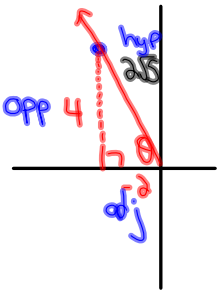
Another example to reinforce angles in all four quadrants

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.




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

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

$4+16=c^2$

$20=c^2$

$\pm\sqrt{20}=c$

$\sqrt{4\cdot5}=c$

$2\sqrt{5}=c$

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

$\cos\theta=\frac{-2}{2\sqrt{5}}=\frac{-1}{\sqrt{5}}\cdot\frac{\sqrt{5}}{\sqrt{5}}=\frac{-\sqrt{5}}{5}$

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

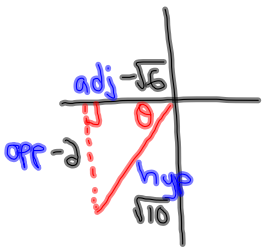
$\csc\theta=\frac{2\sqrt{5}}{4}=\frac{\sqrt{5}}{2}$

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

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

Example:

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




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

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

$a^2+4=10$

$a^2=6$

$a=\pm\sqrt{6}$

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

$\cos\theta=\frac{-\sqrt{6}}{\sqrt{10}}$

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

$\csc\theta=\frac{\sqrt{10}}{-2}$

$\sec\theta=\frac{\sqrt{10}}{-\sqrt{6}}$

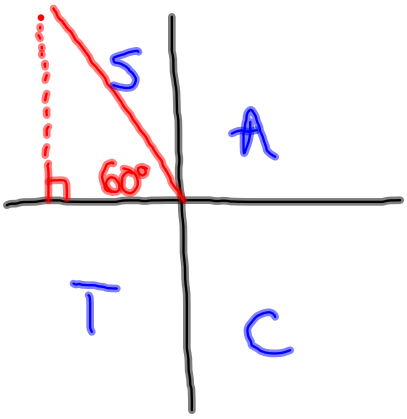
$\cot\theta=\frac{-\sqrt{6}}{-2}=\frac{\sqrt{6}}{2}$

In Simplest form

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

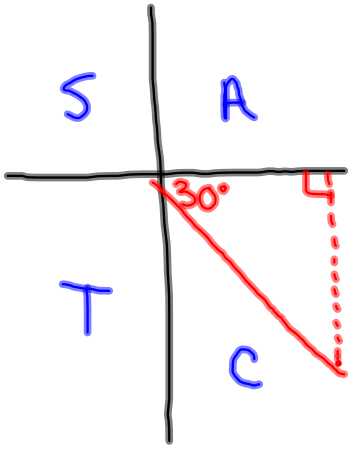
# Questions from homework

② a) $\cos 120° = -\frac{1}{2}$

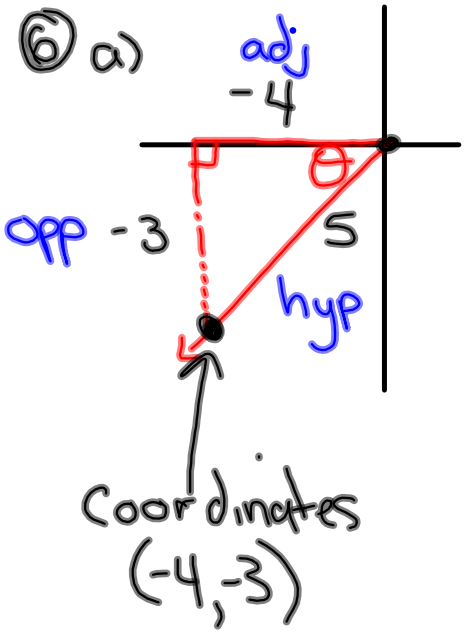



e) $\tan(-30°) = -\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$

330°




⑥ a)




Coordinates
(-4, -3)

Given:

$\tan\theta = \frac{3}{4}$ $\frac{opp}{adj}$

Find hypotenuse:

