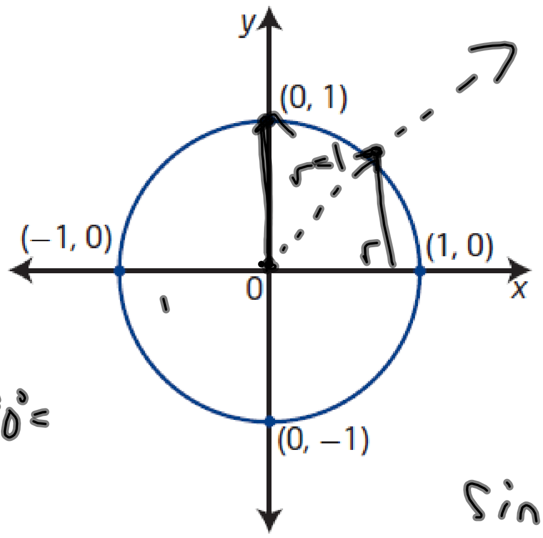
Unit Circle

Quadrantal
Angles

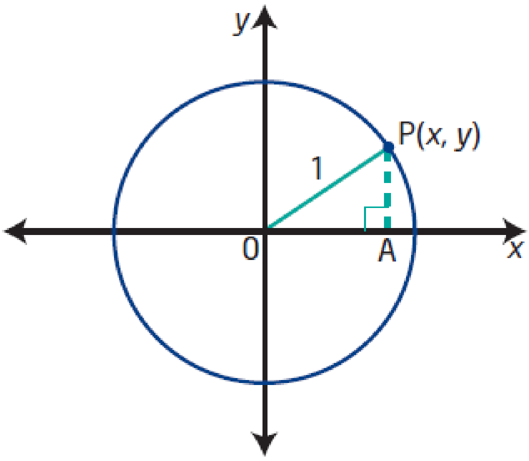


Sin 90° =

unit circle

- a circle with radius 1 unit
- a circle of radius 1 unit with centre at the origin on the Cartesian plane is known as *the* unit circle

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$



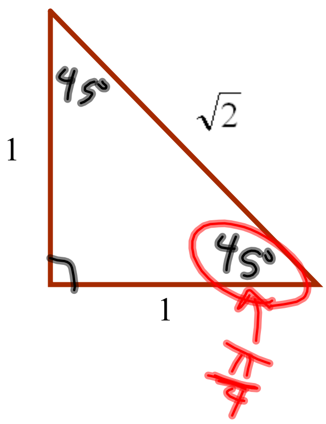
Centre origin

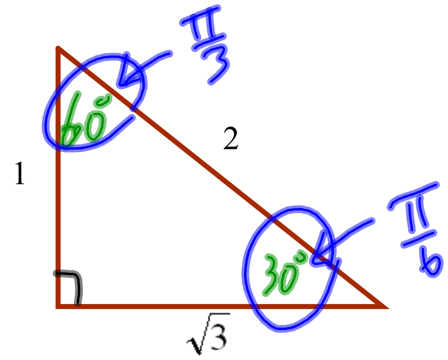
$$x^2+y^2=(\text{radius})^2$$

The equation of the unit circle is $x^2 + y^2 = 1$.

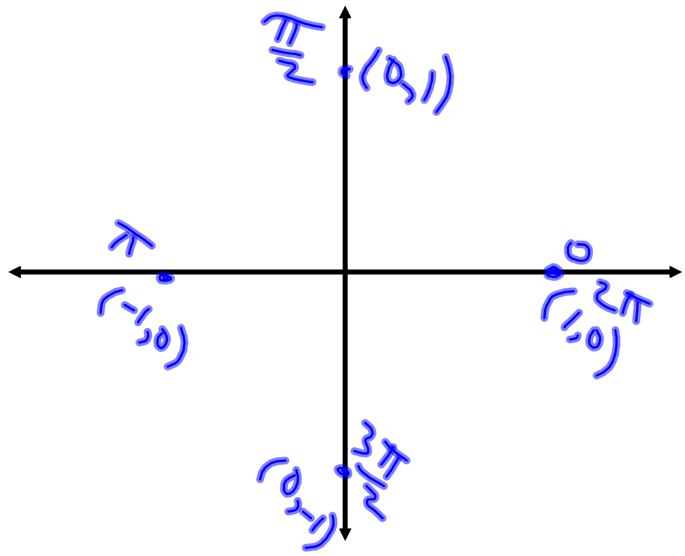
Determine the equation of a circle with centre at the origin and radius 6.

