**Before we begin, are there any questions from last day's work?**

# Today's Learning Goal(s):

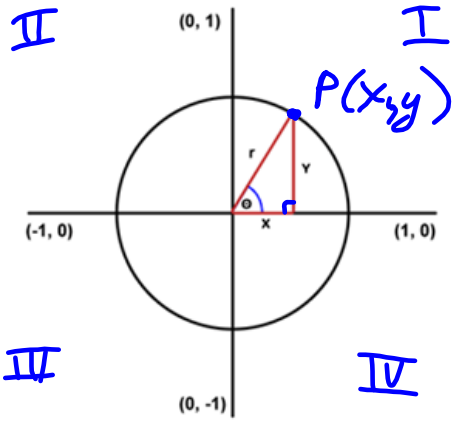
By the end of the class, I will be able to:

a) state the 3 primary trig ratios for an angle in standard position.

b) determine **exact** trig ratios given one trig ratio, or a point on the terminal arm.

4.1.1 Angles in Standard Position/The Primary Trigonometric Ratios Date: Apr. 3/17

Let P(x, y) represent a point on the terminal arm of θ.

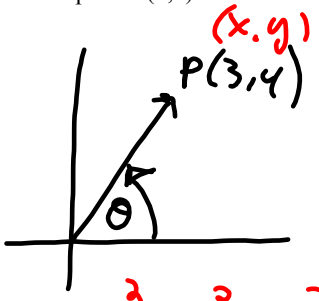



$x^2+y^2=r^2$ (PT)

$\sin\theta=\frac{y}{r}$ $\cos\theta=\frac{x}{r}$ $\tan\theta=\frac{y}{x}$

SYR CXR TYX

Ex. 1 The point P(3,4) lies on the terminal arm of θ. Determine the primary trig ratios.




SYR CXR TYX

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

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

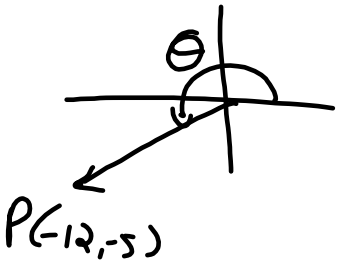
$=(3)^2+(4)^2$

$=9+16$

$=25$

$r=5$ ← r must be positive!

Ex. 2 The point P(-12, -5) lies on the terminal arm of θ. Determine the primary trig ratios.




$\sin\theta=\frac{y}{r}=\frac{-5}{13}$ $\cos\theta=\frac{x}{r}=\frac{-12}{13}$ $\tan\theta=\frac{y}{x}=\frac{-5}{-12}=\frac{5}{12}$

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

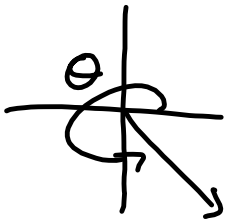
$=(-12)^2+(-5)^2$

$=144+25$

$r^2=169$

$r=13$ ↗

Ex. 3 Angle θ has its terminal arm in quadrant IV, and $\sin\theta = -\frac{4}{5}$. Determine cosθ and tanθ.




$\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$

$\sin\theta = \frac{-4}{5}$ $= \frac{3}{5}$ $= \frac{-4}{3}$

$= \frac{y}{r}$

$\therefore y = -4, r = 5$

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

$x^2 = r^2 - y^2$

$= (5)^2 - (-4)^2$

$= 25 - 16$

$x^2 = 9$

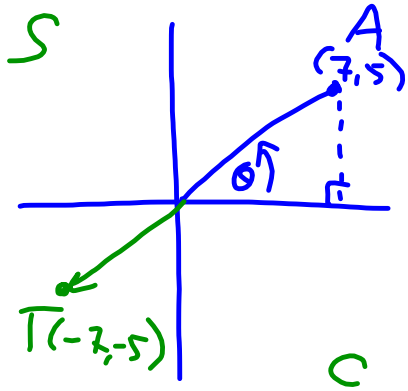
$x = \pm\sqrt{9}$

$x = \pm 3$

Since P(x,y) is in Quadrant IV

$\therefore x = 3$

Ex. 4 Angle θ is in standard position. If $\tan\theta = \frac{5}{7}$, determine sinθ and cos θ.




$\tan\theta = \frac{y}{x}$

$\therefore y = 5, x = 7$

$r^2 = 7^2 + 5^2$

$= 49 + 25$

$= 74$

$r = \sqrt{74}$

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$

$= \frac{5}{\sqrt{74}}$ $= \frac{7}{\sqrt{74}}$

or $\tan\theta = \frac{-5}{-7}$

$r^2 = (-7)^2 + (-5)^2$

$r = \sqrt{74}$

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$

$= \frac{-5}{\sqrt{74}}$ $= \frac{-7}{\sqrt{74}}$