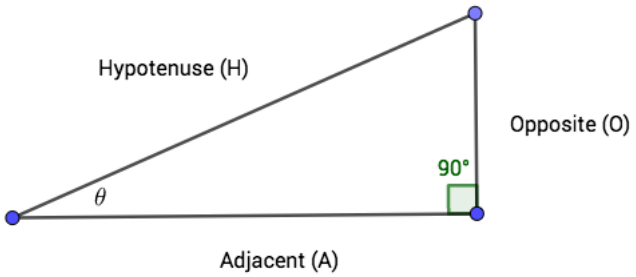
Name:_____

Notesheet. Section 12.2: Trigonometric Functions

Math 1220

Definition 1. Given a right triangle with angle θ marked below, we define our trigonometric functions as follows:

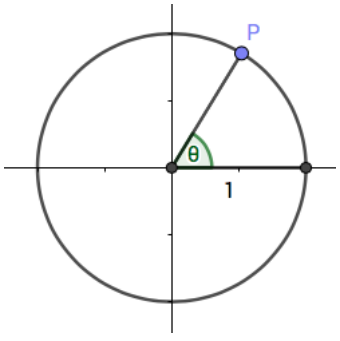
- $\sin\theta =$
- $\cos\theta =$
- $\tan\theta =$
- $\csc\theta =$
- $\sec\theta =$
- $\cot\theta =$



Useful mnemonic: SOHCAHTOA

Challenge 2. Consider a right triangle with $O = 5, A = 12$. What is $\sin\theta$ equal to? What is $\cos\theta$ equal to?

Theorem 3. Let $P = (x, y)$ be a point on the unit circle with angle θ from the x-axis. Then,



Challenge 4. If $\theta = \dfrac{\pi}{4}$ radians, then $P = \left(\dfrac{\sqrt{2}}{2}, \dfrac{\sqrt{2}}{2}\right)$. If $\theta = \dfrac{\pi}{6}$, then $P = \left(\dfrac{\sqrt{3}}{2}, \dfrac{1}{2}\right)$.

(a) Using geometry, figure out the (x, y)-coordinates of P when $\theta = \dfrac{\pi}{3}$. Hint: Draw a picture!

(b) What are the (x, y)-coordinates of P when $\theta = -\dfrac{7\pi}{6}$? What about when $\theta = \dfrac{11\pi}{4}$? Hint: $-\dfrac{7\pi}{6} = -\pi - \dfrac{\pi}{6}$.

Theorem 5 (Useful properties of sine and cosine)**.** (a) For any value of θ, $\sin\theta$ and $\cos\theta$ are bounded by the inequalities

(b) $\sin(\theta + 2\pi) =$ $\cos(\theta + 2\pi) =$

(c) The graphs of $\sin\theta$, $\cos\theta$, and $\tan\theta$ are given by

(d) $\sin(-\theta) =$, $\sin\theta = 0 \iff$

(e) $\cos(-\theta) =$, $\cos\theta = 0 \iff$

(f) $\tan(-\theta) =$, $\tan\theta = 0 \iff$, $\tan(\theta + \pi) =$

Challenge 6. Find all values of θ such that $\csc\theta = -2$.