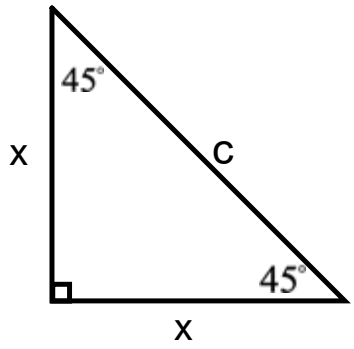
6-3 Trigonometric Ratios and the Unit Circle

Objectives:

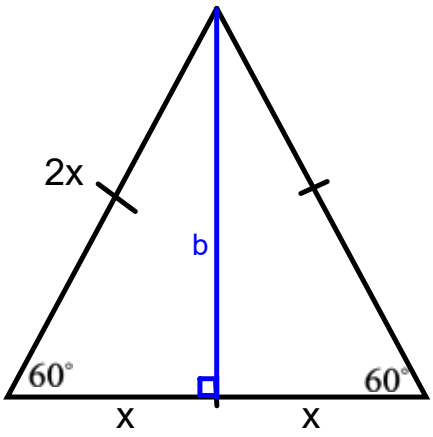
6-3a: I can evaluate trigonometric expressions using the unit circle.

Special Right Triangles

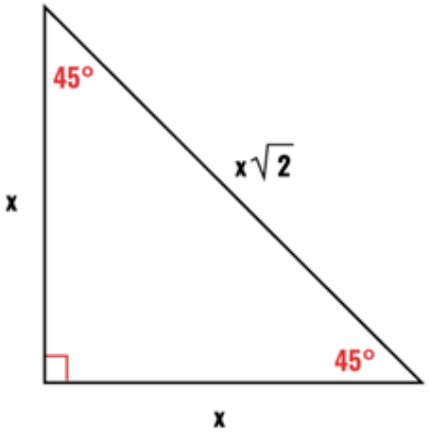
Find the hypotenuse, in terms of x, using pythagorean theorem.



Find b in terms of x, using the pythagorean theorem.



