two sides is  $72^\circ$ . What is the area of the triangle?

11. A triangle has sides of length 9, 7, and 5. What are the angles in this triangle?

12. A triangle has sides of length 11 and 5. The angle that is opposite the unknown sides has a measure of  $20^\circ$ . What is the measure of the unknown side and the other two angles?

#### Review for Test #4

2. If  $\cos u = \frac{1}{5}$  and  $\sin v = \frac{1}{3}$ , find  $\sin 2u$ ,  $\cos 2u$ ,  $\tan 2u$ ,  $\sin 2v$ ,  $\cos 2v$ , and  $\tan 2v$ . Assume that  $u$  and  $v$  are both in the first quadrant.

3. If two sides of a triangle are  $b = 9$  m and  $c = 12$  m and the angle in between the two sides is  $25^\circ$ , what are the possible lengths of the third side of the triangle?