Unit Circle

Lesson Vocabulary

<u>Unit Circle</u> - Has a radius of <u>1</u> with the center at the origin of the x- and y-axis. The coordinates are <u>NOT</u> (x,y), they are (cos θ, sin θ) θ - greek letter for theta that represents an angle in the unit circle.
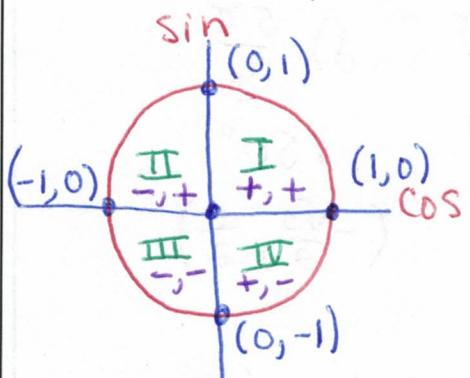
- All ∠'s are central ∠'s
- Start at (1,0)
- move counterclockwise
- Can have negative degrees (clockwise)

4 units of measure of an angle

- Degrees - inner most labeling of the circle
- Radians - unit that includes π. It's measuring the distance traveled of an ∠.
- Exact Values - Found by using trig functions.
- Coordinates (cos θ, sin θ) - Decimal version of the exact values.

Finding Coordinates of an angle

1. Draw a circle with given radius
2. Skecth the angle - calculate the ∠ needed
3. From the point on the circle of the angle, draw a perpendicular line to the x-axis.
4. Use appropriate trig function to find the length of the two legs of the triangle.

This gives you the coordinates.

ex.) Find the radians and exact values.

a) $240°$ b) $-120°$ c) $-45°$ d) $180°$

$\frac{4\pi}{3}$ $-\frac{2\pi}{3}$ $-\frac{\pi}{4}$ π

$\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$ $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$ $\left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$ $(-1, 0)$

ex.) Find the degrees and exact values.

a) $\frac{\pi}{3}$ b) $-\frac{11\pi}{6}$ c) $-\frac{3\pi}{2}$ d) $\frac{5\pi}{6}$

$60°$ $-330°$ $-270°$ $150°$

$\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ $(0, 1)$ $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

ex.) Find the coordinates of a point with an an angle of rotation $\theta = 110°$ and a radius of 1.
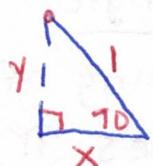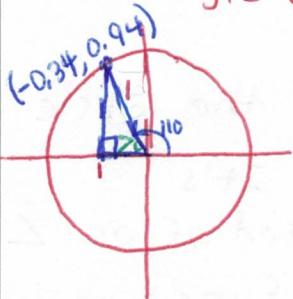
$(-0.34, 0.94)$

$\cos 70° = \frac{x}{1}$ $\sin 70° = \frac{y}{1}$

$0.34 = x$ $0.94 = y$

$(-0.34, 0.94)$

$180 - 110 = 70°$

* cos coordinate in II, x is neg.

b) What are the coordinates of the point after being reflected over the y-axis and over the x and y-axis?

y-axis:
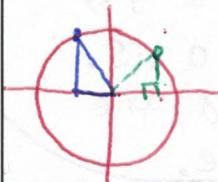
 $(0.34, 0.94)$

x- and y-axis:

 $(0.34, -0.94)$