Special Angles (in radians)

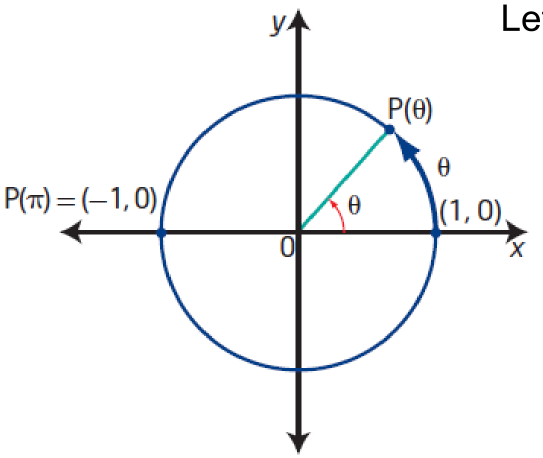




Quadrantal Angles

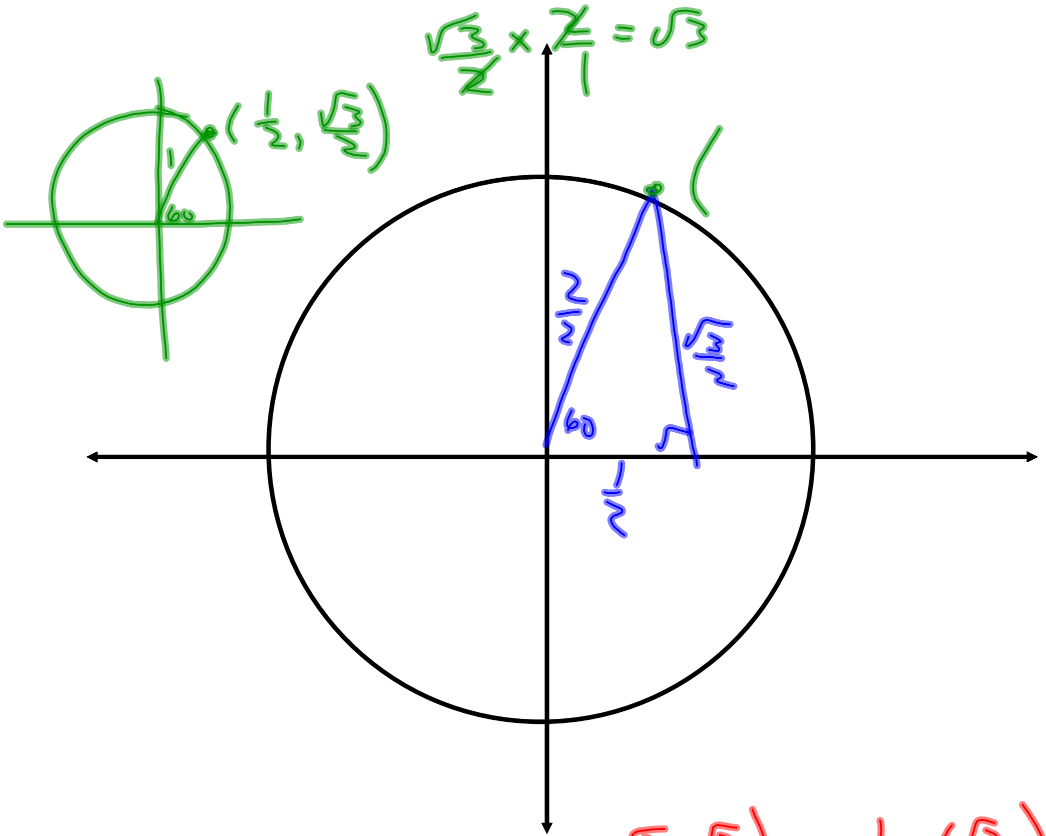


