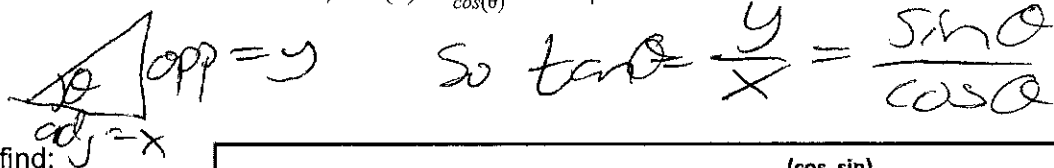


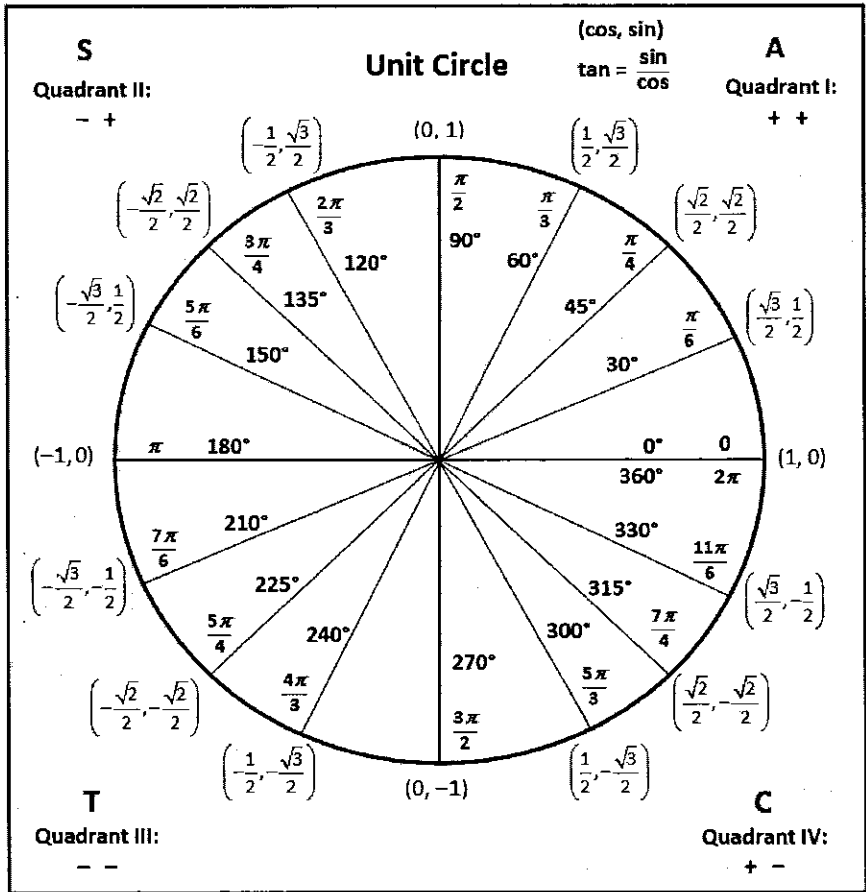
Recall that in a right triangle,  $\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}}$ .

1. Explain why, if  $\theta$  is a rotation on the unit circle,  $\tan(\theta) = \frac{\sin(\theta)}{\cos(\theta)}$ . Be specific.



2. Use the unit circle to find:

- a.  $\tan(45^\circ) = 1$
- b.  $\tan(60^\circ) = \sqrt{3}$
- c.  $\tan(\frac{3\pi}{4}) = -1$
- d.  $\tan(270^\circ) = -\infty$
- e.  $\tan(\frac{7\pi}{6}) = -\frac{1}{\sqrt{3}}$
- f.  $\tan(-45^\circ) = -1$
- g.  $\tan(-120^\circ) = \sqrt{3}$
- h.  $\tan(-\pi) = 0$



3. Use the unit circle to solve each equation for  $\theta$ :

- a.  $\tan(\theta) = \sqrt{3}, 0 \leq \theta \leq 360$   
 $60^\circ \text{ \& } 240^\circ$
- b.  $\tan(\theta) = 0, -\pi \leq \theta \leq \pi$   
 $-\pi, 0, \pi$
- c.  $\tan(\theta) = \infty, -360 \leq \theta \leq 0$   
 $-270^\circ$
- d.  $\tan(\theta) = 1, -360 \leq \theta \leq 720$

$-315^\circ, -135^\circ, 45^\circ, 225^\circ, 405^\circ, 585^\circ$

4. Fill in the following table. Use your answers to draw a graph of sine, cosine, and tangent.

$\theta$	0	30	45	60	90
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
$\sin\theta$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\tan\theta$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$\infty$

<p><math>y = \cos\theta</math></p> <p>Domain: <math>(-\infty, \infty)</math></p> <p>Range: <math>[-1, 1]</math></p> <p>Period: 360</p>	
<p><math>y = \sin\theta</math></p> <p>Domain: <math>(-\infty, \infty)</math></p> <p>Range: <math>[-1, 1]</math></p> <p>Period: 360</p>	
<p><math>y = \tan\theta</math></p> <p>Domain: <math>(-\infty, \infty) / x \neq 90^\circ \pm 180n</math></p> <p>Range: <math>(-\infty, \infty)</math></p> <p>Period: 180</p>	

5. Explain, using the unit circle, why the y-intercept for cosine is (0,1), but the y-intercept for sine AND tangent is (0,0).  
 $\cos\theta = x\text{-value}$  At  $\theta = 0, x=1, y=0$   
 $\sin\theta = y\text{-value}$  So  $\tan = \frac{0}{1} = 0$
6. What Algebra 1/2 concept is equivalent to tangent? Why is the period for tangent DIFFERENT?

Slope Because the slope repeats twice as fast.