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

$(-4)^2 + (-3)^2 = c^2$

$16 + 9 = c^2$

$25 = c^2$

$\pm 5 = c$

$5 = c$

Reciprocal

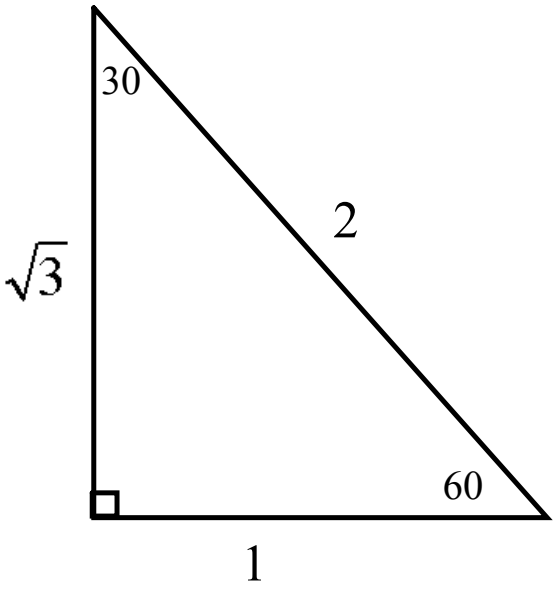
$\csc\theta = -\frac{5}{3}$

$\sec\theta = -\frac{5}{4}$

$\cot\theta = \frac{4}{3}$

# Special Angles

I. 30° *and* 60° **MEMORIZE THESE DIAGRAMS!!!**

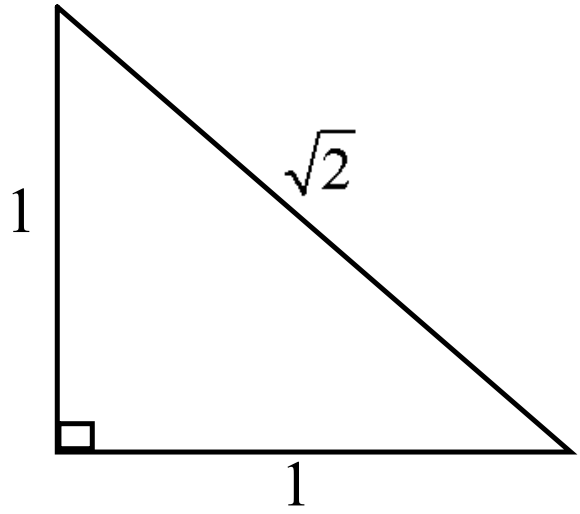



| | 30 | 60 |
|---|---|---|
| Sin | $\frac{1}{2}$ | $\frac{\sqrt{3}}{2}$ |
| Cos | $\frac{\sqrt{3}}{2}$ | $\frac{1}{2}$ |
| Tan | $\frac{\sqrt{3}}{3}$ | $\sqrt{3}$ |

# Special Angles

II. 45°

**MEMORIZE THESE DIAGRAMS!!!**

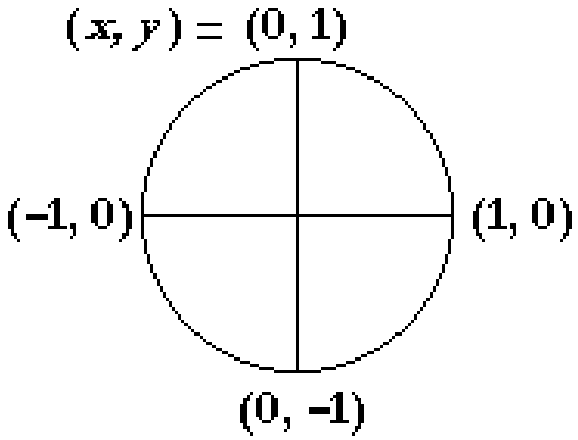



| | 45 |
|---|---|
| Sin | $\frac{\sqrt{2}}{2}$ |
| Cos | $\frac{\sqrt{2}}{2}$ |
| Tan | 1 |

