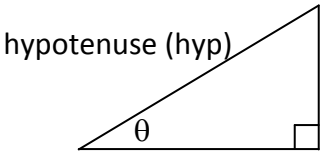
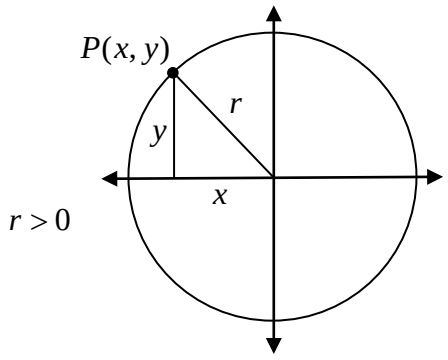
Trigonometric Functions

Definitions of the Trigonometric Functions

	On right triangle	On circle, radius r	On unit circle (r = 1)
$\sin\theta$	$\frac{\text{opp}}{\text{hyp}}$	$\frac{y}{r}$	y
$\cos\theta$	$\frac{\text{adj}}{\text{hyp}}$	$\frac{x}{r}$	x
$\tan\theta$	$\frac{\text{opp}}{\text{adj}}$	$\frac{y}{x}$	$\frac{y}{x}$
$\cot\theta$	$\frac{\text{adj}}{\text{opp}}$	$\frac{x}{y}$	$\frac{x}{y}$
$\sec\theta$	$\frac{\text{hyp}}{\text{adj}}$	$\frac{r}{x}$	$\frac{1}{x}$
$\csc\theta$	$\frac{\text{hyp}}{\text{opp}}$	$\frac{r}{y}$	$\frac{1}{y}$

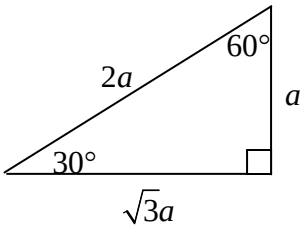


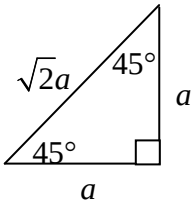


Signs of the Trigonometric Functions

Quadrant	sin	cos	tan	csc	sec	cot
I	+	+	+	+	+	+
II	+	-	-	+	-	-
III	-	-	+	-	-	+
IV	-	+	-	-	+	-

Important Reference Triangles





Equations of Trigonometric Functions

For: $f(x) = A\sin\left[B(x-C)\right]+D$ *o r* $f(x) = A\cos\left[B(x-C)\right]+D$

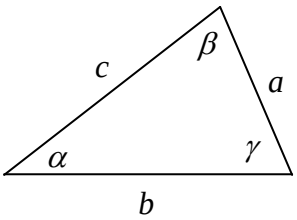
Amplitude = $|A|$ Period = $\frac{2\pi}{|B|}$

Phase Shift (Horizontal Shift) = C Midline (Vertical Shift) = D

For: $f(x) = A\tan\left[B(x-C)\right]+D$

Amplitude = $|A|$ Period = $\frac{\pi}{|B|}$ Phase Shift = C Vertical Shift = D

Successive vertical asymptotes solve: $B(x+C) = \frac{\pi}{2}$ & $B(x+C) = -\frac{\pi}{2}$



Law of Sines $\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$ *or* $\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$

Law of Cosines

$a^2 = b^2 + c^2 - 2\cdot b\cdot c\cdot\cos\alpha$ $\quad \alpha = \cos^{-1}\left(\frac{b^2+c^2-a^2}{2\cdot b\cdot c}\right)$

$b^2 = a^2 + c^2 - 2\cdot a\cdot c\cdot\cos\beta$ $\quad \beta = \cos^{-1}\left(\frac{a^2+c^2-b^2}{2\cdot a\cdot c}\right)$

$c^2 = a^2 + b^2 - 2\cdot a\cdot b\cdot\cos\gamma$ $\quad \gamma = \cos^{-1}\left(\frac{a^2+b^2-c^2}{2\cdot a\cdot b}\right)$