

# Hon Pre-Calc

## Quiz 4.1 - 4.4

Name \_\_\_\_\_

No Calculators!!! Show All Work!!! Label!!! Label!!! Label!!! Circle All Final Answers!!!

### Short Answer

1. Determine the quadrant in which the angle (in radians) lies:

a) 3.5

b)  $-\frac{21\pi}{9}$

c) 19

2. Convert to  $\frac{\pi}{8}$  radians to degrees.

3. Convert  $-3.58^\circ$  to degrees, minutes, and seconds.

4. Find the area of a sector defined by a  $\frac{3\pi}{4}$  radian central angle whose arc length is 10 inches.

5. A circular power saw has an 8 inch-diameter blade that rotates 5000 revolutions per minute.

a) Find the angular speed of the blade in radians per minute.

b) Find the linear speed (in feet per minute) of one of the 26 teeth as they contact the wood being cut.

6. Use the value of the trigonometric function to evaluate the following:  $\sin(-t) = \frac{3}{8}$

a)  $\sin(t) =$

b)  $\sin(\pi - t) =$

c)  $-\sin(\pi + t)$

7. Evaluate:

a)  $\cos \frac{7\pi}{3}$

b)  $\sin \frac{9\pi}{4}$

c)  $\tan\left(-\frac{26\pi}{3}\right)$

d)  $\sec\left(-\frac{8\pi}{3}\right)$

8. Given:  $\sec \theta = -\frac{3}{2}$  and  $\sin \theta > 0$  find:

a)  $\tan \theta$

b)  $\csc \theta$

9. Simplify completely:

a)  $(\sec \theta + \tan \theta)(\sec \theta - \tan \theta)$

b)  $\frac{\tan \beta + \cot \beta}{\tan \beta}$

10.

10. You are skiing down a mountain with a vertical height 6000 ft. The distance from the top of the mountain to the base is  $4000\sqrt{3}$  feet. What is the angle of depression (in radians) for which the skier must descend?

11. Determine the reference angle  $\theta'$  for the given angle  $\theta$  in standard position.

a) 15 rad

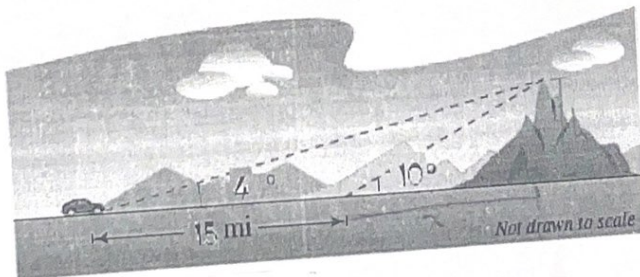
b)  $\theta = \frac{6\pi}{5}$

12. Given:  $\theta = (0, 2\pi]$ . Find all  $\theta$  which satisfy the following:

a)  $\cot \theta = -\sqrt{3}$

b)  $\sec \theta = -2$

13. In traveling across flat land, you notice a mountain directly in front of you. Its angle of elevation (to the peak) is  $4^\circ$ . After you drive 15 miles closer to the mountain, the angle of elevation is  $10^\circ$ . Write a calculator ready expression for the height of the mountain.