# MEMORIZE THESE DIAGRAMS!!!

## III. Quadrantal Angles (Multiples of 90)

### Unit Circle

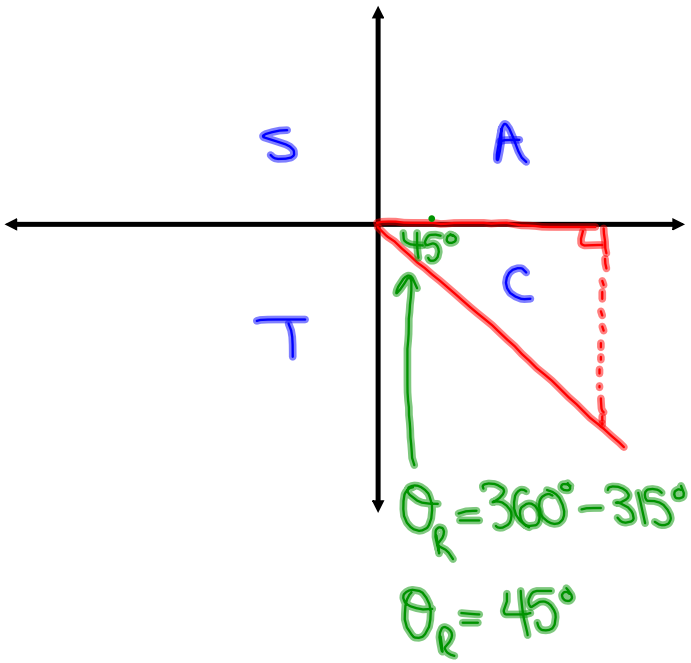



| | $0^0$ | $90^0$ | $180^0$ | $270^0$ | $360^0$ |
|---|---|---|---|---|---|
| sin | 0 | 1 | 0 | -1 | 0 |
| cos | 1 | 0 | -1 | 0 | 1 |
| tan | 0 | undefined | 0 | undefined | 0 |

# Extend the special angles into all FOUR quadrants

Without a calculator determine the value of $\tan 315°$ → $\frac{-1}{1}$ → $-1$

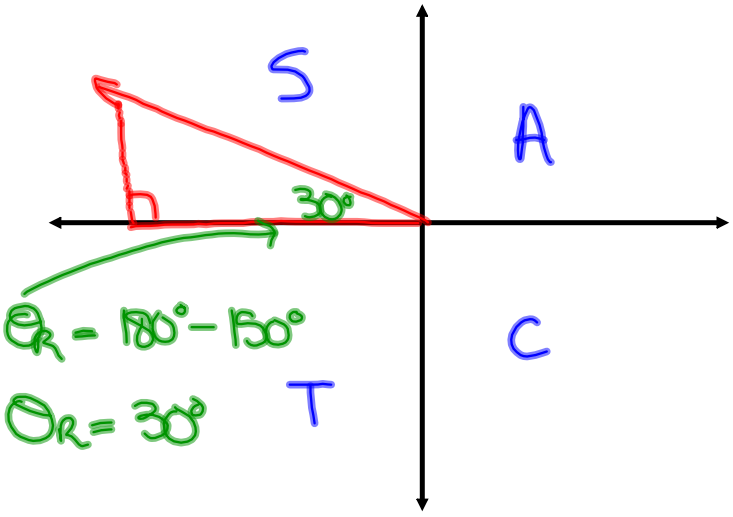
*1. Start by sketching the angle*



# Extend the special angles into all FOUR quadrants

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

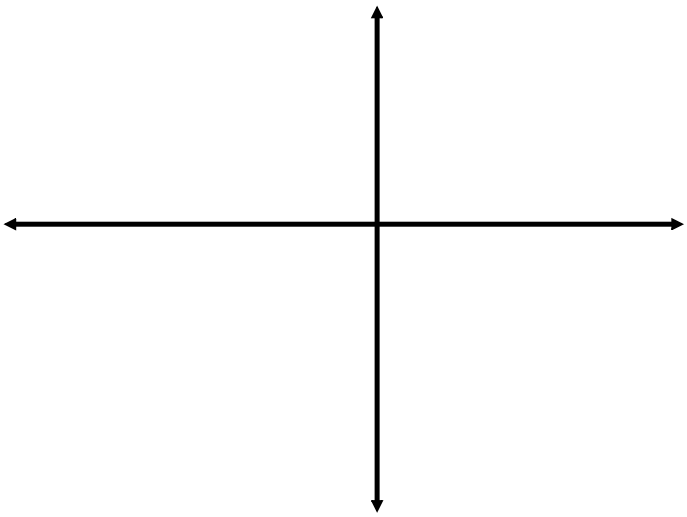
*1. Start by sketching the angle*



# Extend the special angles into all FOUR quadrants

Without a calculator determine the value of csc630

*1. Start by sketching the angle*



# Homework