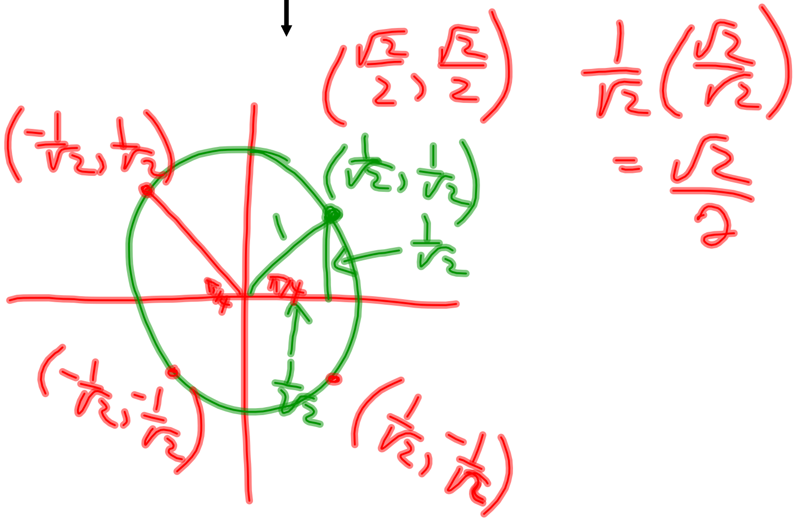
Special Angles on the Unit Circle:



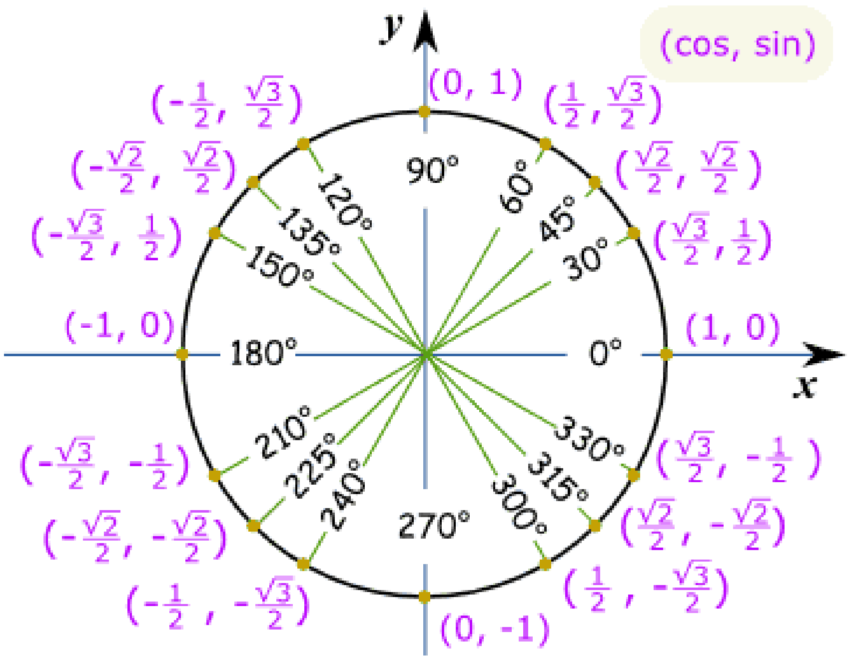
Let's use $\frac{\pi}{4}$ as our reference angle

