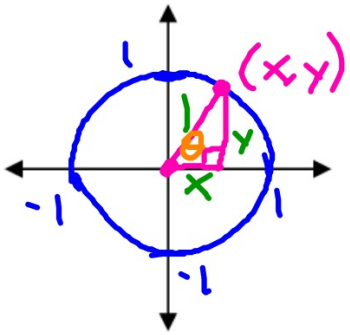
nometric Functions are known as circular functions b/c their values repeat in a cir

In the Unit Circle each angle has a cosine and a sine

x value y value

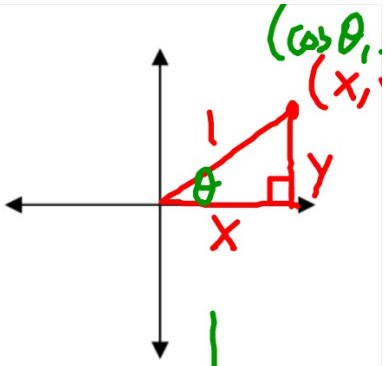


Note: in the unit circle the radius of the is 1.

The Six Trigonometric Functions

Soh Cah Toa

- $\sin\theta = \frac{opp}{hyp}$ → $\csc\theta = \frac{hyp}{opp}$
- $\cos\theta = \frac{adj}{hyp}$ → $\sec\theta = \frac{hyp}{adj}$
- $\tan\theta = \frac{opp}{adj}$ → $\cot\theta = \frac{adj}{opp}$



$\sin\theta = y$

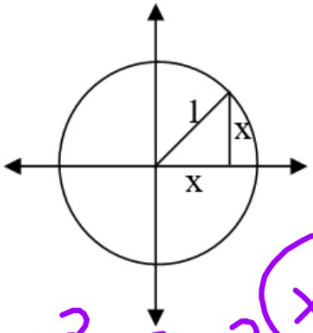
$\cos\theta = x$

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

Pythagorean Theorem

$$a^2+b^2=c^2$$

Find the measures of the following sides.



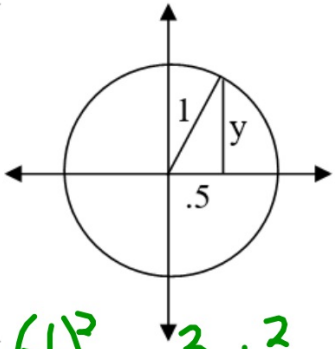
$x^2+x^2=1^2$

$2x^2=1$

$x^2=\frac{1}{2}$

$x=\sqrt{\frac{1}{2}}=\frac{\sqrt{1}}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$

