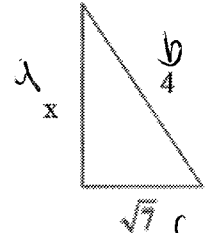
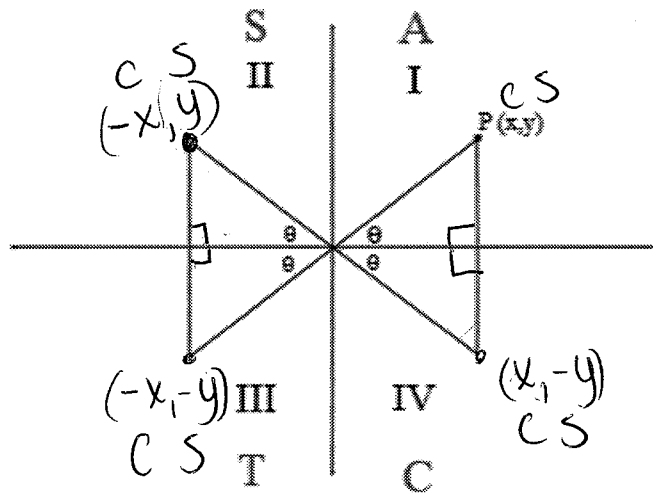


LESSON #3: BOWTIE PROBLEMS

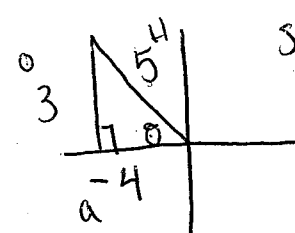
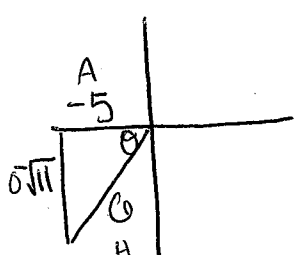
Do Now:

<p>1) Find the length of the missing side of the triangle</p>  $x^2 + (\sqrt{7})^2 = 4^2$ $x^2 + 7 = 16$ $\frac{-7 \quad -7}{x^2 = 9}$ $\boxed{x = 3}$	<p>2) What is the reciprocal of:</p> <p>a) $\sin \theta = \csc \theta$</p> <p>b) $\cos \theta = \sec \theta$</p> <p>c) $\tan \theta = \cot \theta$ or $\frac{\cos \theta}{\sin \theta}$</p>
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⊖ values left & down
 ⊕ values up & right



Hypotenuse is ALWAYS POSITIVE!

<p>1) If $\sin \theta = \frac{3}{5}$, and θ is in Quadrant II, find:</p>  <p>special right Δ's!</p> <p>a) $\cos \theta = -\frac{4}{5}$ FLIP d) $\sec \theta = -\frac{5}{4}$</p> <p>b) $\tan \theta = -\frac{3}{4}$ FLIP e) $\cot \theta = -\frac{4}{3}$</p> <p>*c) $\csc \theta = \frac{5}{3}$</p>	<p>2) If $\cos B = -\frac{5}{6}$, and B is in Quadrant III, find:</p>  $x^2 + (-5)^2 = 6^2$ $x^2 + 25 = 36$ $\frac{-25 \quad -25}{\sqrt{x^2} = \sqrt{11}}$ $x = \sqrt{11}$ <p>a) $\sin \theta = -\frac{\sqrt{11}}{6}$ d) $\csc \theta = -\frac{6}{\sqrt{11}}$</p> <p>*b) $\tan \theta = -\frac{\sqrt{11}}{-5} = \frac{\sqrt{11}}{5}$ e) $\cot \theta = \frac{5}{\sqrt{11}}$</p> <p>c) $\sec \theta = \frac{6}{-5}$</p>
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↳ only $\sin \theta$ & $\csc \theta$ are ⊕ in QII