Special Right Triangle Relationships



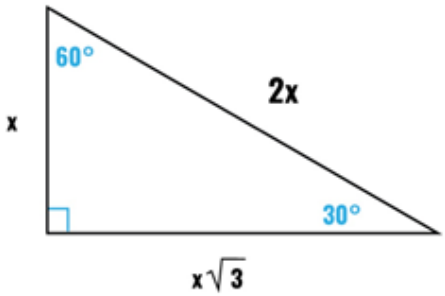
$leg = side\ opposite\ 45°$

45°-45°-90°

$$\mathbf{1 : 1 : \sqrt{2}}$$

$$1x : 1x : \sqrt{2}x$$

$$1(leg) : 1(leg) : \sqrt{2}(leg)$$



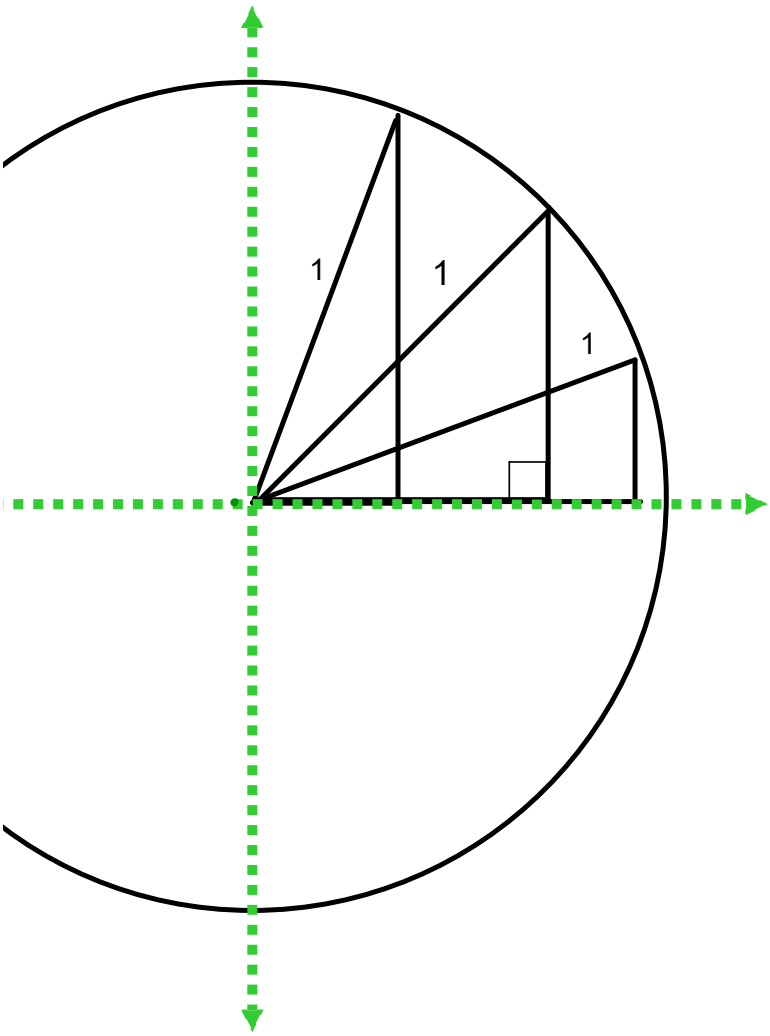
$leg = side\ opposite\ 30°$

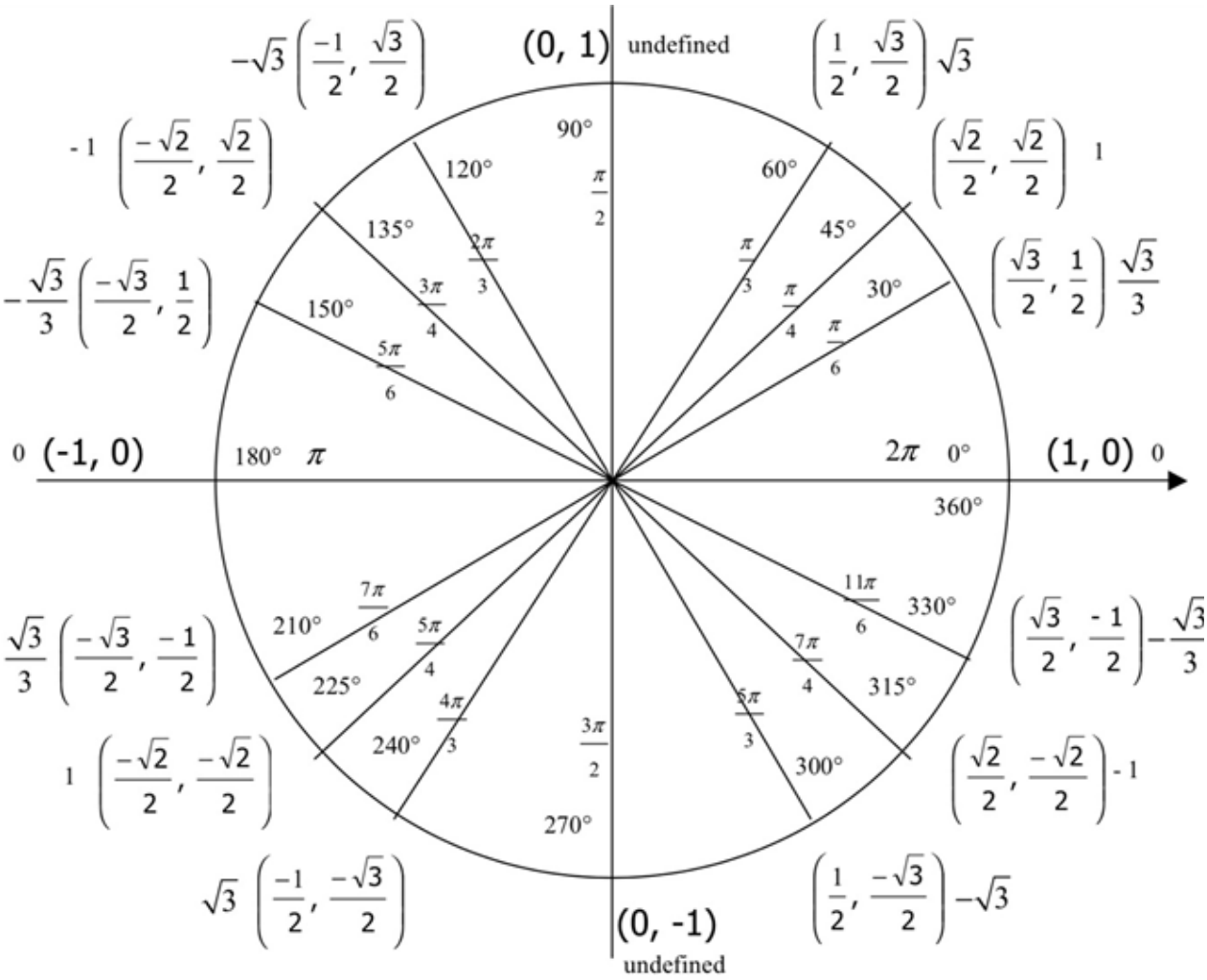
30°-60°-90°

$$\mathbf{1 : \sqrt{3} : 2}$$

$$1x : \sqrt{3}x : 2x$$

$$1(leg) : \sqrt{3}(leg) : 2(leg)$$

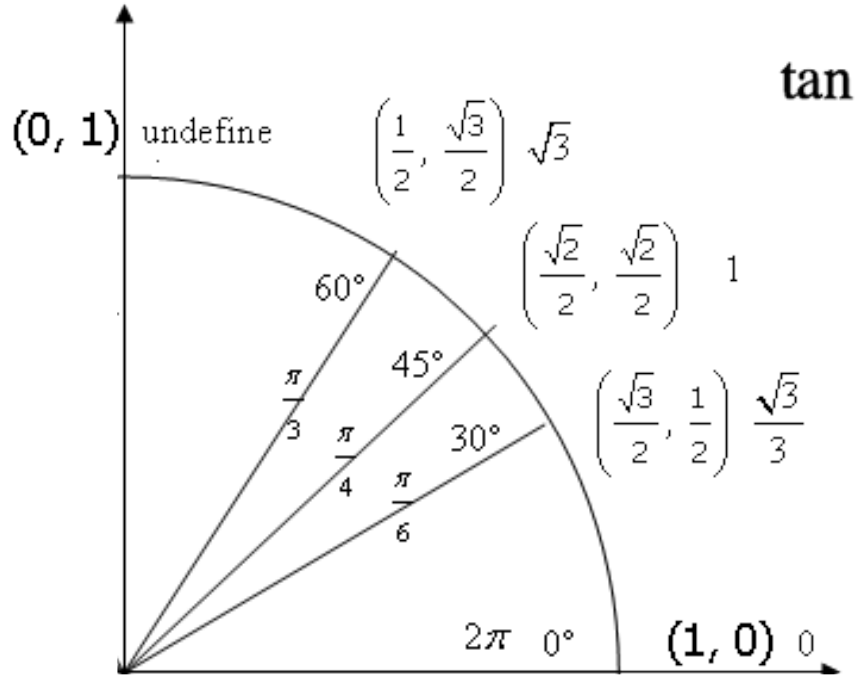

1
1
1


$-\sqrt{3}\left(\frac{-1}{2}, \frac{\sqrt{3}}{2}\right)$
(0, 1) undefined
$\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)\sqrt{3}$
- 1 $\left(\frac{-\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$
$\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$ 1
$-\frac{\sqrt{3}}{3}\left(\frac{-\sqrt{3}}{2}, \frac{1}{2}\right)$
$\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)\frac{\sqrt{3}}{3}$
90°
120°
60°
135°
45°
150°
30°
$\frac{\pi}{2}$
$\frac{2\pi}{3}$
$\frac{\pi}{3}$
$\frac{3\pi}{4}$
$\frac{\pi}{4}$
