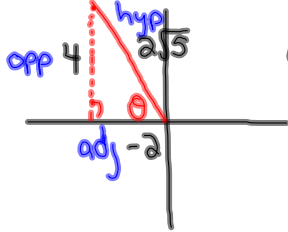


Another example to reinforce angles in all four quadrants

Example:

If the point $(-2, 4)$ lies on the terminal arm of an angle θ , determine the six trigonometric ratios of θ as radicals in simplest form.

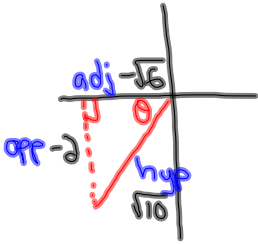


$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 (-2)^2 + (4)^2 &= c^2 \\
 20 &= c^2 \\
 \pm\sqrt{20} &= c \\
 2\sqrt{5} &= c
 \end{aligned}$$

$$\begin{aligned}
 \sin \theta &= \frac{4}{2\sqrt{5}} = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5} & \csc \theta &= \frac{2\sqrt{5}}{4} = \frac{\sqrt{5}}{2} \\
 \cos \theta &= \frac{-2}{2\sqrt{5}} = \frac{-1}{\sqrt{5}} = \frac{-\sqrt{5}}{5} & \sec \theta &= \frac{2\sqrt{5}}{-2} = -\sqrt{5} \\
 \tan \theta &= \frac{4}{-2} = -2 & \cot \theta &= \frac{-2}{4} = \frac{-1}{2}
 \end{aligned}$$

Example:

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



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 a^2 + (-2)^2 &= (\sqrt{10})^2 \\
 a^2 + 4 &= 10 \\
 a^2 &= 6 \\
 a &= \pm\sqrt{6}
 \end{aligned}$$

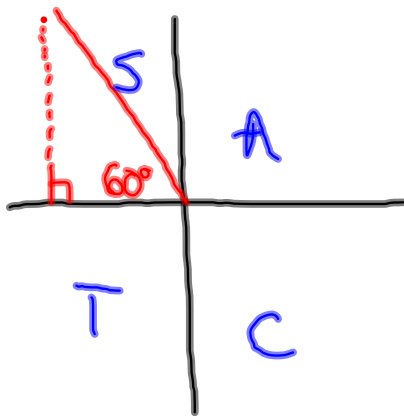
$$\begin{aligned}
 \sin \theta &= \frac{-2}{\sqrt{10}} \\
 \cos \theta &= \frac{-\sqrt{6}}{\sqrt{10}} \\
 \tan \theta &= \frac{-2}{-\sqrt{6}} = \frac{2}{\sqrt{6}} \\
 \csc \theta &= \frac{\sqrt{10}}{-2} \\
 \sec \theta &= \frac{\sqrt{10}}{-\sqrt{6}} \\
 \cot \theta &= \frac{-\sqrt{6}}{-2} = \frac{\sqrt{6}}{2}
 \end{aligned}$$

In Simplest form

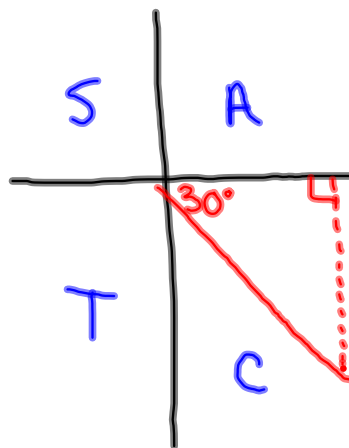
$$* \cos \theta = \frac{-\sqrt{6} \cdot \sqrt{10}}{\sqrt{10} \cdot \sqrt{10}} = \frac{-\sqrt{60}}{10} = \frac{-2\sqrt{15}}{10} = \boxed{\frac{-\sqrt{15}}{5}}$$

