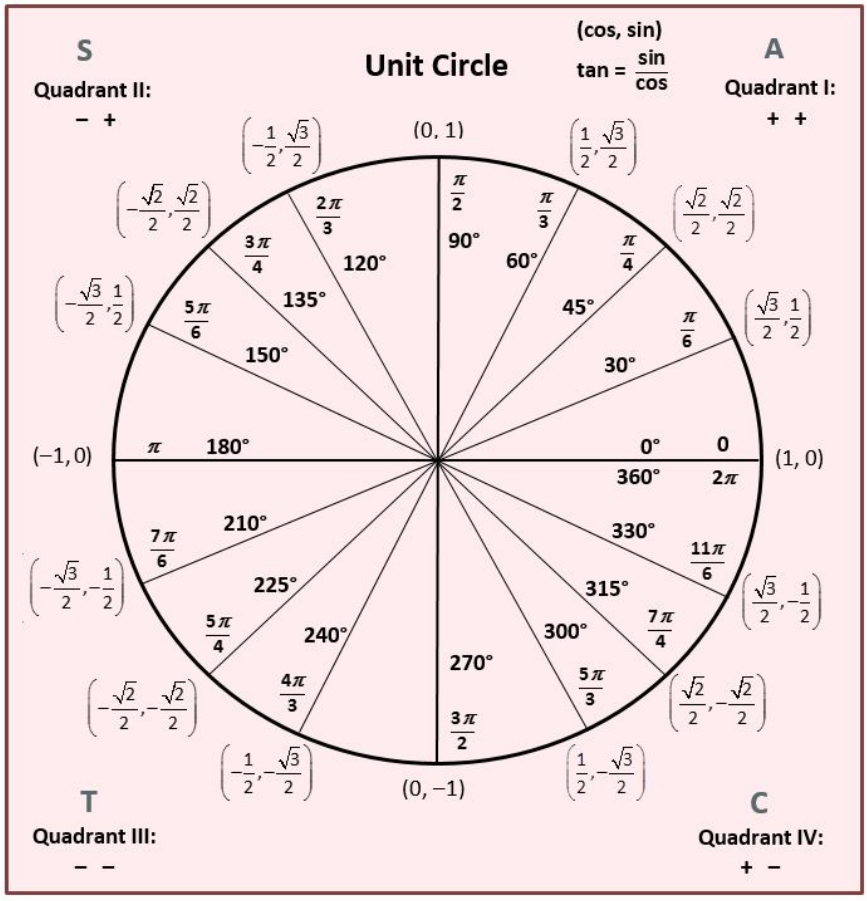
CCSS Algebra 4 Tangent on the Unit Circle

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

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

2. Use the unit circle to find:
   a. $tan(45^o)$
   b. $tan(60^o)$
   c. $tan(\frac{3\pi}{4})$
   d. $tan(270^o)$
   e. $tan(\frac{7\pi}{6})$
   f. $tan(-45^o)$
   g. $tan(-120^o)$
   h. $tan(-\pi)$



3. Use the unit circle to solve each equation for θ:
   a. $tan(\theta) = \sqrt{3}, \quad 0 \le \theta \le 360$
   b. $tan(\theta) = 0, \quad -\pi \le \theta \le \pi$
   c. $tan(\theta) = \infty, \quad -360 \le \theta \le 0$
   d. $tan(\theta) = 1, \quad 0 \le \theta \le 360$

4. Tangent and Linear Equations
   a. What is the equation of the line that connects the origin to $(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$?

   b. What is $tan(\pi/4)$?

   c. How are the answers to (a) and (b) related?

   d. What is the equation of the line that connects $(\frac{1}{2}, \frac{-\sqrt{3}}{2})$ to $(\frac{-1}{2}, \frac{\sqrt{3}}{2})$?

   e. What is $tan(5\pi/3)$? What is $tan(2\pi/3)$?

   f. How are the answers to (d) and (e) related?

   g. Write notes about how tangent is related to a linear equation.

5. Segments Tangent to the Unit Circle: Recall that in a right triangle, $tan(\theta) = \frac{opposite}{adjacent}$

a. Which trigonometric function gives the length of QR?

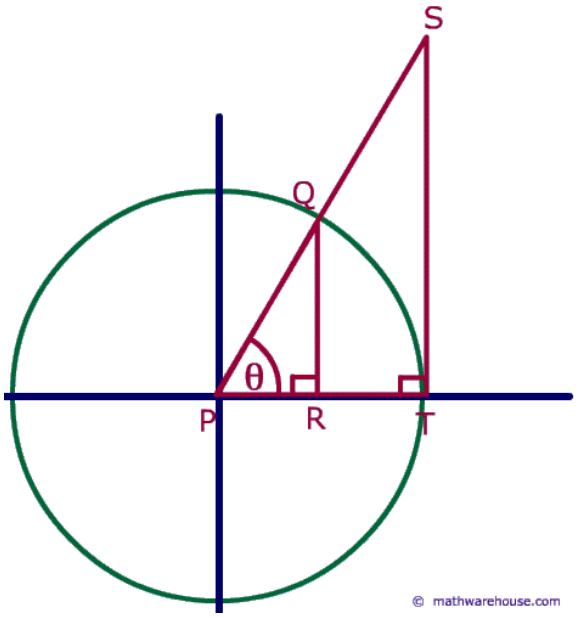
b. Which trigonometric function gives the length of PR?

c. What is the length of QP?

d. What is the length of PT?

e. Name two segments that are **opposite** to θ

f. Name two segments that are **adjacent** to θ



g. Thus, what is the length of ST?

h. Write notes about what tangent tells you about the unit circle.