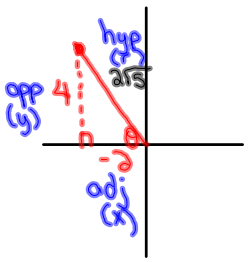
Another example to reinforce angles in all four quadrants

Example:

If the point (−2,4) lies on the terminal arm of an angle θ, determine the six trigonometric ratios of θ



$c^2 = a^2 + b^2$

$c^2 = (4)^2 + (-2)^2$

$c^2 = 16 + 4$

$c^2 = 20$

$c = \sqrt{20} = 2\sqrt{5}$

$\sin\theta = \frac{4}{2\sqrt{5}} = \frac{4\sqrt{5}}{10} = \frac{2\sqrt{5}}{5}$

$\cos\theta = \frac{-2}{2\sqrt{5}} = \frac{-2\sqrt{5}}{10} = \frac{-\sqrt{5}}{5}$

$\tan\theta = \frac{4}{-2} = -2$

$\csc\theta = \frac{2\sqrt{5}}{4} = \frac{\sqrt{5}}{2}$

$\sec\theta = \frac{2\sqrt{5}}{-2} = -\sqrt{5}$

$\cot\theta = \frac{-2}{4} = -\frac{1}{2}$

Example:

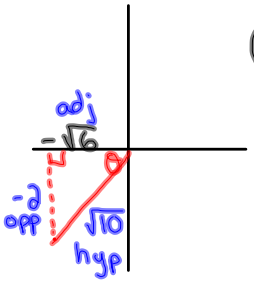
If $\csc\theta = -\frac{\sqrt{10}}{2}$ and $\tan\theta > 0$, determine the value of the remaining FIVE trigonometric ratios of angle θ.

hyp

tan is positive

opp

opp = −2 hyp = $\sqrt{10}$



$c^2 = a^2 + b^2$

$(\sqrt{10})^2 = (-2)^2 + b^2$

$10 = 4 + b^2$

$6 = b^2$

$\sqrt{6} = b$

$\sin\theta = \frac{-2}{\sqrt{10}} = \frac{-2\sqrt{10}}{10} = \frac{-\sqrt{10}}{5}$

$\cos\theta = \frac{-\sqrt{6}}{\sqrt{10}} = \frac{-\sqrt{60}}{10} = \frac{-2\sqrt{15}}{10} = \frac{-\sqrt{15}}{5}$

$\tan\theta = \frac{-2}{-\sqrt{6}} = \frac{2}{\sqrt{6}} = \frac{2\sqrt{6}}{6} = \frac{\sqrt{6}}{3}$

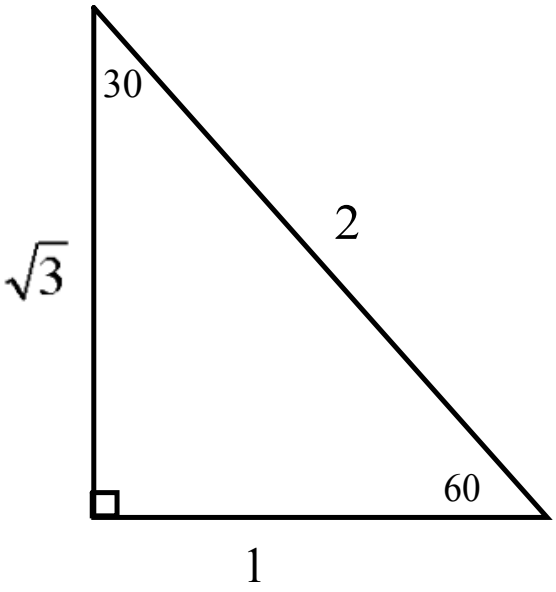
$\sec\theta = \frac{\sqrt{10}}{-\sqrt{6}} = -\frac{\sqrt{60}}{6} = \frac{-2\sqrt{15}}{6} = \frac{-\sqrt{15}}{3}$

$\cot\theta = \frac{-\sqrt{6}}{-2} = \frac{\sqrt{6}}{2}$

Special Angles

I. 30° *and* 60°

MEMORIZE THESE DIAGRAMS!!!

