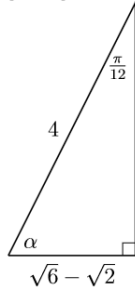
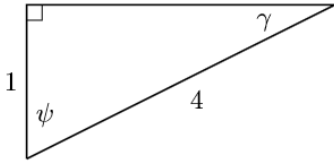


Practice Problems

1. For each diagram below determine the value of the requesting quantities. Do not give decimal approximations.

(a) Find $\cos \varphi$, $\sin \varphi$, and $\tan \varphi$



(b) Find α , $\sin \alpha$, and $\tan \alpha$

2. Determine an angle θ that matches the criterion given below. (If there are multiple answers, you only need to give one)

(a) An angle that is coterminal with $\alpha = \pi/4$ and is greater than π

(b) An angle that is coterminal with $\theta = 3\pi/4$ and is negative

3. Given the information below determine the values of the requested quantities. Please give exact values, not calculator approximations.

(a) The point $(x, 0.3)$ is on the unit circle and in the first quadrant. Determine the value of x .

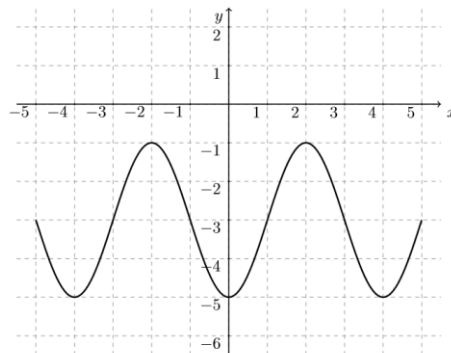
(b) $\arctan -\sqrt{3}$

(c) $\arcsin(\sin 5\pi/6)$

(d) $\sin(\arccos(0.2))$

4. A turtle sits at the edge of a circular pond of diameter 30 ft. Suppose the pond is on a coordinate plane with the center of the point at $(0,0)$ and the turtle is sitting on the positive side of the x -axis. The turtle crawls in a clockwise direction through an angle of 60 degrees. What are the coordinates of the new location of the turtle? Give exact answers.

5. The function below is defined by $f(x) = A \sin(bx - c) + d$. Determine the values of A , b , c and d where A is a positive number.



6. A slice of pizza comes from a 16 inch diameter pie which was cut into 7 equally sized slices. What is the area of each slice?

7. Refer to the graph of $y = \sin x$ to find the exact values of x in the interval $[0, 4\pi]$ that satisfy the equation, $-4 \sin x = -2$.

8. Suppose a robot has a straight arm 9 inches long. If the robot's arm sweeps (rotates) through an angle of 120° .

(a) Find the length of the arc swept by the arm of the robot.

(b) Find the area of the sector swept by the arm of the robot.

9. An elevator full of painters is moving down the edge of a skyscraper at a constant speed. You are standing one hundred feet away from the skyscraper pointing a laser at the painters. When you first start doing this,

the laser beam has an angle of elevation of 33° , and ten seconds later it has an angle of elevation of 23° . What is the speed of the elevator's descent, in ft/sec?

10. Simplify the following expression so that it contains only the variable u , and contains no trigonometric or inverse trigonometric functions.

$$\cos(\tan^{-1}(u) + \sec^{-1}(u))$$

11. Verify the following identity: $\sin\left(\theta + \frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}(-\sin\theta + \cos\theta)$

Answers to Practice Problems

1. Triangles

(a) $\cos \varphi = 1/4, \sin \varphi = \sqrt{15}/4, \tan \gamma = 1/\sqrt{15}$

(b) $\alpha = 11\pi/12, \sin \alpha = \frac{\sqrt{10+4\sqrt{3}}}{4}, \tan \alpha = \frac{\sqrt{10+4\sqrt{3}}}{\sqrt{6}-\sqrt{2}}$

2. Coterminal Angles

(a) $\frac{9\pi}{4}$

(b) $-\frac{5\pi}{4}$

3. Composite trig

(a) $x = 0.91$

(b) $-\frac{\pi}{6}$

(c) $\frac{\pi}{6}$

(d) 0.96

4. Turtle $\left(\frac{15}{2}, \frac{15\sqrt{3}}{2}\right)$

5. $A = 2, b = \frac{\pi}{2}, c = \frac{\pi}{2}, d = -3$ So, $f(x) = 2 \sin\left(\frac{\pi}{2}x - \frac{\pi}{2}\right) - 3$

6. $A = \frac{64\pi}{7}$

7. $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}$

8. Robot

(a) $s = \frac{18\pi}{3}$

(b) $A = \frac{81\pi}{3}$

9. $speed = \frac{100 \tan 33^\circ - 100 \tan 23^\circ}{10} = 10 \tan 33^\circ - 10 \tan 23^\circ \text{ ft/s}$

10. $\frac{1-u\sqrt{u^2-1}}{u\sqrt{u^2+1}}$

11. Verify the identity

$$\begin{aligned} \sin\left(\theta + \frac{3\pi}{4}\right) &= \sin \theta \cos \frac{3\pi}{4} + \sin \frac{3\pi}{4} \cos \theta \\ &= -\frac{\sqrt{2}}{2} \sin \theta + \frac{\sqrt{2}}{2} \cos \theta = \frac{\sqrt{2}}{2} (-\sin \theta + \cos \theta) \end{aligned}$$