Construct reference triangles for all multiples of π/4 between 0 and 2π



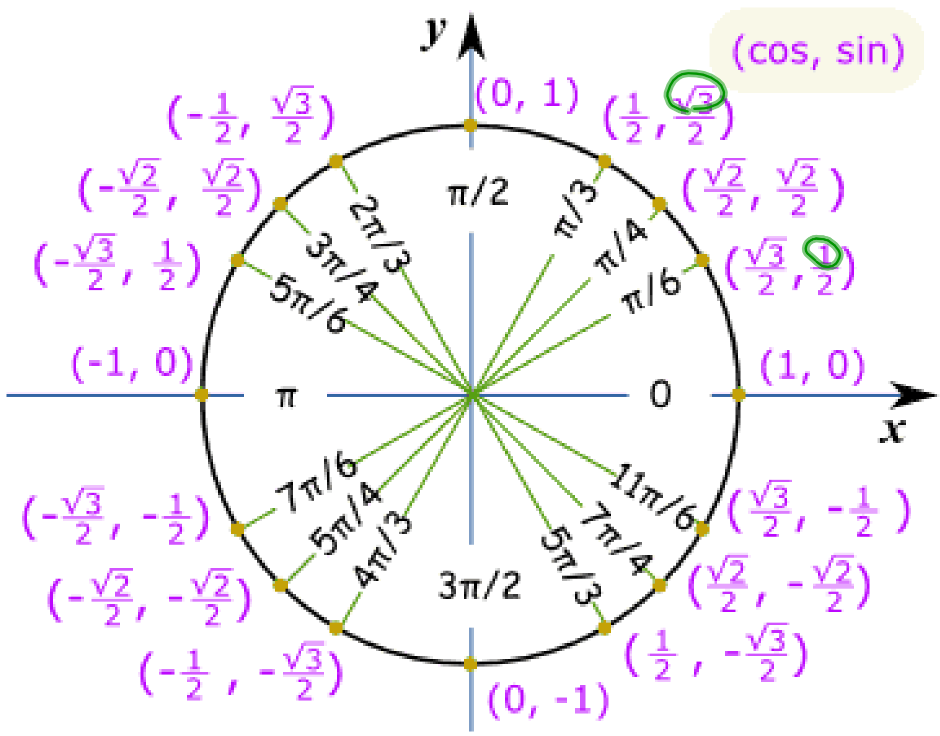


Unit Circle of Special Angles in Degrees



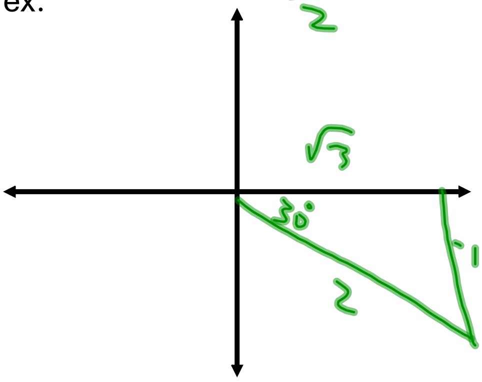
This is lovely...so what is it used for????

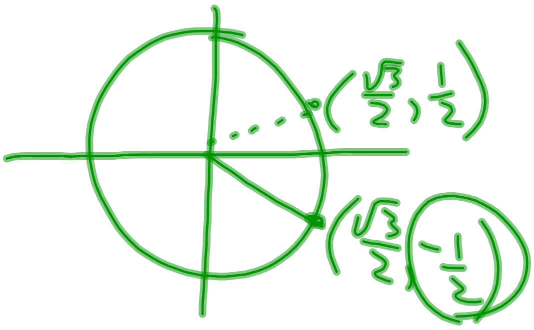
Unit Circle of Special Angles in Radians



