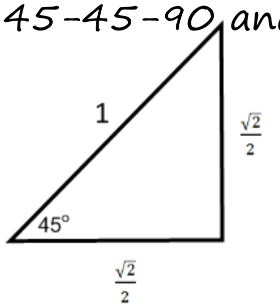
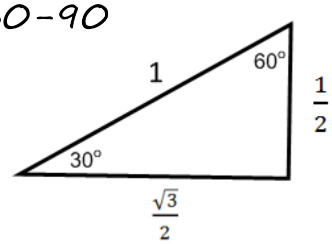
Trig Review

45-45-90 and 30-60-90





Right Triangle Trigonometry:

Trig Ratios SOH-CAH-TOA $\tan = \frac{\sin}{\cos}$

$\sin = \frac{opposite}{hypotuse}$ $\cos = \frac{adjacent}{hypotuse}$ $\tan = \frac{opposite}{adjacent}$

$\csc = \frac{1}{\sin} = \frac{hypotuse}{opposite}$ $\sec = \frac{1}{\cos} = \frac{hypotuse}{adjacent}$ $\cot = \frac{1}{\tan} = \frac{adjacent}{opposite}$

Radians : $180^o = \pi$ radians

Conversions: $D = R \cdot \frac{180}{\pi}$ $R = D \cdot \frac{\pi}{180}$

sin 0 = 0 cos 0 = 1 tan 0 = 0

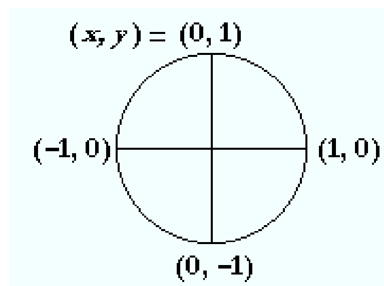
sin 90 = 1 cos 90 = 0 tan 90 = undefined

sin 180 = 0 cos 180 = -1 tan 180 = 0

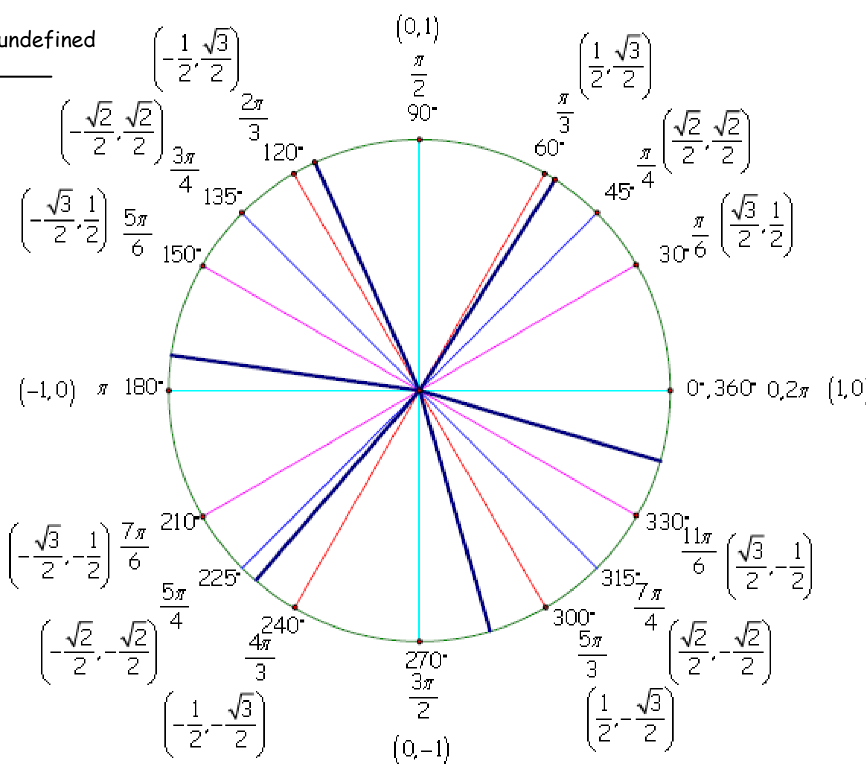
sin 270 = -1 cos 270 = 0 tan 270 = undefined

