Reference table of trigonometric identities

Some basic identities. This compilation of trigonometric identities is the first part of the following online site**:**

http://www.sosmath.com/trig/Trig5/trig5/trig5.html

Familiarity with these identities will be assumed in the course **(Math 10A – 001).**

Reciprocal identities

$$\sin u = \frac{1}{\csc u} \quad \cos u = \frac{1}{\sec u} \quad \tan u = \frac{1}{\cot u}$$

$$\csc u = \frac{1}{\sin u} \quad \sec u = \frac{1}{\cos u} \quad \cot u = \frac{1}{\tan u}$$

Pythagorean Identities

$$\sin^2 u + \cos^2 u = 1 \quad 1 + \tan^2 u = \sec^2 u \quad 1 + \cot^2 u = \csc^2 u$$

Quotient Identities

$$\tan u = \frac{\sin u}{\cos u} \quad \cot u = \frac{\cos u}{\sin u}$$

Co-Function Identities

$$\sin\left(\frac{\pi}{2} - u\right) = \cos u \quad \cos\left(\frac{\pi}{2} - u\right) = \sin u \quad \tan\left(\frac{\pi}{2} - u\right) = \cot u$$

$$\csc\left(\frac{\pi}{2} - u\right) = \sec u \quad \sec\left(\frac{\pi}{2} - u\right) = \csc u \quad \cot\left(\frac{\pi}{2} - u\right) = \tan u$$

Sum-Difference Formulas

$$\sin(u \pm v) = \sin u \cos v \pm \cos u \sin v$$
$$\cos(u \pm v) = \cos u \cos v \mp \sin u \sin v$$
$$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u \tan v}$$

Double Angle Formulas

$$\begin{aligned}\sin(2u) &= 2\sin u\cos u\\ \cos(2u) &= \cos^2 u - \sin^2 u\\ &= 2\cos^2 u - 1\\ &= 1 - 2\sin^2 u\\ \tan(2u) &= \frac{2\tan u}{1-\tan^2 u}\end{aligned}$$

Values for special angles. The following table is taken from the online site http://oakroadsystems.com/twt/special.htm.

$$\sin 30^\circ = \tfrac{1}{2}, \qquad \sin 60^\circ = (\sqrt{3})/2$$

$$\cos 30^\circ = (\sqrt{3})/2, \qquad \cos 60^\circ = \tfrac{1}{2}$$

$$\tan 30^\circ = (\sqrt{3})/3, \qquad \tan 60^\circ = \sqrt{3}$$

It is also important to know the values of these functions at multiples of 90°. For example, the sine and tangent are zero at 0°, while the cosine is equal to one, and the cosine is zero at 90°, while the sine is equal to one and the tangent is undefined. The values at 180° and 270° can be read off from these and the formulas in the table below.

Values for nonacute angles. The following table is taken from the online site http://oakroadsystems.com/twt/refangle.htm#refangleTop.

$\sin(180^\circ - A) = \sin A$ $\sin(\pi - A) = \sin A$	$\cos(180^\circ - A) = -\cos A$ $\cos(\pi - A) = -\cos A$	$\tan(180^\circ - A) = -\tan A$ $\tan(\pi - A) = -\tan A$
$\sin(180^\circ + A) = -\sin A$ $\sin(\pi + A) = -\sin A$	$\cos(180^\circ + A) = -\cos A$ $\cos(\pi + A) = -\cos A$	$\tan(180^\circ + A) = \tan A$ $\tan(\pi + A) = \tan A$
$\sin(-A) = -\sin A$	$\cos(-A) = \cos A$	$\tan(-A) = -\tan A$

The formulas on the last line are often called the ***Even-Odd Identities.***