**Determine the quadrant in which the terminal side of the angle lies.**
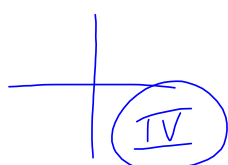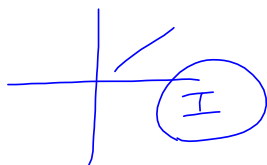
1.) $\theta = \dfrac{-9\pi}{5}$   $-1\dfrac{4}{5}\pi$   2.) $\theta = \dfrac{55\pi}{7}$   $7\dfrac{6}{7}\pi$   3.) $\theta = \dfrac{127\pi}{9}$   4.) $\theta = \dfrac{-28\pi}{13}$

I

IV

5.) $\theta = \dfrac{-22\pi}{7}$   6.) $\theta = \dfrac{47\pi}{15}$   7.) $\theta = -\dfrac{6\pi}{11}$   8.) $\theta = \dfrac{37\pi}{4}$

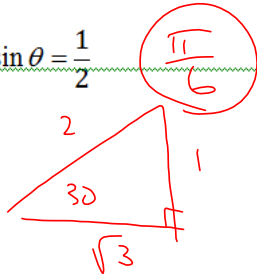9.) $\theta = 1.237 \ rad$   10.) $\theta = 16.9 \ rad$   11.) $\theta = -10.5 \ rad$   12.) $\theta = 4.9 \ rad$

## Unit Circle Trig Functions

| $\sin\theta = y$ | $\cos\theta = x$ | $\tan\theta = \dfrac{\sin\theta}{\cos\theta} = \dfrac{y}{x}$ |
|---|---|---|
| $\csc\theta = \dfrac{1}{\sin\theta} = \dfrac{1}{y}$ | $\sec\theta = \dfrac{1}{\cos\theta} = \dfrac{1}{x}$ | $\cot\theta = \dfrac{\cos\theta}{\sin\theta} = \dfrac{x}{y}$ |

**Find the ~~acute~~ angle that satisfies the given equation.**

$$x : x\sqrt{3} : 2x$$

1.) $\sin\theta = \dfrac{1}{2}$   $\dfrac{\pi}{6}$

2.) $\tan\theta = 1$   $\dfrac{\pi}{4}$, $45°$

3.) $\tan\theta = \dfrac{\sqrt{3}}{3}$   $30, \dfrac{\pi}{6}$
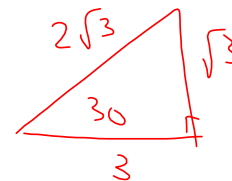
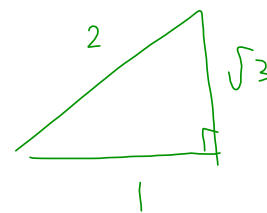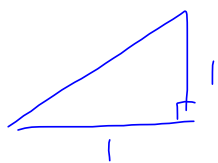4.) $\cos\theta = \dfrac{\sqrt{3}}{2}$   $30, \dfrac{\pi}{6}$
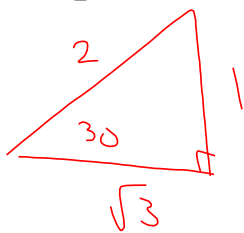
5.) $\csc\theta = 2$   $\sin\theta = \dfrac{1}{2}$   $\dfrac{\pi}{6}$, $30$

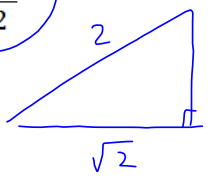6.) $\sin\theta = \dfrac{\sqrt{3}}{2}$   $60, \dfrac{\pi}{3}$

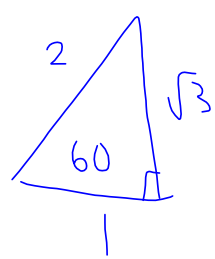7.) $\cot\theta = 1$   45 , $\frac{\pi}{4}$      8.) $\cos\theta = \dfrac{\sqrt{2}}{2}$

45 , $\frac{\pi}{4}$

**Find the exact value.**

9.) $\sec\left(\dfrac{\pi}{3}\right)$   2     10.) $\tan\left(\dfrac{\pi}{4}\right)$        11.) $\csc\left(\dfrac{\pi}{3}\right)$

$\cos\dfrac{\pi}{3}$       1

$\sin\dfrac{\pi}{3} = \dfrac{\sqrt{3}}{2}$

$\dfrac{2}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{2\sqrt{3}}{3}$

### 4.2 Mini-Lesson

*Use the calculator to evaluate each function to four decimal places.*

**1.)** $\sin 10°$

.1736

**2.)** $\tan 23.5°$

.4348

**3.)** $\cot 66.5°$

$$\frac{1}{\tan 66.5} = .4348$$

**4.)** $\csc 16.35°$

$$\frac{1}{\sin 16.35} = 3.5573$$

**5.)** $\tan 11° \, 15'$

$$\tan\left(11 + \frac{15}{60}\right) = .1989$$

**6.)** $\sec 56° \, 8' \, 10''$

$$\frac{1}{\cos\left(56 + \frac{8}{60} + \frac{10}{3600}\right)} = 1.7946$$

*Use the calculator to evaluate each function to four decimal places.*

**7.)** $\sin \dfrac{\pi}{3}$   $\dfrac{\sqrt{3}}{2}$
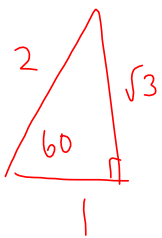
.866

**8.)** $\csc 1.3$

1.0378

**9.)** $\sec 22.8$

-1.4486

**10.)** $\cos(-2.5)$

-.8011

**11.) From an apartment window 24 m above the ground, the angle of depression of the base of a nearby building is 38 degrees and the angle of elevation of the top is 63 degrees. Find the height of the nearby building (to the nearest foot).**
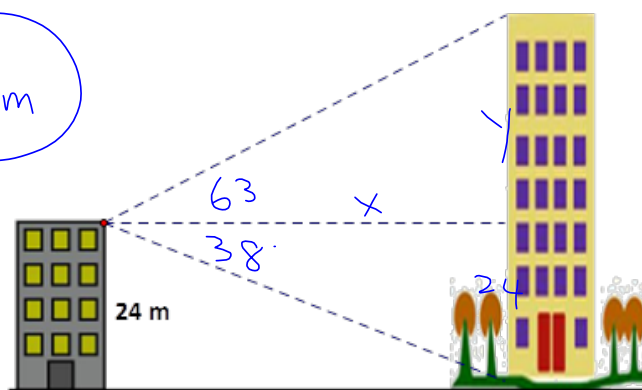
$\tan 38 = \dfrac{24}{x}$          $\boxed{84 \text{ m}}$

$x = 30.7 \text{ m}$

$\tan 63 = \dfrac{y}{30.7}$

$\boxed{y = 60.29 \text{ m}}$

24 m

63

38

x

y

24

**12.) From a lighthouse 1000 ft above sea level, the angle of depression to a boat (A) is 29 degrees. A little bit later the boat has moved closer to the shore (B) and the angle of depression measures 44 degrees. How far (to the nearest foot) has the boat moved in that time?**

$$\tan 29 = \frac{1000}{A}$$

$$A = 1804.05 \text{ ft}$$

$$\tan 44 = \frac{1000}{B}$$

$$B = 1035.53 \text{ ft}$$

$$\boxed{769 \text{ ft}}$$

29°

44°

1000 ft

A    29    B    44