Name: _____ Date: _____

Learning Goal 2.2	Using trigonometric ratios and solving simple trigonometric equations.

$\cos\theta = \frac{x}{r} = \frac{-2}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$

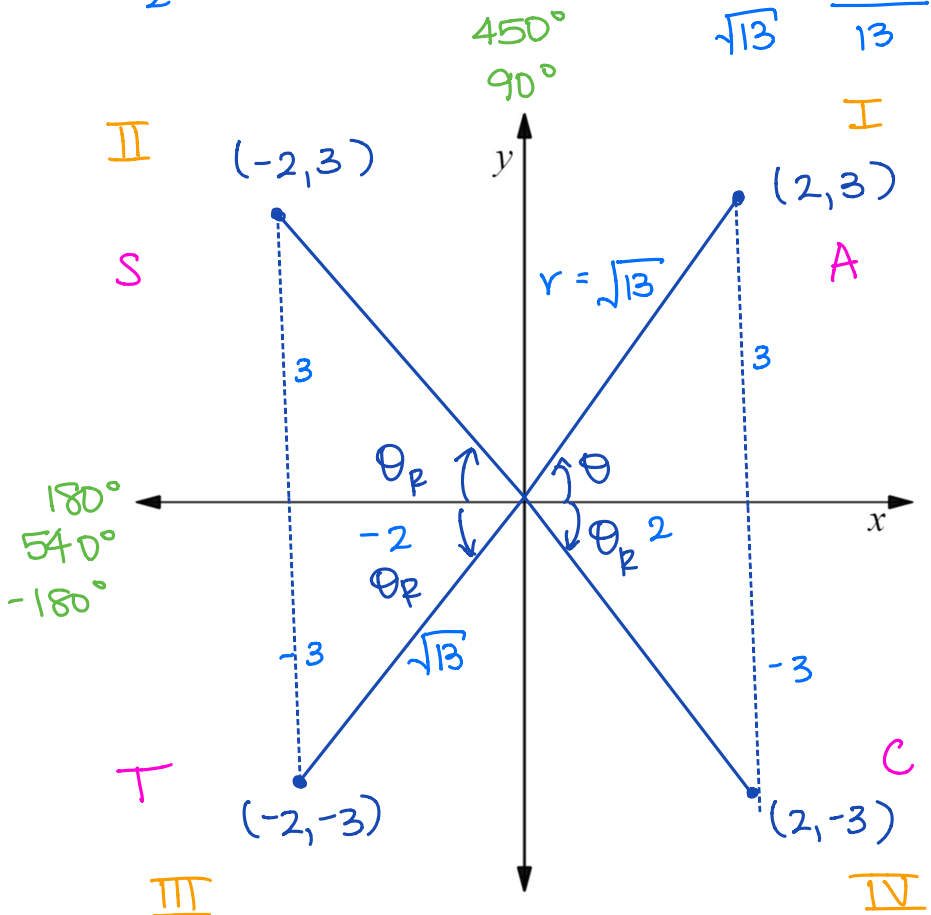
$\tan\theta = \frac{y}{x} = \frac{3}{-2}$

$\cos\theta = \frac{adj}{hyp} = \frac{x}{r} = \frac{2}{\sqrt{13}} = \frac{2\sqrt{13}}{13}$

$\sin\theta = \frac{opp}{hyp} = \frac{y}{r}$

$\tan\theta = \frac{opp}{adj} = \frac{y}{x} = \frac{3}{2}$

$r^2 = 2^2 + 3^2$
$= 4 + 9$
$= 13$
$r = \pm\sqrt{13}$



$\sin\theta = \frac{y}{r} = \frac{-3}{\sqrt{13}} = \frac{-3\sqrt{13}}{13}$

$\cos\theta = \frac{x}{r} = \frac{-2}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$

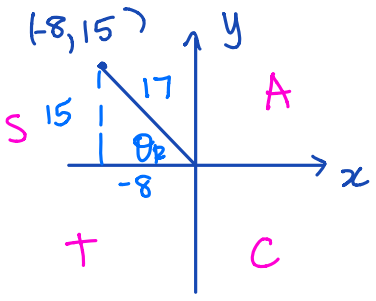
$\tan\theta = \frac{y}{x} = \frac{-3}{-2} = \frac{3}{2}$