↳ only $\tan \theta$ & $\cot \theta$ are ⊕ in QIII

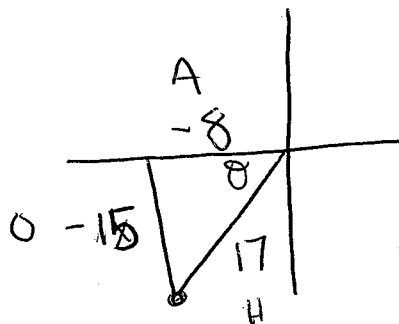
3) A circle centered at the origin has a radius of 17 units. The terminal side of an angle, θ , intercepts the circle in Quadrant III at point C. The x-coordinate of point C is -8. Draw a diagram and find the values of all 6 trig functions:

a) $\sin \theta = -\frac{15}{17}$

d) $\csc \theta = \frac{17}{-15}$

b) $\cos \theta = \frac{-8}{17}$

e) $\sec \theta = \frac{17}{-8}$



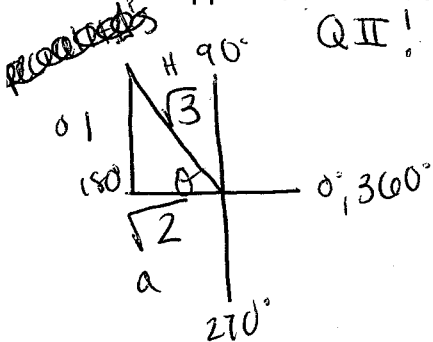
* c) $\tan \theta = \frac{-15}{-8} = \frac{15}{8}$

f) $\cot \theta = \frac{8}{15}$

$$\begin{aligned} x^2 + (-8)^2 &= 17^2 \\ x^2 + 64 &= 289 \\ x^2 &= 225 \\ x &= 15 \end{aligned}$$

↳ only tan is \oplus in QIII

4) Suppose $90^\circ < \theta < 180^\circ$ and $\csc \theta = \sqrt{3}$. What is the value of $\cos(\theta)$?



QII! $\sin \theta = \frac{1}{\sqrt{3}}$

$$x^2 + 1^2 = (\sqrt{3})^2$$

$$x^2 + 1 = 3$$

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

$$x = \sqrt{2}$$

$$\boxed{\cos \theta = \frac{\sqrt{2}}{\sqrt{3}}}$$

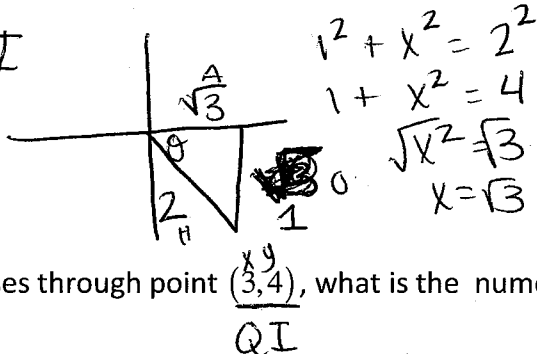
5) If $\sin(\theta) = 0.5$, and $\cos(\theta) > 0$, then what is $\cos \theta$?

convert to fraction!

$\sin \theta = \frac{1}{2}$

QIV

$$\boxed{\cos \theta = \frac{\sqrt{3}}{2}}$$



$$1^2 + x^2 = 2^2$$

$$1 + x^2 = 4$$

$$\sqrt{x^2} = \sqrt{3}$$

$$x = \sqrt{3}$$

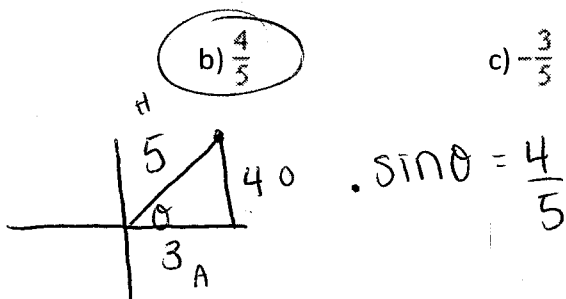
6) If the terminal side of angle θ , in standard position, passes through point $(3, 4)$, what is the numerical value of $\sin \theta$? Draw a diagram.

a) $\frac{3}{5}$

b) $\frac{4}{5}$

c) $-\frac{3}{5}$

d) $-\frac{4}{5}$



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

Practice:

7) If $\cos B = \frac{\sqrt{5} \cdot A}{3 \cdot H}$ and B is in Quadrant I, find:

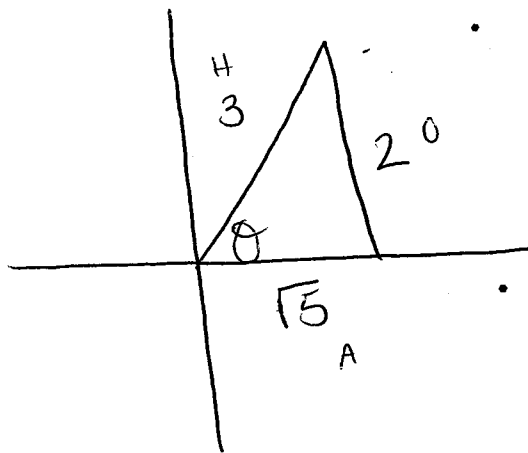
a) $\sin \theta = \frac{2}{3}$

c) $\csc \theta = \frac{3}{2}$

b) $\tan \theta = \frac{2}{\sqrt{5}}$

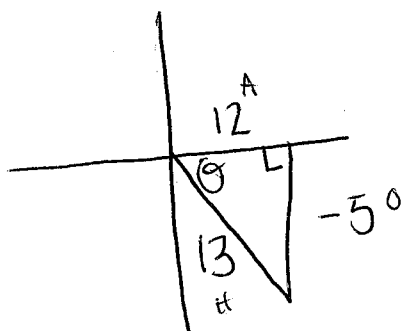
d) $\cot \theta = \frac{\sqrt{5}}{2}$

e) $\sec \theta = \frac{3}{\sqrt{5}}$



$$\begin{aligned} x^2 + (\sqrt{5})^2 &= 3^2 \\ x^2 + 5 &= 9 \\ \sqrt{x^2} &= \sqrt{4} \\ x &= 2 \end{aligned}$$

8) If $\tan \theta = \frac{-5}{12}$ and θ is in Quadrant IV, find $\csc \theta$



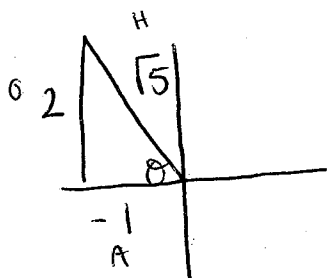
$$\begin{aligned} (-5)^2 + (12)^2 &= x^2 \\ 25 + 144 &= x^2 \\ \sqrt{169} &= \sqrt{x^2} \\ x &= 13 \end{aligned}$$

$$\sin \theta = \frac{-5}{13}$$

$$\boxed{\csc \theta = \frac{13}{-5}}$$

9) If $\sec B = -\sqrt{5}$, and B is in Quadrant II, find $\tan B$

$$\cos B = -\frac{1}{\sqrt{5}}$$



$$\begin{aligned} (-1)^2 + x^2 &= (\sqrt{5})^2 \\ 1 + x^2 &= 5 \\ x^2 &= 4 \\ x &= 2 \end{aligned}$$

$$\boxed{\tan B = \frac{2}{-1} = -2}$$

Name: _____

Date: _____

CC ALGEBRA 2

TROICI

LAB #15

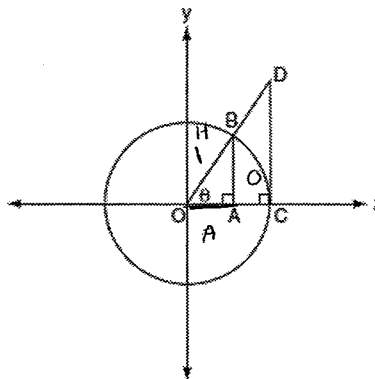
1) The accompanying diagram shows unit circle O , with radius $OB = 1$. Which line segment has a length equivalent to $\cos \theta$?

1) \overline{AB}

2) \overline{CD}

3) \overline{OC}

4) \overline{OA}



2) If the terminal side of angle θ , in standard position, passes through point $(-6, -8)$, what is the numerical value of $\sin \theta$? Draw a diagram.

1) $\frac{3}{5}$

2) $\frac{4}{5}$

3) $-\frac{3}{5}$

4) $-\frac{4}{5}$

3) Suppose $270^\circ < \theta < 360^\circ$ and $\sin(\theta^\circ) = -\frac{1}{\sqrt{2}}$. What is the value of $\cos(\theta^\circ)$?