# Hon Pre-Calc

## Quiz 4.1 - 4.4

Name \_\_\_\_\_

49/50

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### Short Answer

1. Determine the quadrant in which the angle (in radians) lies:

a) 3.5

Q3



b)  $-\frac{21\pi}{9}$

$$-\frac{21\pi}{9} + \frac{18\pi}{9} = -\frac{3\pi}{9}$$

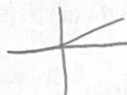
Q4



c) 19

$$\begin{array}{r} 12.56 \\ + 6.28 \\ \hline 18.84 \end{array}$$

Q1



2. Convert to  $\frac{\pi}{8}$  radians to degrees.

$$\frac{\pi}{8} \times \frac{180}{\pi} = \frac{90}{4} = \frac{45}{2}$$

22.5 degrees

3. Convert  $-3.58^\circ$  to degrees, minutes, and seconds.

3.58

$$0.58 \times 60$$

$-3^\circ 34' 48''$

$$\begin{array}{r} 34 \\ 6 \\ \hline 348 \end{array}$$

$$0.8 \times 60 = 48$$

4. Find the area of a sector defined by a  $\frac{3\pi}{4}$  radian central angle whose arc length is 10 inches.

$$s = r\theta$$

$$A = \frac{1}{2}r^2\theta$$

$$10 = r\left(\frac{3\pi}{4}\right)$$

$$\frac{10}{1} \times \frac{4}{3\pi} = \frac{40}{3\pi}$$

$$A = \frac{1}{2}\left(\frac{40}{3\pi}\right)^2\left(\frac{3\pi}{4}\right)$$

$$A = \frac{1}{2}\left(\frac{1600}{9\pi^2}\right)\left(\frac{3\pi}{4}\right)$$

$$A = \left(\frac{200}{3\pi}\right)\left(\frac{1}{2}\right) = \frac{200}{3\pi} \text{ in}^2$$

5. A circular power saw has an 8 inch-diameter blade that rotates 5000 revolutions per minute.

- a) Find the angular speed of the blade in radians per minute.

$$5000(2\pi) = 10000\pi$$

$$10000\pi \frac{\text{radians}}{\text{min}}$$

- b) Find the linear speed (in feet per minute) of one of the 26 teeth as they contact the wood being cut.

$$C = 8\pi$$

$$8\pi(5000)\left(\frac{1}{12}\right)$$

$$\frac{2}{3}\pi(5000) = \frac{10,000\pi}{3} \text{ feet/min}$$



$$-2 = a$$

$$\sin^2 = \frac{3}{8}$$



6. Use the value of the trigonometric function to evaluate the following:  $\sin(-t) = \frac{3}{8}$

a)  $\sin(t) = \boxed{-\frac{3}{8}}$

b)  $\sin(\pi - t) = \boxed{-\frac{3}{8}}$

c)  $-\sin(\pi + t)$   
 $\sin(\pi + t) = \frac{3}{8}$   
 $-\left(\frac{3}{8}\right) = \boxed{-\frac{3}{8}}$



7. Evaluate:

a)  $\cos \frac{7\pi}{3} = \cos \frac{\pi}{3}$

$$\boxed{\frac{1}{2}}$$

b)  $\sin \frac{9\pi}{4} = \sin \frac{\pi}{4}$

$$\boxed{\frac{\sqrt{2}}{2}}$$

c)  $\tan\left(-\frac{26\pi}{3}\right)$

$$-\frac{26\pi}{3} + \frac{24\pi}{3} = -\frac{2\pi}{3}$$

$$\tan -\frac{2\pi}{3} = \tan \frac{4\pi}{3}$$

d)  $\sec\left(-\frac{8\pi}{3}\right)$

$$\sec \frac{4\pi}{3}$$

$$\cos \frac{4\pi}{3} = -\frac{1}{2}$$

$$\boxed{-2}$$



$$\boxed{\sqrt{3}}$$

$$-2, \quad 4 + x^2 = 9$$

$$x^2 = 5$$

$$x = \sqrt{5}$$

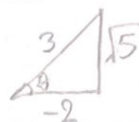
8. Given:  $\sec \theta = -\frac{3}{2}$  and  $\sin \theta > 0$  find:

a)  $\tan \theta$   

$$= \boxed{-\frac{\sqrt{5}}{2}}$$

b)  $\csc \theta$   

$$\frac{3}{\sqrt{5}} = \boxed{\frac{3\sqrt{5}}{5}}$$



10.

