Name: Kelly
CC ALGEBRA 2

Date: 1/8/18
TROICI

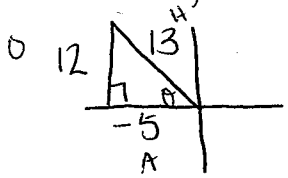
LESSON #5: THE PYTHAGOREAN IDENTITY

Do Now:

a. If $\cos\theta = -\frac{5}{13}$ and $\sin\theta > 0$, find $\sin\theta$. (Hint: Determine what Quadrant θ is in, and draw your "bowtie" triangle!)

$\cos\theta$ (−), $\sin\theta$ (+) → QII!

S A
T C



$(-5)^2 + x^2 = (13)^2$

$25 + x^2 = 169$

$\sqrt{x^2} = \sqrt{144}$

$x = 12$

$\sin\theta = \frac{12}{13}$

b. If $x^2 + y^2 = 25$ and $x = 4$, what does $y = ?$

$(4)^2 + y^2 = 25$

$16 + y^2 = 25$

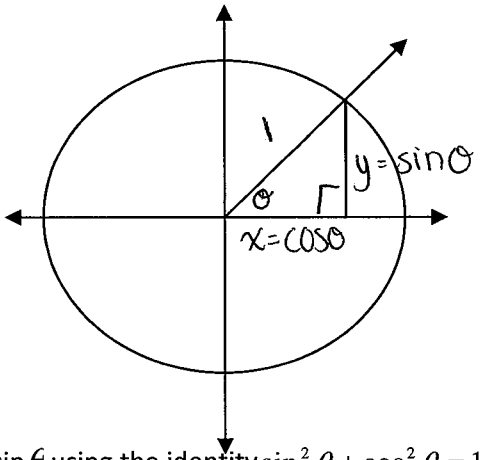
$\sqrt{y^2} = \sqrt{9}$

$y = 3$

Given the unit circle we can derive the MAIN TRIG IDENTITY!

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

$\cos^2\theta + \sin^2\theta = 1$



1) If $\cos\theta = -\frac{5}{13}$ and $\sin\theta > 0$, find $\sin\theta$ using the identity $\sin^2\theta + \cos^2\theta = 1$. (*Do Now question*)

still in QII → $\sin\theta$ (+)

$\left(-\frac{5}{13}\right)^2 + \sin^2\theta = 1$

$\frac{25}{169} + \sin^2\theta = \frac{169}{169}$

$-\frac{25}{169}$ $\quad -\frac{25}{169}$

$\sqrt{\sin^2\theta} = \sqrt{\frac{144}{169}}$

$\sin\theta = \frac{12}{13}$

2) If $\sin\theta = \frac{\sqrt{2}}{5}$, and $\frac{\pi}{2} < \theta < \pi$, find $\sec\theta$ using the identity $\sin^2\theta + \cos^2\theta = 1$.

↳ convert to degrees

$\frac{\pi}{2} \cdot \frac{180}{\pi} = 90°$ $\quad 90° < \theta < 180°$

$\frac{\pi}{1} \cdot \frac{180}{\pi} = 180°$ $\quad$ QII → sin (+), cos (−), sec (−)

$\left(\frac{\sqrt{2}}{5}\right)^2 + \cos^2\theta = 1$

$\frac{2}{25} + \cos^2\theta = 1$

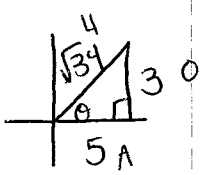
$\sqrt{\cos^2\theta} = \sqrt{\frac{23}{25}}$

$\cos\theta = \frac{\sqrt{23}}{5}$

$\boxed{\sec\theta = \frac{-5}{\sqrt{23}}}$

3) If $\tan\theta = 0.6$ and $< \theta$ is a positive acute angle, find $\cos\theta$ using the identity $\sin^2\theta + \cos^2\theta = 1$.

$\tan\theta = \frac{6}{10} = \frac{3}{5}$ QI!



$3^2 + 5^2 = x^2$

$9 + 25 = x^2$

$34 = x^2$

$x = \sqrt{34}$

$\sin^2\theta + \cos^2\theta = 1$

$\left(\frac{3}{\sqrt{34}}\right)^2 + \cos^2\theta = 1$

$\frac{9}{34} + \cos^2\theta = \frac{34}{34}$

$\sqrt{\cos^2\theta} = \sqrt{\frac{25}{34}}$

$\boxed{\cos\theta = \frac{5}{\sqrt{34}}}$

4) If $\csc\theta = -\frac{9}{4}$, and $\cos\theta < 0$, find the value of $\sec\theta$ using the identity $\sin^2\theta + \cos^2\theta = 1$.

$\sin\theta = \frac{-4}{9}$

S | A
T | C

↳ need cosθ going to be negative!

$\left(\frac{-4}{9}\right)^2 + \cos^2\theta = 1$

$\frac{16}{81} + \cos^2\theta = \frac{81}{81}$

$\sqrt{\cos^2\theta} = \sqrt{\frac{65}{81}}$

$\cos\theta = \frac{\sqrt{65}}{9}$

$\boxed{\sec\theta = -\frac{9}{\sqrt{65}}}$