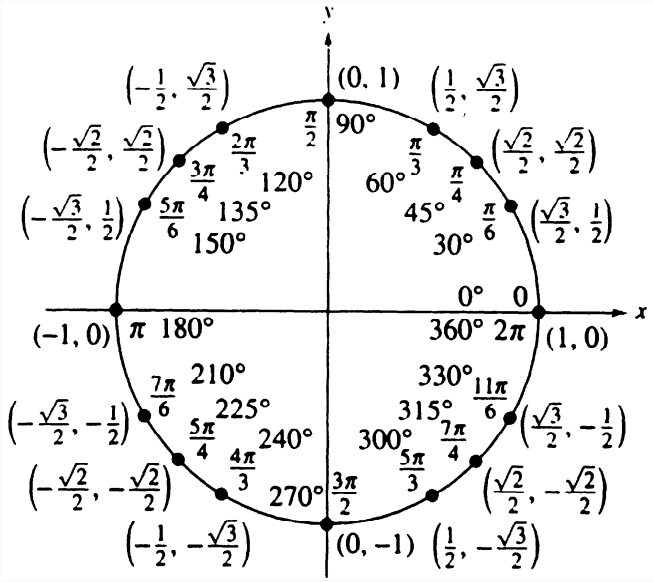
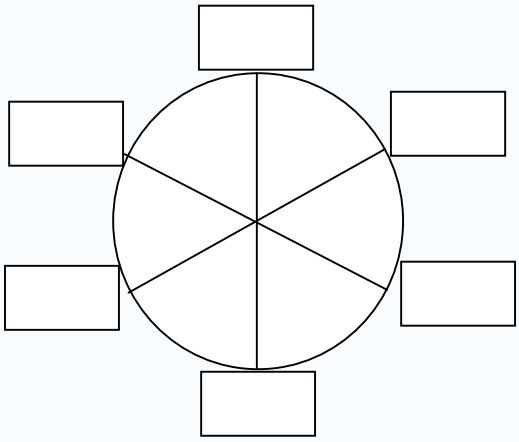
Wikipedia- List of trigonometric identities

Unit Circle



Wheel of identities

(You have to fill this in)



If $y = A\sin[B(x-C)]+D$

Period = $\frac{Period_0}{B}$ The original period for a sin, cos, sec, & csc is 2π and for tan or cot it is π

Frequency= $\frac{1}{P}$ Phase Shift = C Amplitude =A= $\left|\frac{\max-\min}{2}\right|$

D=middle of the graph = $\frac{\max+\min}{2}$ Range= [min,max]

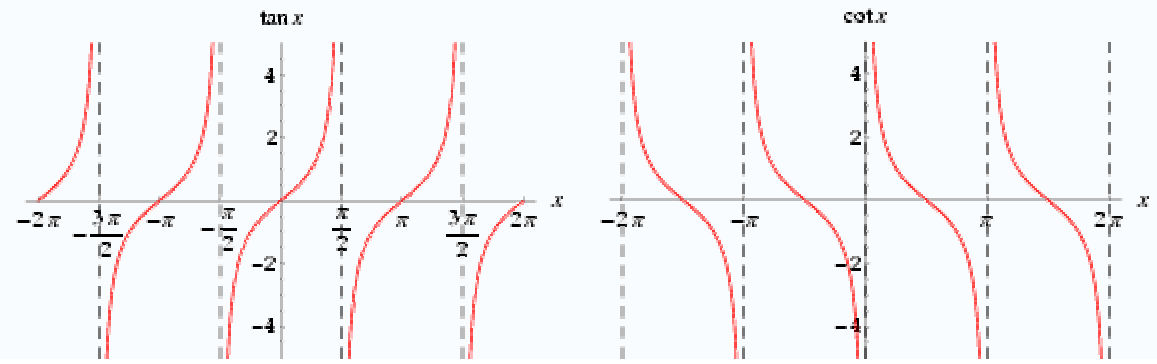
Right angle triangle:

$\sin(\theta)=\frac{opp}{hyp}$

$\cos(\theta)=\frac{adj}{hyp}$

$\tan(\theta)=\frac{opp}{adj}$

Graphs- you have to know sin(x) and cos(x) and how to get csc(x) and sec(x) from them.