$\frac{5\pi}{6}$
$\frac{\pi}{6}$
0 (-1, 0)
180° π
2π 0°
(1, 0) 0
360°
$\frac{\sqrt{3}}{3}\left(\frac{-\sqrt{3}}{2}, \frac{-1}{2}\right)$
$\left(\frac{\sqrt{3}}{2}, \frac{-1}{2}\right)-\frac{\sqrt{3}}{3}$
210°
330°
$\frac{7\pi}{6}$
$\frac{11\pi}{6}$
$\frac{5\pi}{4}$
$\frac{7\pi}{4}$
225°
315°
$\frac{4\pi}{3}$
$\frac{5\pi}{3}$
240°
300°
$\frac{3\pi}{2}$
1 $\left(\frac{-\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$
$\left(\frac{\sqrt{2}}{2}, \frac{-\sqrt{2}}{2}\right)$ - 1
270°
$\sqrt{3}\left(\frac{-1}{2}, \frac{-\sqrt{3}}{2}\right)$
$\left(\frac{1}{2}, \frac{-\sqrt{3}}{2}\right)-\sqrt{3}$
(0, -1)
undefined

UNIT CIRCLE

$(\cos\theta, \sin\theta)$

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$



Evaluate the following

$\sin \pi =$

$\csc \frac{5\pi}{4} =$

$\cos \frac{3\pi}{4} =$

$\sec \frac{\pi}{6} =$

$\tan \frac{11\pi}{6} =$

$\cot \frac{\pi}{3} =$

Evaluate the following

$$\sin\frac{13\pi}{4}$$

$$\csc\frac{19\pi}{6}$$

$$\tan\left(-\frac{\pi}{4}\right)$$

$$\sec\left(-\frac{3\pi}{2}\right)$$