$x=\frac{\sqrt{2}}{2}$

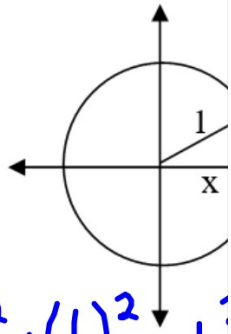


$\left(\frac{1}{2}\right)^2+y^2=1^2$

$\frac{1}{4}+y^2=1$

$y^2=\frac{3}{4}$

$y=\frac{\sqrt{3}}{2}$

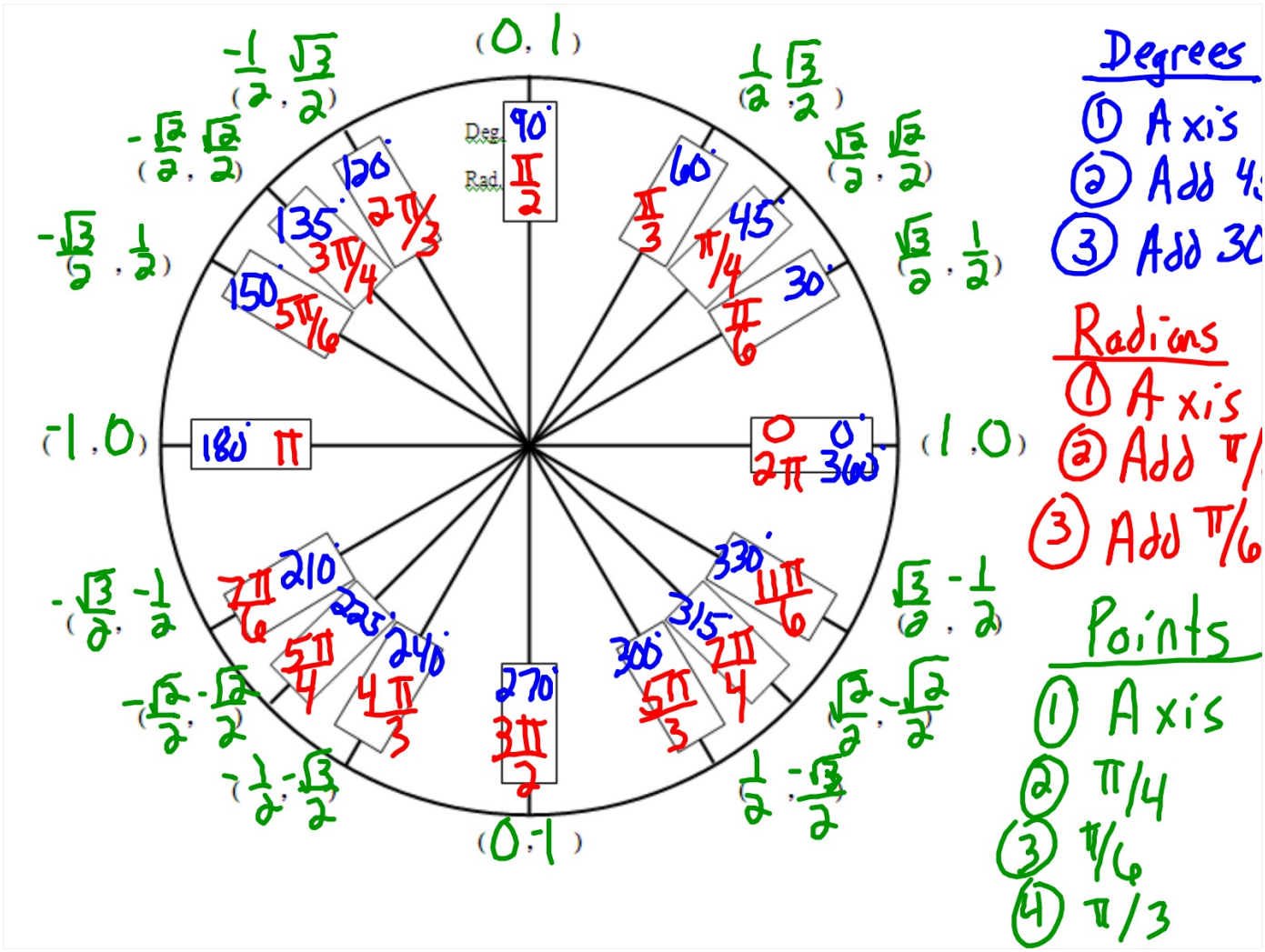


$x^2+\left(\frac{1}{2}\right)^2=1$

$x^2+\frac{1}{4}=1$

$x^2=\frac{3}{4}$

$x=\frac{\sqrt{3}}{2}$


(0, 1)
(1, 0)
(0, -1)
(-1, 0)
Deg
Rad
90° π/2
60° π/3
45° π/4
30° π/6
0° 0
2π 360°
330° 11π/6
315° 7π/4
300° 5π/3
270° 3π/2
240° 4π/3
225° 5π/4
210° 7π/6
180° π
150° 5π/6
135° 3π/4
120° 2π/3
Degrees
① Axis
② Add 45
③ Add 30
Radians
① Axis
② Add π/4
③ Add π/6
Points
① Axis
② π/4
③ π/6
④ π/3

Using the Unit Circle identify the six trigonometric functions for the following angles.

1. $\theta = \frac{\pi}{6}$

2. $\theta = -60^\circ$

$\sin\frac{\pi}{6} = \frac{1}{2}$ | $\csc\frac{\pi}{6} = 2$

$\cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}$ | $\sec\frac{\pi}{6} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

$\tan\frac{\pi}{6} = \frac{\sqrt{3}}{3}$ | $\cot\frac{\pi}{6} = \sqrt{3}$

$\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}$

$\frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

$\sin -60^\circ = \frac{-\sqrt{3}}{2}$ | $\csc -60^\circ = \frac{-2}{\sqrt{3}}$

$\cos -60^\circ = \frac{1}{2}$ | $\sec -60^\circ = 2$

$\tan -60^\circ = -\sqrt{3}$ | $\cot -60^\circ = \frac{-\sqrt{3}}{3}$

$\frac{\frac{-\sqrt{3}}{2}}{\frac{1}{2}} = \frac{-\sqrt{3}}{2} \cdot \frac{2}{1}$

3. $\theta = \frac{7\pi}{4}$

$\sin \frac{7\pi}{4} = -\frac{\sqrt{2}}{2}$ | $\csc \frac{7\pi}{4} = -\sqrt{2}$

$\cos \frac{7\pi}{4} = \frac{\sqrt{2}}{2}$ | $\sec \frac{7\pi}{4} = \sqrt{2}$

$\tan \frac{7\pi}{4} = -1$ | $\cot \frac{7\pi}{4} = -1$

$\frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2} = \sqrt{2}$

4. $\theta = -\frac{4\pi}{3}$

$\sin -\frac{4\pi}{3} = \frac{\sqrt{3}}{2}$ | $\csc -\frac{4\pi}{3} = \frac{2\sqrt{3}}{3}$

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

$\tan -\frac{4\pi}{3} = -\sqrt{3}$ | $\cot -\frac{4\pi}{3} = -\frac{\sqrt{3}}{3}$

5. $\theta = \frac{7\pi}{2} - 2\pi = \frac{3\pi}{2}$

3.5

$\sin \frac{7\pi}{2} = -1$ | $\csc \frac{7\pi}{2} = -1$

$\cos \frac{7\pi}{2} = 0$ | $\sec \frac{7\pi}{2} = U$

$\tan \frac{7\pi}{2} = U$ | $\cot \frac{7\pi}{2} = 0$

6. $\theta = -\frac{7\pi}{3} + 2\pi = -\frac{\pi}{3}$

$\sin -\frac{7\pi}{3} = -\frac{\sqrt{3}}{2}$ | $\csc -\frac{7\pi}{3} = -\frac{2\sqrt{}}{3}$

$\cos -\frac{7\pi}{3} = \frac{1}{2}$ | $\sec -\frac{7\pi}{3} = 2$

$\tan -\frac{7\pi}{3} = -\sqrt{3}$ | $\cot -\frac{7\pi}{3} = -\frac{\sqrt{3}}{3}$