

Can Quickly Determine a Trig Function Value

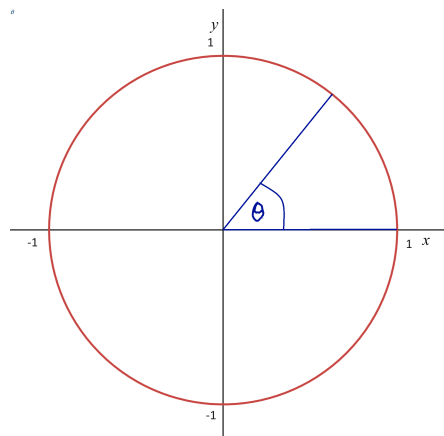
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1 / 7

Unit Circle

To remember trig function values, especially the values of sine and cosine, it is very helpful to picture the angle in the unit circle with the initial side on the positive x – axis. Work through the "Can Use the Unit Circle" unit before proceeding with this unit.

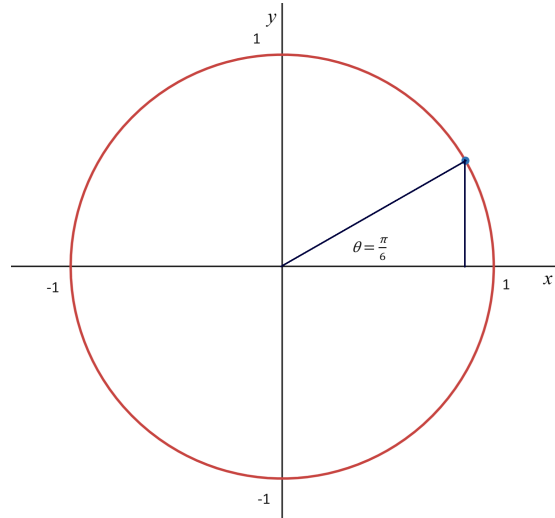


2 / 7

Tangent

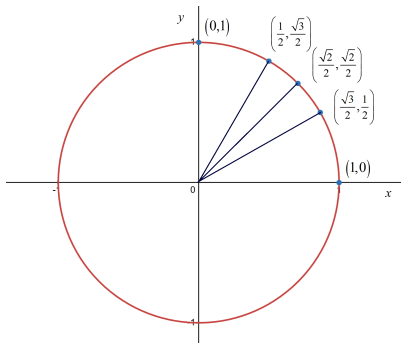
Once you are able to quickly determine the values of Sine and Cosine, you can find Tangent because $\tan \theta = \frac{\sin \theta}{\cos \theta}$.

$$\tan \frac{\pi}{6} = \frac{\sin \frac{\pi}{6}}{\cos \frac{\pi}{6}} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$



3 / 7

Other Angles



Similarly,

$$\tan \frac{\pi}{4} = \frac{\sin \frac{\pi}{4}}{\cos \frac{\pi}{4}} = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1.$$

$$\tan \frac{\pi}{3} = \frac{\sin \frac{\pi}{3}}{\cos \frac{\pi}{3}} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}.$$

And

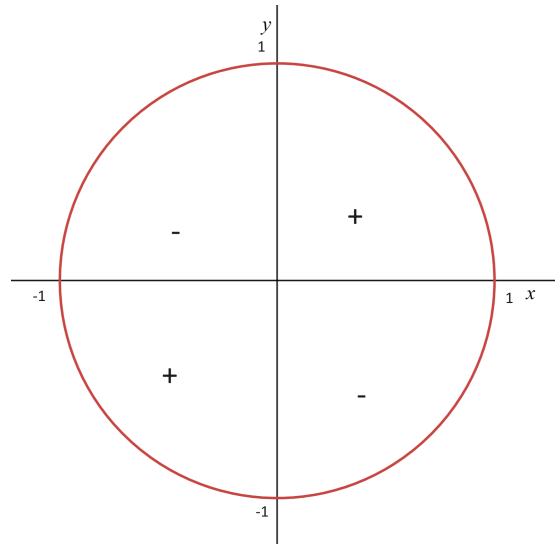
$$\tan 0 = \frac{\sin 0}{\cos 0} = \frac{0}{1} = 0.$$

$$\tan \frac{\pi}{2} = \frac{\sin \frac{\pi}{2}}{\cos \frac{\pi}{2}} = \frac{1}{0} \text{ (Undefined)}$$

4 / 7

Sign of Tangent

For angles in the other quadrants, determine the reference angle (the angle to the x-axis). The reference angle determines the magnitude. The quadrant determines the sign of Tangent:



5 / 7

Secant, Cosecant, Cotangent

Determine Secant, Cosecant, and Cotangent by taking the reciprocal of Cosine, Sine, and Tangent, respectively:

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

6 / 7

A few Examples

Try these:

$$\tan \frac{2\pi}{3} =$$

$$\sec \frac{\pi}{4} =$$

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

$$\csc \frac{5\pi}{6} =$$

$$\sec \frac{11\pi}{3} =$$

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

$$\cot \frac{7\pi}{6} =$$