Questions from homework

② a) $\cos 120^\circ = -\frac{1}{2}$



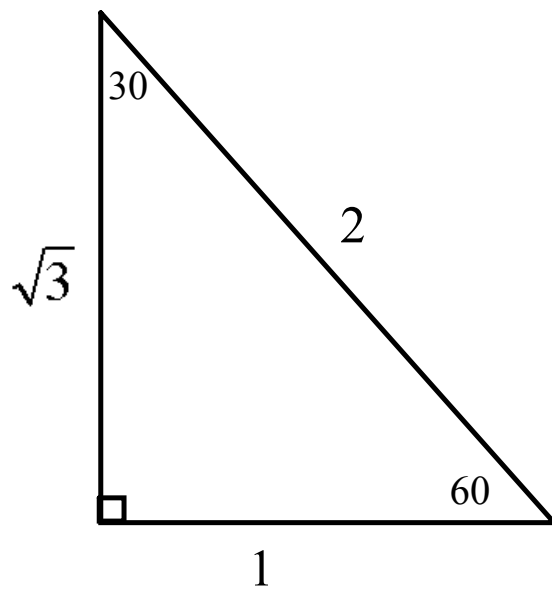
e) $\tan(-30^\circ) = -\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$



Special Angles

I. 30° and 60°

MEMORIZE THESE DIAGRAMS!!!

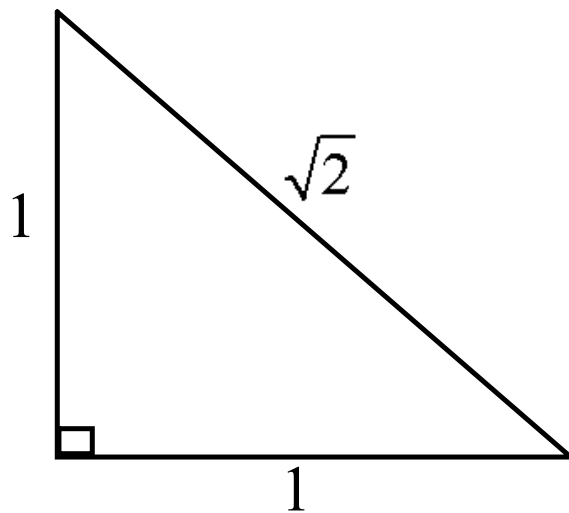


	30°	60°
Sin		
Cos		
Tan		

Special Angles

II. 45°

MEMORIZE THESE DIAGRAMS!!!

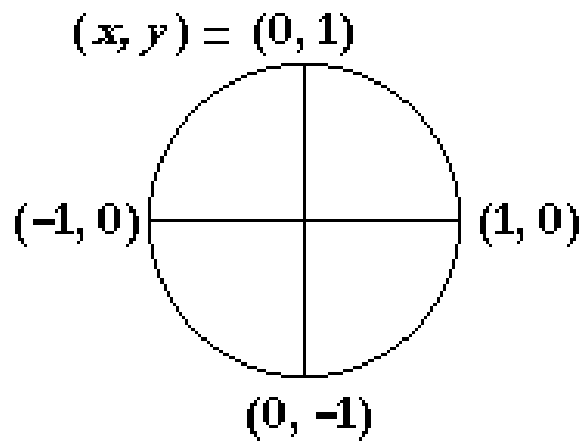


	45
Sin	
Cos	
Tan	

MEMORIZE THESE DIAGRAMS!!!

III. Quadrantal Angles (Multiples of 90)

Unit Circle

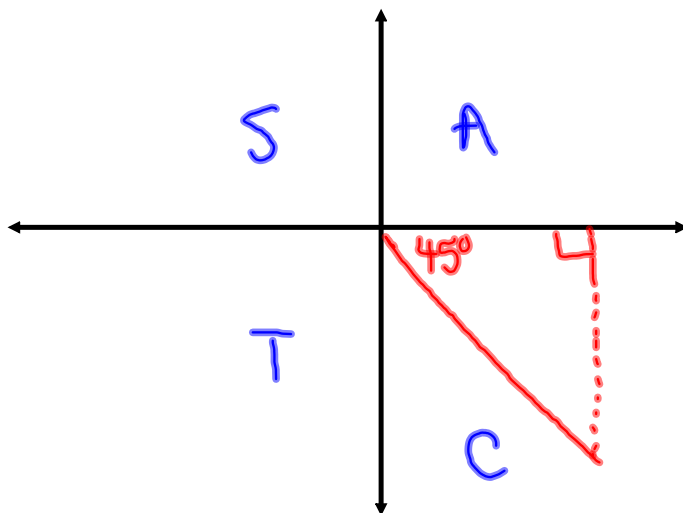


	0°	90°	180°	270°	360°
sin	0	1	0	-1	0
cos	1	0	-1	0	1
tan	0	undefined	0	undefined	0

