Lesson 66 Objective: SWBAT use the unit circle to determine points and trig fucntions.

Kickoff- Convert each of the following to radians and find the complementary and supplementary angles in radians.

1) 65° $\frac{\pi}{180} = \frac{13}{36}\pi$

Com. → 90° → $\frac{\pi}{2}$

$\frac{\pi}{2} - \frac{13}{36}\pi = \frac{5}{36}\pi$

Supp → 180° → π

$\pi - \frac{13}{36}\pi = \frac{23\pi}{36}$

2) 24° $\frac{\pi}{180} \to \frac{2\pi}{15}$

Com

$\frac{\pi}{2} - \frac{2}{15}\pi = \frac{11\pi}{30}$

Supp →

$\pi - \frac{2}{15}\pi = \frac{13}{15}\pi$

Unit Circle's

Try This: Solve for x in each of the following:

1) H, 15, O, x, 7, A

$\cos x = \frac{7}{15}$

$x = 62.2$

2) 41°, 21.5, H, O, x

$\tan(41) = \frac{x}{21.5}$

$21.5\tan(41) = x$

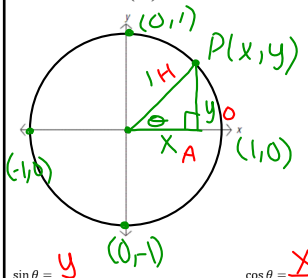
$x = 18.7$

3) 10, 21, x

$\sin x = \frac{10}{21}$ $\sin^{-1}$

$x = 28.4$

Unit Circle- *Center (0,0) with radius 1*



Some Greek Letters Used

- θ Theta
- β Beta
- σ Sigma
- φ Phi

Angles!

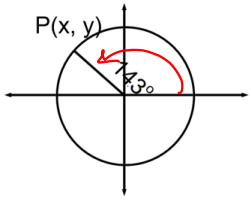
$\sin\theta = \frac{y}{1}$ $\cos\theta = \frac{x}{1}$ $\tan\theta = \frac{y}{x}$

$\sin\theta = y$ $\cos\theta = x$ $\frac{\sin\theta}{\cos\theta} = \tan\theta = \frac{y}{x}$

In conclusion, any point on the unit circle can be represented by (x,y) = $(\cos\theta, \sin\theta)$ and $Tan\theta = \frac{y}{x}$ or $\frac{\sin\theta}{\cos\theta}$

Examples:

1) Find the P(x, y) that is located on the unit circle, to the nearest tenth.



$x = \cos\theta$

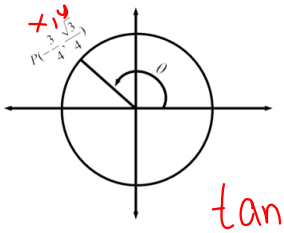
$\cos(143) = -.8$

$y = \sin\theta$

$\sin(143) = .6$

$(-.8, .6)$

2) Find $\sin\theta$, $\cos\theta$, *and* $\tan\theta$ if point P is on the unit circle.



$x = \cos\theta = -\frac{3}{4}$

$y = \sin\theta = \frac{\sqrt{3}}{4}$

$\tan\theta = \frac{y}{x} = \frac{\sin\theta}{\cos\theta} = \frac{\frac{\sqrt{3}}{4}}{-\frac{3}{4}}$

$\frac{\sqrt{3}}{4} \cdot -\frac{4}{3} = -\frac{\sqrt{3}}{3}$

3) If θ is an angle in standard position, determine to the nearest tenth the coordinate of the point where the terminal side intersects the unit circle.

$\theta = \frac{\pi}{12}$

*Change mode!

(x, y)

$(\cos\theta, \sin\theta)$

$\cos(\frac{\pi}{12}) = 1.0$

$\sin(\pi/12) = .3$

$(1.0, .3)$

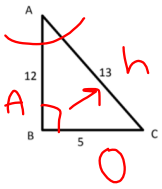
Reciprocal Trig Functions

Recall, to find the reciprocal of a number you must flip ____ the given fraction.

Reciprocal Trig Functions

- Sine and Cosecant are reciprocals — Sin θ → CSC θ
- Cosine and Secant are reciprocals — Cos θ → sec θ
- Tangent and Cotangent are reciprocals — Tan θ → cot θ

Example #1: Given ΔABC, find the following ratios.

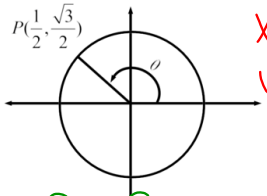


$\sin A = \frac{5}{13}$ $\quad \csc A = \frac{13}{5}$

$\cos A = \frac{12}{13}$ $\quad \sec A = \frac{13}{12}$

$\tan A = \frac{5}{12}$ $\quad \cot A = \frac{12}{5}$

Example#2: Find all the 6 trig functions using point p on the graph.



$x = \cos\theta = \frac{1}{2}$

$y = \sin\theta = \frac{\sqrt{3}}{2}$

$\tan\theta = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{1}$

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

$\csc\theta = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

$\cot\theta = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$