Sketching Angles in Radians

ex. $\sin 690° = -\frac{1}{2}$





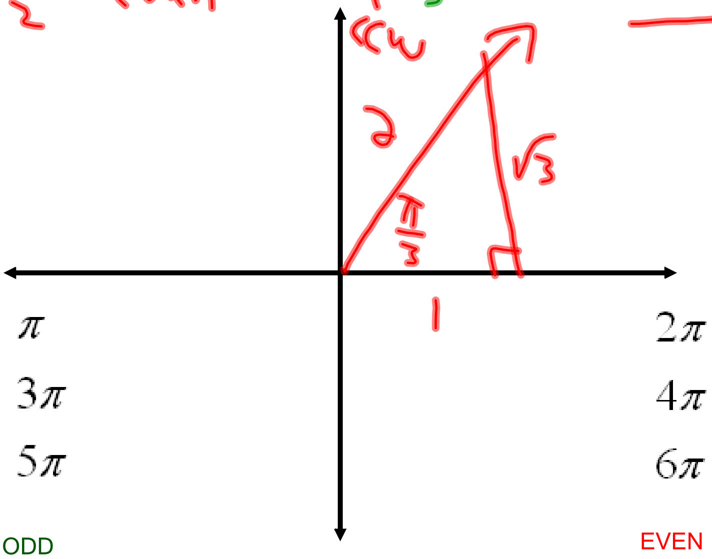
$\sin 690° = -\frac{1}{2}$

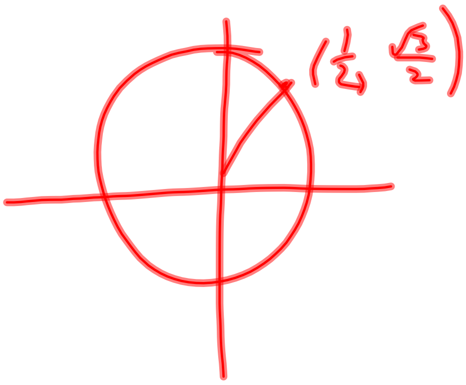
Ex. $\cos\frac{13\pi}{3} = \frac{12\pi}{3} + \frac{\pi}{3}$