9. Simplify completely:

a)  $(\sec \theta + \tan \theta)(\sec \theta - \tan \theta)$

$$\sec^2 \theta - \tan^2 \theta = \boxed{1}$$

$$1 + \tan^2 \theta = \sec^2 \theta \Rightarrow \sec^2 \theta - \tan^2 \theta = 1$$

b)  $\frac{\tan \beta + \cot \beta}{\tan \beta}$

$$\frac{\tan \beta}{\tan \beta} + \frac{\cot \beta}{\tan \beta}$$

$$1 + \frac{\cot \beta}{\frac{1}{\cot \beta}} = 1 + \cot^2 \beta = \boxed{\csc^2 \beta}$$

$$\frac{\cot \beta}{1} \times \frac{\cot \beta}{1} = \cot^2 \beta$$





10. You are skiing down a mountain with a vertical height 6000 ft. The distance from the top of the mountain to the base is  $4000\sqrt{3}$  feet. What is the angle of depression (in radians) for which the skier must descend?



$$\sin \theta = \frac{6000}{4000\sqrt{3}}$$

$$\sin \theta = \frac{3}{2\sqrt{3}} = \frac{3\sqrt{3}}{6} = \frac{\sqrt{3}}{2}$$

$$\sin \theta = \frac{\sqrt{3}}{2}, \theta = \frac{\pi}{3}$$

$$\frac{\pi}{3} \text{ radians}$$

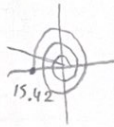
11. Determine the reference angle  $\theta'$  for the given angle  $\theta$  in standard position.

a) 15 rad

$$5\pi - 15$$

$$\begin{aligned} 15.708 &\approx 4\pi \\ + 3.14 &\approx \pi \\ \hline 15.42 &= 5\pi \end{aligned}$$

$$15.42 - 15$$



b)  $\theta = \frac{6\pi}{5} - \frac{5\pi}{5} = \frac{\pi}{5}$

$$\frac{\pi}{5}$$



12. Given:  $\theta = (0, 2\pi]$ . Find all  $\theta$  which satisfy the following:

a)  $\cot \theta = -\sqrt{3}$

$$\tan \theta = -\frac{\sqrt{3}}{3}$$



$$\frac{5\pi}{6}, \frac{11\pi}{6}$$

b)  $\sec \theta = -2$

$$\cos \theta = -\frac{1}{2}$$



$$\frac{2\pi}{3}, \frac{4\pi}{3}$$

13. In traveling across flat land, you notice a mountain directly in front of you. Its angle of elevation (to the peak) is  $4^\circ$ . After you drive 15 miles closer to the mountain, the angle of elevation is  $10^\circ$ . Write a calculator ready expression for the height of the mountain.

$$\tan 4 = \frac{h}{15 + \frac{h}{\tan 10}}$$

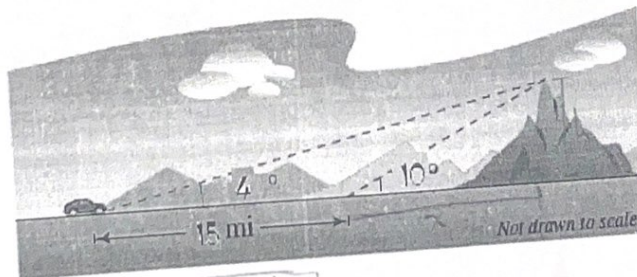
$$\tan 4 (15 + \frac{h}{\tan 10}) = h$$

$$15 \tan 4 + \frac{h \tan 4}{\tan 10} = h$$

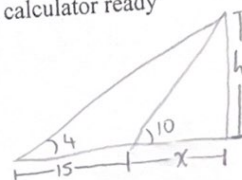
$$15 \tan 4 = h - \frac{h \tan 4}{\tan 10}$$

$$15 \tan 4 = h (1 - \frac{\tan 4}{\tan 10})$$

$$h = \frac{15 \tan 4}{(1 - \frac{\tan 4}{\tan 10})}$$



$$h = \frac{(15 \tan 4)}{(1 - \frac{\tan 4}{\tan 10})}$$



$$\tan 4 = \frac{h}{15 + x}$$

$$\tan 10 = \frac{h}{x}$$

$$x = \frac{h}{\tan 10}$$

$$-1$$