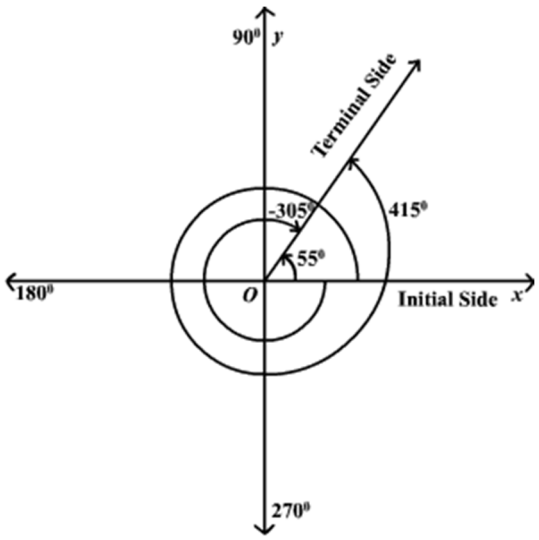
Trigonometry Basics

$$\textbf{1 Radian} = \frac{360°}{2\pi} \textbf{ or } \frac{180°}{\pi}$$



Example: Perform the following conversions.
a) Convert to degrees

$$\frac{2\pi}{5} = \frac{2\pi}{5} \cdot \frac{180°}{\pi} = \frac{360°\,\pi}{5\pi} = 72°$$

b) Convert to radians

$$-12° = \frac{-12°}{1} \cdot \frac{\pi}{180°} = \frac{-12\pi}{180} = \frac{-\pi}{15}$$

Example: Finding Missing Sides and Angles Using Right Triangle Trigonometry

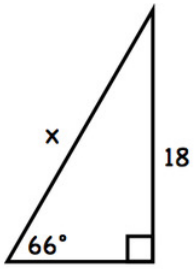
Solve for *x*

$$\sin 66° = \frac{18}{x}$$

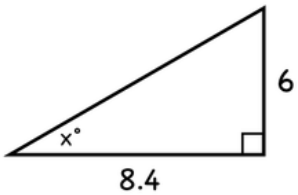
$$x \sin 66° = 18$$

$$x = \frac{18}{\sin 66°}$$

$$x \approx 19.703$$



Solve for *x*



$$\tan x = \frac{6}{8.4}$$

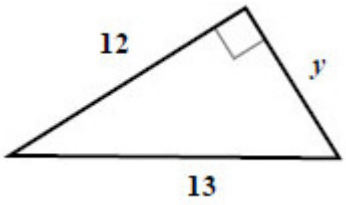
$$\tan^{-1}\left(\frac{6}{8.4}\right) = x$$

$$x \approx 35.538°$$

Don't forget, angles in a triangle add up to 180°.

If you know two sides of a RIGHT triangle you can find the third by using the Pythagorean Theorem

Example:



$$12^2 + y^2 = 13^2$$

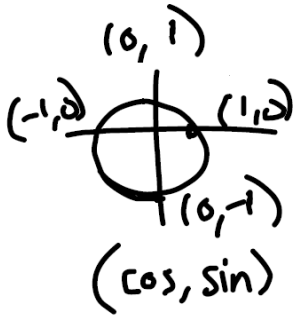
$$144 + y^2 = 169$$

$$y^2 = 25$$

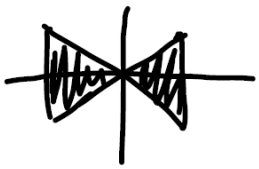
$$\sqrt{y^2} = \sqrt{25}$$

$$\boxed{y = 5}$$

	30 $\pi/6$	45 $\pi/4$	60 $\pi/3$
sin $\sqrt{\ }$	1	2	3
cos $\sqrt{\ }$	3	2	1
		2	

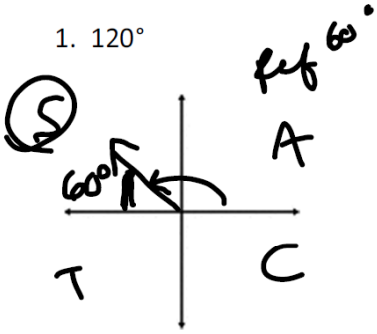


Reference Angles
(Bowtie Angles)



Draw and label the given angle and its reference (or the unit circle). Then evaluate the trigonometric values of the angle exactly without using a calculator.

1. 120°

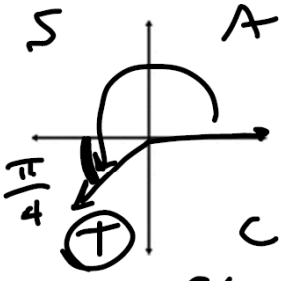


sin θ = $+\sqrt{3}/2$

cos θ = $-1/2$

tan θ = $-\frac{\sqrt{3}}{1} = -\sqrt{3}$

2. 5π/4

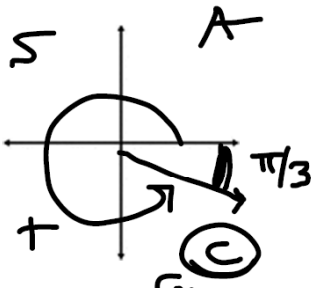


sin θ = $-\sqrt{2}/2$

cos θ = $-\sqrt{2}/2$

tan θ = $+1$

3. 5π/3

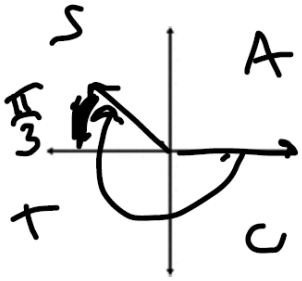


sin θ = $-\sqrt{3}/2$

cos θ = $+1/2$

tan θ = $-\sqrt{3}$

4. –4π/3



sin θ = $+\sqrt{3}/2$

cos θ = $-1/2$

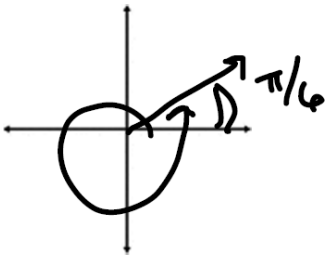
tan θ = $-\sqrt{3}$

csc θ = $+2/\sqrt{3} = \frac{2\sqrt{3}}{3}$

sec θ = -2

cot θ = $-1/\sqrt{3} = -\frac{\sqrt{3}}{3}$

5. 13π/6



sin θ = $1/2$

cos θ = $\sqrt{3}/2$

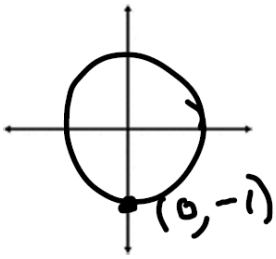
tan θ = $\sqrt{1}/\sqrt{3} = \sqrt{3}/3$

csc θ = 2

sec θ = $2/\sqrt{3} = \frac{2\sqrt{3}}{3}$

cot θ = $\sqrt{3}$

6. 3π/2



sin θ = -1

cos θ = 0

tan θ = $-1/0$ = undef.

csc θ = -1

sec θ = $\frac{1}{0}$ = undef

cot θ = 0