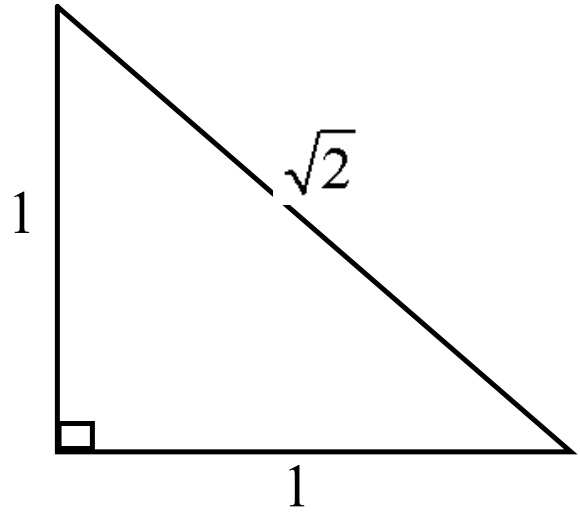


	30	60
Sin	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
Cos	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
Tan	$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$	$\sqrt{3}$

Special Angles

II. 45°

MEMORIZE THESE DIAGRAMS!!!

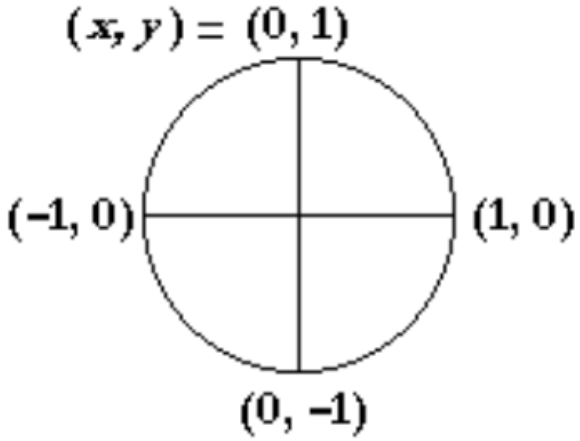


	45
Sin	$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
Cos	$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
Tan	1

MEMORIZE THESE DIAGRAMS!!!

III. Quadrantal Angles (Multiples of 90^o)

Unit Circle

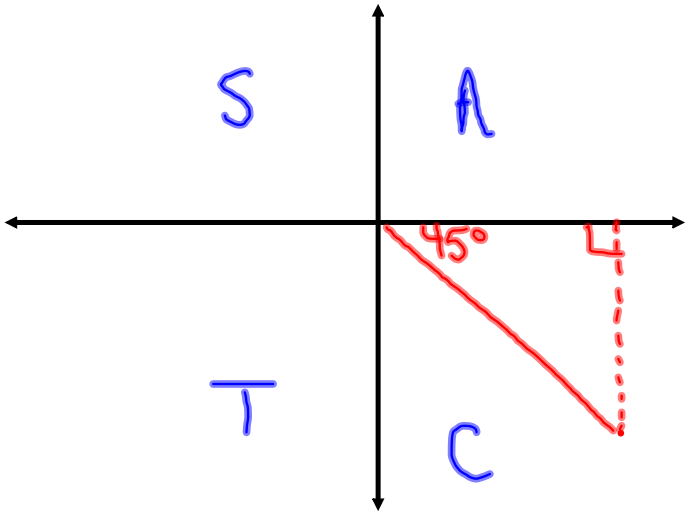


	0^0	90^0	180^0	270^0	360^0
sin	0	1	0	-1	0
cos	1	0	-1	0	1
tan	0	undefined	0	undefined	0

Extend the special angles into all FOUR quadrants

Without a calculator determine the value of $\tan 315^\circ$ ref$\theta = 45^\circ$

1. Start by sketching the angle

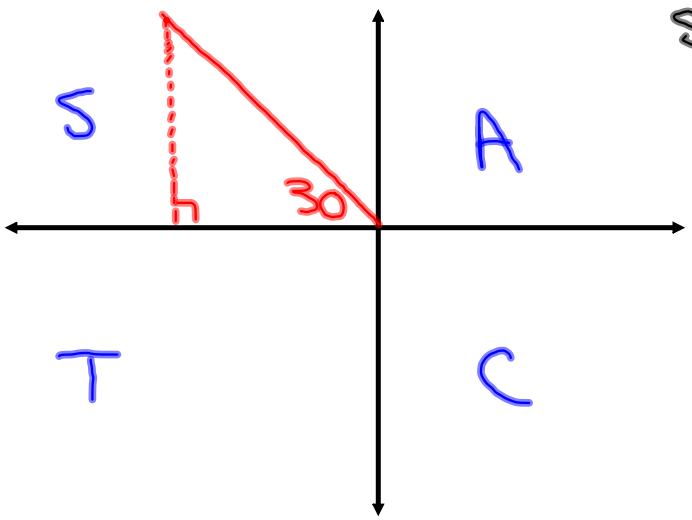


$\tan 315 = -1$

Extend the special angles into all FOUR quadrants

Without a calculator determine the value of sin150 $\text{ref}\,\theta = 30°$

1. Start by sketching the angle



$\sin 150 = +\frac{1}{2}$