$h = \frac{-b}{2a}$ $k = f(h)$

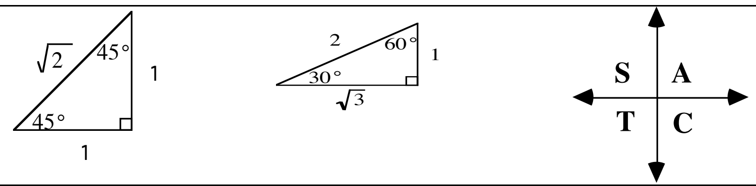
$K = \frac{1}{2} bc \sin A = \frac{1}{2} ab \sin C = \frac{1}{2} ac \sin B$

$\frac{\pi}{180}$

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$s = r\theta$

sohcahtoa



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

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

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

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

Sum or Difference of Two Angles Identities

$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$

$\sin(\alpha - \beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

$\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$

$\tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$

$\tan(\alpha - \beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$

Double-Angle Identities

$\sin 2\alpha = 2\sin\alpha\cos\alpha$

$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha$

$= 1 - 2\sin^2\alpha$

$= 2\cos^2\alpha - 1$

$\tan 2\alpha = \frac{2\tan\alpha}{1 - \tan^2\alpha}$

Half-Angle Identities

$\sin\frac{\alpha}{2} = \pm\sqrt{\frac{1 - \cos\alpha}{2}}$ $\tan\frac{\alpha}{2} = \frac{\sin\alpha}{1 + \cos\alpha} = \frac{1 - \cos\alpha}{\sin\alpha}$

$\cos\frac{\alpha}{2} = \pm\sqrt{\frac{1 + \cos\alpha}{2}}$

$a^2 = b^2 + c^2 - 2bc\cos A$ OR $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

$b^2 = a^2 + c^2 - 2ac\cos B$ OR $\cos B = \frac{a^2 + c^2 - b^2}{2ac}$

$c^2 = a^2 + b^2 - 2ab\cos C$ OR $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$

$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$ where $s = \frac{1}{2}(a + b + c)$.

Generalized Formulas for Graphs

$y = a\ \sin(bx - c) + d$ $\qquad y = a\ \csc(bx - c) + d$

$y = a\ \cos(bx - c) + d$ $\qquad y = a\ \sec(bx - c) + d$

$y = a\ \tan(bx - c) + d$ $\qquad y = a\ \cot(bx - c) + d$

amplitude = $\lvert a \rvert$	Inverse Functions (Restrictions)
period $\frac{\pi}{b}$ or $\frac{2\pi}{b}$	$y = \arctan x$ $-\infty < x < \infty$ $-\frac{\pi}{2} < y < \frac{\pi}{2}$
tick marks $\frac{\text{period}}{4}$	$y = \arcsin x$ $-1 \le x \le 1$ $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$
endpoints $bx - c = 0$ and $bx - c = \pi$ $bx - c = 0$ and $bx - c = 2\pi$ $bx - c = \frac{-\pi}{2}$ and $bx - c = \frac{\pi}{2}$	$y = \arccos x$ $-1 \le x \le 1$ $0 \le y \le \pi$
vertical shift = d	

Product to Sum Identities
$\sin\alpha\cos\beta = \frac{1}{2}\left[\sin(\alpha+\beta) + \sin(\alpha-\beta)\right]$
$\cos\alpha\cos\beta = \frac{1}{2}\left[\cos(\alpha+\beta) + \cos(\alpha-\beta)\right]$
$\sin\alpha\sin\beta = \frac{1}{2}\left[\cos(\alpha-\beta) - \cos(\alpha+\beta)\right]$
$\cos\alpha\sin\beta = \frac{1}{2}\left[\sin(\alpha+\beta) - \sin(\alpha-\beta)\right]$

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