Quadrantal Angles:

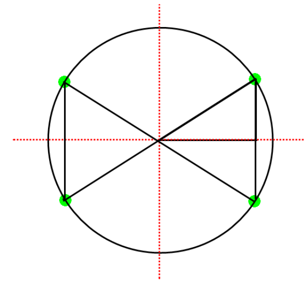
$\tan = \frac{\sin}{\cos}$



Deg.	Rad.	sin	cos	tan
0	0	0	1	0
30	$\frac{\pi}{6}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$
45	$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1
60	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90	$\frac{\pi}{2}$	1	0	undefined
180	π	0	-1	0
270	$\frac{3\pi}{2}$	-1	0	undefined



Reference Angles



A. Determine in which quadrant the angle θ lies.
B. Determine the reference angle θ'.
C. Find the indicated ratio for θ'. This must be an exact value.
D. Determine the value for the original expression using the ASTC mneumonic.

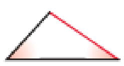
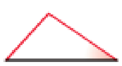
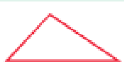
Example: Find θ if $\sin\theta = -0.78$

Answer: $\sin^{-1}(-0.78) = -51^{o}$
$-51^{o} = 360 - 51 = 309^{o}$.
Sin is also negative in Quadrant III so the second answer is $180+51 = 231^{o}$

Example: Find θ if $\cos\theta = 0.34$

Answer: $\cos^{-1}(0.34) = 70^{o}$
Cos is also positive in Quadrant IV so the second answer is 360-70 = 290

Solving Triangles:

If you know this information . . .		use this law . . .
angle-angle-side		Law of sines
angle-side-angle		Law of sines
side-side-angle		Law of sines
side-angle-side		Law of cosines
side-side-side		Law of cosines

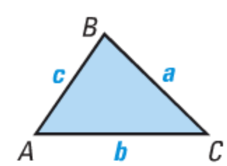
Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Law of Cosines:

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$c^2 = a^2 + b^2 - 2ab\cos C$$

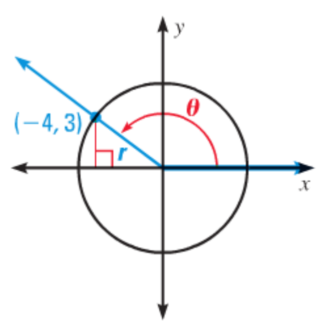
Area of a Triangle

The area of any triangle is given by one half the product of the lengths of two sides times the sine of their included angle. For $\triangle ABC$ shown, there are three ways to calculate the area:



$$\text{Area} = \frac{1}{2}bc\sin A \qquad \text{Area} = \frac{1}{2}ac\sin B \qquad \text{Area} = \frac{1}{2}ab\sin C$$

Let $(-4, 3)$ be a point on the terminal side of an angle θ in standard position. Evaluate the six trigonometric functions of θ.



Solution

Use the Pythagorean theorem to find the value of r.

$$r = \sqrt{x^2 + y^2} = \sqrt{(-4)^2 + 3^2} = \sqrt{25} = 5$$

Using $x = -4$, $y = 3$, and $r = 5$, you can write the following:

$$\sin\theta = \frac{y}{r} = \frac{3}{5} \qquad \cos\theta = \frac{x}{r} = -\frac{4}{5} \qquad \tan\theta = \frac{y}{x} = -\frac{3}{4}$$

$$\csc\theta = \frac{r}{y} = \frac{5}{3} \qquad \sec\theta = \frac{r}{x} = -\frac{5}{4} \qquad \cot\theta = \frac{x}{y} = -\frac{4}{3}$$