$\sin\theta = \frac{y}{r} = \frac{-3}{\sqrt{13}} = \frac{-3\sqrt{13}}{13}$

$\cos\theta = \frac{x}{r} = \frac{2}{\sqrt{13}} = \frac{2\sqrt{13}}{13}$

$\tan\theta = \frac{y}{x} = \frac{-3}{2}$

Example The point $P(-8, 15)$ lies on the terminal arm of an angle θ, in standard position. Determine the exact trigonometric ratios for $\sin\theta$, $\cos\theta$ and $\tan\theta$.



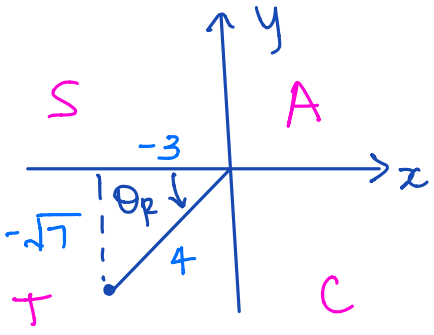
$\tan\theta = \tan\theta_R = -\frac{15}{8}$

$r^2 = (-8)^2 + 15^2$
$= 64 + 225$
$= 289$
$r = \sqrt{289} = 17$

$\sin\theta = \sin\theta_R = \frac{15}{17}$

$\cos\theta = \cos\theta_R = \frac{-8}{17}$

Example Suppose θ is an angle in standard position with terminal arm in quadrant III, and $\cos\theta = -\frac{3}{4}$. What are the exact values of $\sin\theta$ and $\tan\theta$?



$\cos\theta = \frac{adj}{hyp}$
$= \frac{x}{r}$
$= \frac{-3}{4}$

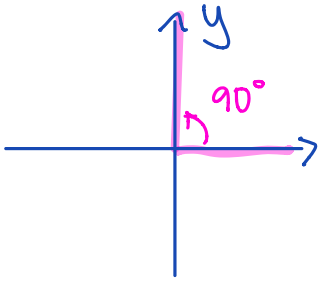
$\Rightarrow x = -3, r = 4$

$r^2 = x^2 + y^2$
$(4)^2 = (-3)^2 + y^2$
$16 = 9 + y^2$
$-9 \quad -9$
$7 = y^2$
$y = \pm\sqrt{7}$

$\sin\theta = \sin\theta_R$
$= \frac{y}{r}$
$= \frac{-\sqrt{7}}{4}$

$\tan\theta = \tan\theta_R$
$= \frac{y}{x}$
$= \frac{-\sqrt{7}}{-3}$
$= \frac{\sqrt{7}}{3}$

Example Determine the values of $\sin\theta$, $\cos\theta$ and $\tan\theta$ when the terminal arm of quadrantal angle θ coincides with the positive $y-$ axis.



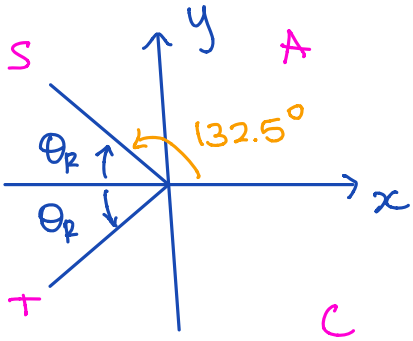
$r^2 = x^2 + y^2$
$r^2 = y^2$
$r = y$
$x = 0$

$\sin\theta = \frac{y}{r} = 1$

$\cos\theta = \frac{x}{r} = \frac{0}{r} = 0$

$\tan\theta = \frac{y}{x} = \frac{r}{0} = DNE$

Example Given $\cos\theta = -0.6753$ where $0° \le \theta < 360°$, determine the measure of θ to the nearest tenth of a degree.



$\cos\theta = -0.6753$
$\theta_1 = \cos^{-1}(-0.6753)$
$= 132.5° \Rightarrow$ II

$\theta_R = 180 - 132.5°$
$= 47.5°$

$\theta_2 = 180 + 47.5$
$= 227.5°$