Name:_____

Partner's Names:_____

Recitation Week 3: Trig!

Directions: Below are the questions for the activity. The triangles will say something like "Question 1". You will answer Question 1 below and look for the answer on a different triangle. When you are finished, you should have 3 tetrahedrons. If you want a hint, some questions will have a helpful hint on the back. Also, for an extra challenge, there are 6 additional questions for another tetrahedron. Good Luck!

Question 1) What is the exact value of $(\cos(\frac{5\pi}{12}) + \sin(\frac{5\pi}{12}))(\cos(\frac{5\pi}{12}) - \sin(\frac{5\pi}{12}))$?

Question 2) What is the exact value of $\sin(15°)\cos(15°)$?

Question 3) Given $\cos\theta = \frac{3}{5}$ and $\sin\theta < 0$, what is $\sin(2\theta)$?

Question 4) If $\cos(2\theta) = \frac{4}{5}$ and $\theta \in (\frac{\pi}{2}, \pi)$ what is $\cos\theta$?

Question 5) Given $\sin(\frac{\theta}{2}) = \frac{3}{5}$, what is $\cos\theta$?

Question 6) If $\sin(\frac{\theta}{2}) = \frac{3}{5}$, what is $\sin\theta$?

Question 7) If $\cos(\frac{\theta}{2}) = \frac{5}{13}$, what is $\sin\theta$?

Question 8) What is the exact value of $\cos(\frac{11\pi}{12})\cos(\frac{5\pi}{12}) - \sin(\frac{11\pi}{12})\sin(\frac{5\pi}{12})$

Question 9) What is the exact value of $\cos(\frac{7\pi}{12})\cos(\frac{5\pi}{3}) - \sin(\frac{7\pi}{12})\sin(\frac{5\pi}{3})$

Question 10) Given $\sin\theta = \frac{4}{5}, \theta \in (\frac{\pi}{2}, \pi), \cos\phi = -\frac{5}{13}$ and $\phi \in (\pi, \frac{3\pi}{2})$, what quadrant is $\theta + \phi$ in?

Question 11) What is the exact value of $\sin(75°)$

Question 12) What is the exact value of $\sin(\frac{7\pi}{12})\cos(\frac{5\pi}{6}) - \cos(\frac{7\pi}{12})\sin(\frac{5\pi}{6})$

Question 13) Given $\sin\theta = \frac{4}{5}, \theta \in (\frac{\pi}{2}, \pi), \cos\phi = -\frac{5}{13}$ and $\phi \in (\pi, \frac{3\pi}{2})$, what quadrant is $\theta - \phi$ in?

Question 14) If a $45-45-90$ triangle has a hypotenuse length of 6, what is the leg length?

Question 15) If a $30-60-90$ triangle has a short length of $5\sqrt{3}$, what is the length of the other length?

Question 16) If the short leg of $30-60-90$ triangle is 5 and the leg of a $45-45-90$ triangle is also 5 which triangle has the SHORTER perimeter? For ease of calculation, you may use $\sqrt{2} \approx 1.41$ and $\sqrt{3} \approx 1.73$

Question 17) If the hypotenuse of a $30-60-90$ triangle is 10 and the hypotenuse of a $45-45-90$ triangle is also 10, which triangle has the LARGER area?

Hint 1) Have fun with some algebra!

Hint 2) What identity does this look like?

Hint 3) Which quadrant is this in?

Hint 4) Which quadrant is this in?

Hint 5) Which quadrant is this in?

Hint 6) What identity relates $\sin\theta$ and $\cos\theta$?

Hint 7) What identity relates $\sin\theta$ and $\cos\theta$?

Hint 8) What identity does this look like?

Hint 9) What identity does this look like?

Hint 10) What are the signs of $\sin(\theta+\phi)$ and $\cos(\theta+\phi)$?

Hint 11) $135-60=75$

Hint 12) What identity does this look like?

Hint 13) What are the signs of $\sin(\theta-\phi)$ and $\cos(\theta-\phi)$?

Hint 14) Remember your special right triangles!

Hint 15) Remember your special right triangles!

Hint 16) Remember your special right triangles!

Hint 17) Remember your special right triangles!

Challenge 1) Use the angle addition or subtraction formula(s) to determine the exact value of $\tan(\frac{7\pi}{12})$
(Hint: What is $\sin(\frac{7\pi}{12})$? $\cos(\frac{7\pi}{12})$? How will those help here?)

Challenge 2) What is the general form for $\tan(\theta+\phi)$?

Challenge 3) What is the general form for $\tan(2\theta)$?

Challenge 4) What is the general form for $\tan(\frac{\theta}{2})$?

Challenge 5) Is $\cos(\frac{\pi}{2})$ defined? Why?

Challenge 6) Is $\tan(\frac{\pi}{2})$ defined? Why?