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

$= \frac{1}{2}$ even

ccw



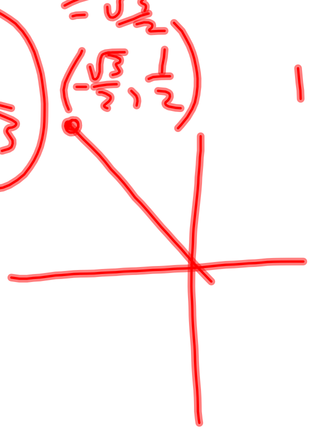


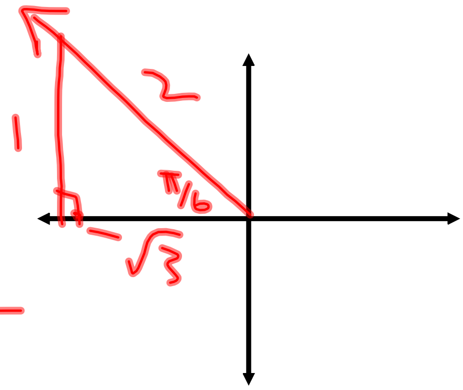
$\cos\frac{13\pi}{3}$ Break it apart

Ex. $\tan\frac{17\pi}{6} = -\frac{1}{\sqrt{3}}$

$\frac{18\pi}{6} - \frac{\pi}{6}$

$3\pi - \frac{\pi}{6}$

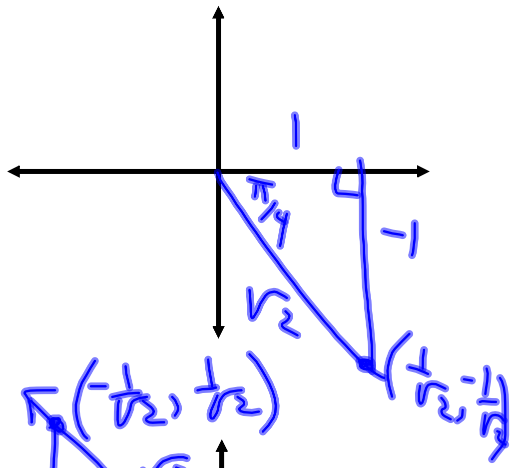




Ex. $\sin\frac{15\pi}{4} = \frac{-1}{\sqrt{2}}$

$\frac{16\pi}{4} - \frac{\pi}{4}$

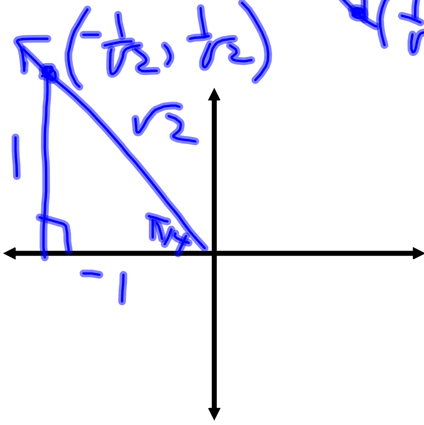
$4\pi - \frac{\pi}{4}$



Ex. $\cos\left(-\frac{21\pi}{4}\right) = -\frac{1}{\sqrt{2}}$

$-\frac{20\pi}{4} - \frac{\pi}{4}$

odd



Evaluate without the use of a calculator:

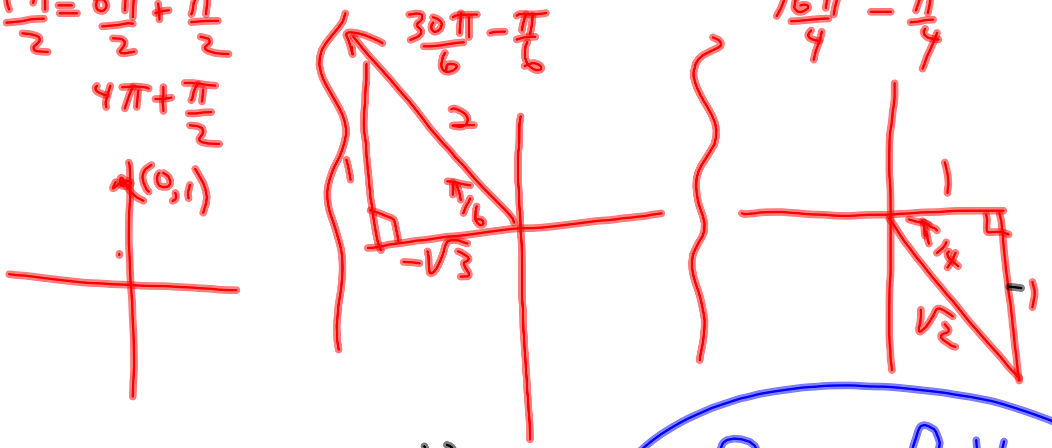
$$\sin\frac{9\pi}{2}-\cos^2\left(\frac{29\pi}{6}\right)\tan\left(\frac{15\pi}{4}\right)$$

$\frac{9\pi}{2}=\frac{8\pi}{2}+\frac{\pi}{2}$

$4\pi+\frac{\pi}{2}$

$\frac{30\pi}{6}-\frac{\pi}{6}$

$\frac{16\pi}{4}-\frac{\pi}{4}$



$$=1-\left(\frac{-\sqrt{3}}{2}\right)^2(-1)$$

$$=1-\left(\frac{3}{4}\right)(-1)$$

$$=1+\frac{3}{4}$$

$$=\frac{7}{4}$$

Practice Problems

Pg. 201-203

#1, 3, 5, 6, 8, 9