Extend the special angles into all FOUR quadrants

Without a calculator determine the value of $\tan 315^\circ = -\frac{1}{1} = -1$

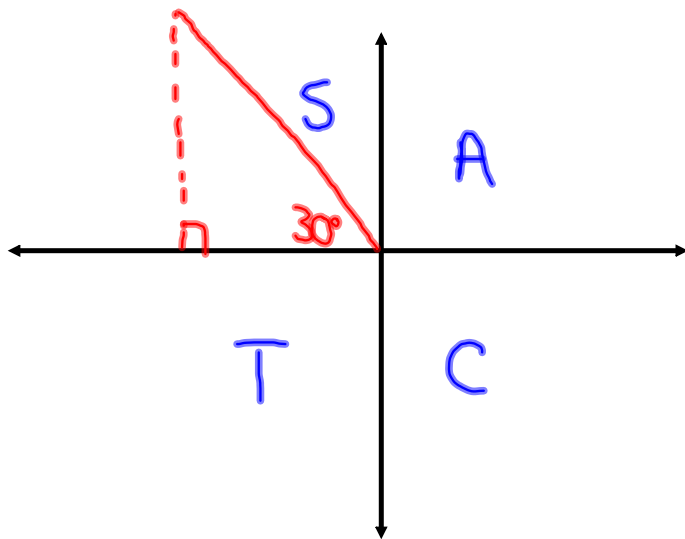
1. Start by sketching the angle



Extend the special angles into all FOUR quadrants

Without a calculator determine the value of $\sin 150^\circ = +\frac{1}{2}$

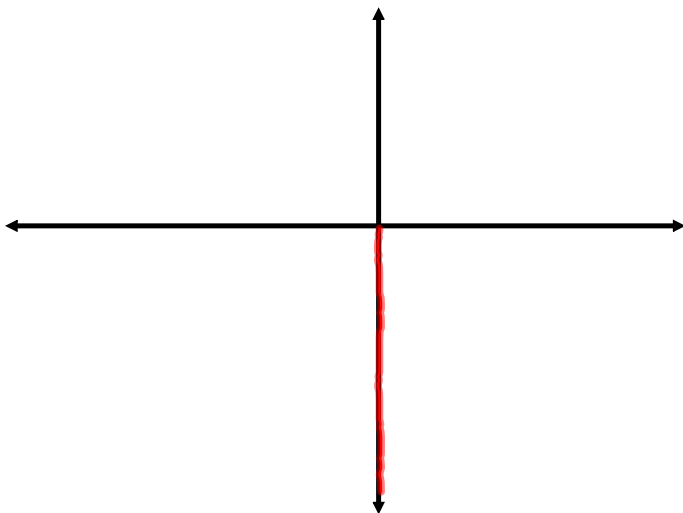
1. Start by sketching the angle



Extend the special angles into all FOUR quadrants

Without a calculator determine the value of $\csc 270^\circ = \frac{1}{-1} = -1$

1. Start by sketching the angle



Homework

Quiz:

- ① Principal Angles
- ② Coterminal Angles
- ③ Solving Trig Expressions (ie. $\tan 315^\circ$)

Coterminal Angles:

Ex: 30°

Positive: $390^\circ, 750^\circ, 1110^\circ$

Negative: $-330^\circ, -690^\circ, -1050^\circ$

Principal Angles:

20255°

$$\textcircled{1} 20255 \div 360 = 56.263\bar{8}$$

$$\textcircled{2} 56.263\bar{8} - 56 = 0.263\bar{8}$$

$$\textcircled{3} 0.263\bar{8} \times 360 = 95^\circ$$