Odd/ Even and Cofunction identities:

$$\begin{array}{lll}
\sin(-x) = -\sin(x) & \sin\left(\frac{\pi}{2} - x\right) = \cos(x) & \sin(\pi - x) = +\sin(x) \\
\cos(-x) = +\cos(x) & \cos\left(\frac{\pi}{2} - x\right) = \sin(x) & \cos(\pi - x) = -\cos(x) \\
\tan(-x) = -\tan(x) & \tan\left(\frac{\pi}{2} - x\right) = \cot(x) & \tan(\pi - x) = -\tan(x) \\
\cot(-x) = -\cot(x) & \cot\left(\frac{\pi}{2} - x\right) = \tan(x) & \cot(\pi - x) = -\cot(x) \\
\sec(-x) = +\sec(x) & \sec\left(\frac{\pi}{2} - x\right) = \csc(x) & \sec(\pi - x) = -\sec(x) \\
\csc(-x) = -\csc(x) & \csc\left(\frac{\pi}{2} - x\right) = \sec(x) & \csc(\pi - x) = +\csc(x)
\end{array}$$

Double-angle formulae:

$$\sin(2x) = 2\sin(x)\cos(x)$$

$$\cos(2x) = \cos^2(x) - \sin^2(x) = 2\cos^2(x) - 1 = 1 - 2\sin^2(x) = \frac{1 - \tan^2(x)}{1 + \tan^2(x)}$$

$$\tan(2x) = \frac{2\tan(x)}{1 - \tan^2(x)} \qquad \cot(2x) = \frac{\cot(x) - \tan(x)}{2}$$

Pythagorean identities

$$\sin^2(x) + \cos^2(x) = 1$$
$$\tan^2(x) + 1 = \sec^2(x)$$
$$\cot^2(x) + 1 = \csc^2(x)$$

Product-to-sum identities

$$\cos(x)\cos(y) = \frac{\cos(x-y) + \cos(x+y)}{2}$$
$$\sin(x)\sin(y) = \frac{\cos(x-y) - \cos(x+y)}{2}$$
$$\sin(x)\cos(y) = \frac{\sin(x-y) + \sin(x+y)}{2}$$

Sum and difference identities

$$\sin(x \pm y) = \sin(x)\cos(y) \pm \cos(x)\sin(y)$$

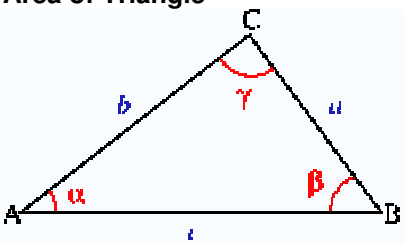
$$\cos(x \pm y) = \cos(x)\cos(y) \mp \sin(x)\sin(y)$$

$$\tan(x \pm y) = \frac{\tan(x) \pm \tan(y)}{1 \mp \tan(x)\tan(y)}$$

Sum-to-product identities

$$\cos(x) + \cos(y) = 2\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$
$$\sin(x) + \sin(y) = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$$
$$\cos(x) - \cos(y) = -2\sin\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$$
$$\sin(x) - \sin(y) = 2\cos\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$$

Area of Triangle



S=Area

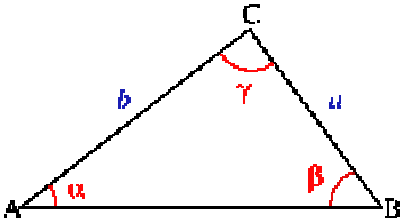
$$S = \frac{1}{2}ab\sin\gamma = \frac{1}{2}bc\sin\alpha = \frac{1}{2}ca\sin\beta.$$

Half-angle formulae

$$\cos\left(\frac{x}{2}\right) = \pm\sqrt{\frac{1+\cos(x)}{2}}$$
$$\sin\left(\frac{x}{2}\right) = \pm\sqrt{\frac{1-\cos(x)}{2}}$$

$$\tan\left(\frac{x}{2}\right) = \frac{\sin(x)}{1+\cos(x)} = \frac{1-\cos(x)}{\sin(x)}.$$
$$\tan\left(\frac{x}{2}\right) = \csc(x) - \cot(x),$$
$$\cot\left(\frac{x}{2}\right) = \csc(x) + \cot(x).$$

Law of Cosines:



$$c^2 = a^2 + b^2 - 2ab\cos(\gamma),$$
$$b^2 = a^2 + c^2 - 2ac\cos(\beta),$$
$$a^2 = b^2 + c^2 - 2bc\cos(\alpha).$$

Law of Sines:

$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$

Heron's Area Formula for a triangle:

$$A = \sqrt{H(H-a)(H-b)(H-c)}$$
$$H = (a+b+c)/2$$

Reduction Formula: θ is the angle in standard position whose terminal side contains (a,b) then

$$a\sin x + b\cos x = \sqrt{a^2+b^2}\,\sin(x+\theta)$$