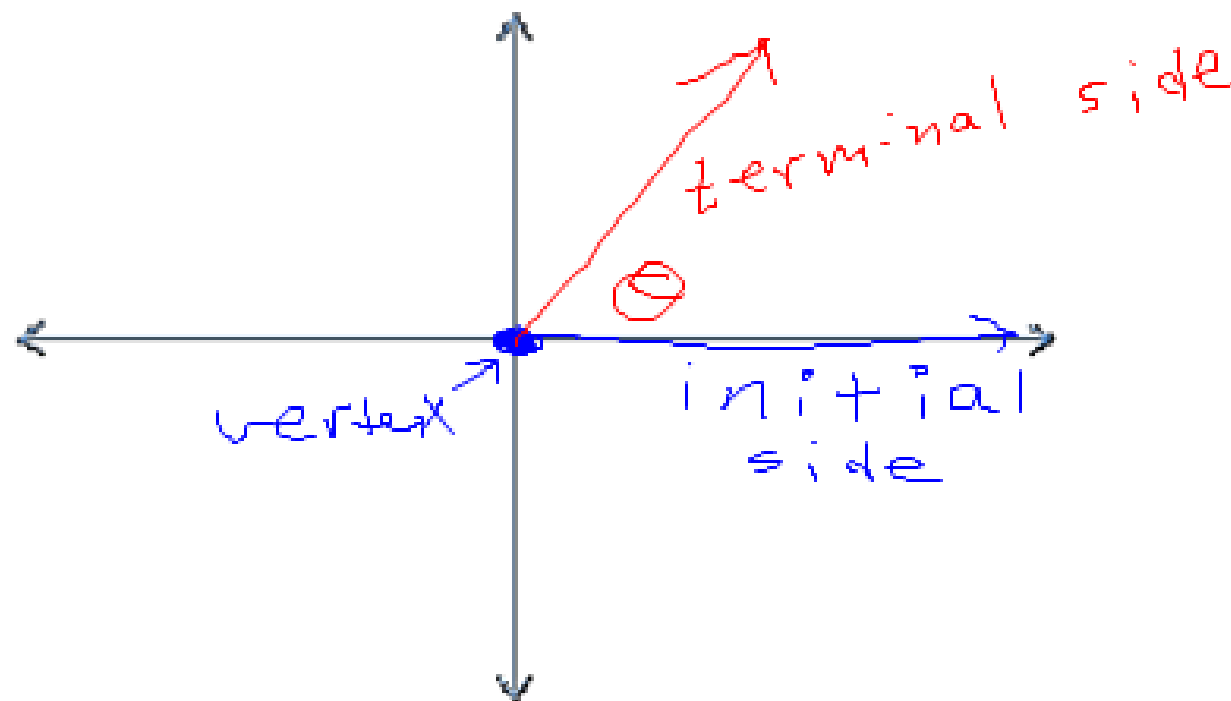


# **All About Angles:**

Their Measure and  
Representation

The standard position of an angle throughout all mathematics (not just trig) has its **vertex at the origin** and **initial side on the positive x-axis**. The other side is called the **terminal side**.



**We typically denote angles by the Greek letter theta,  $\theta$ , but occasionally we use other letters like alpha, beta, ...**

$\theta$  - theta

$\alpha$  - alpha

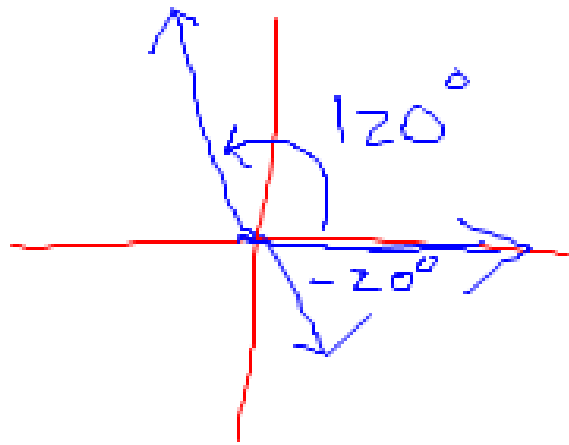
$\beta$  - beta

X

Note that **positive angles** rotate **counter clock-wise**.

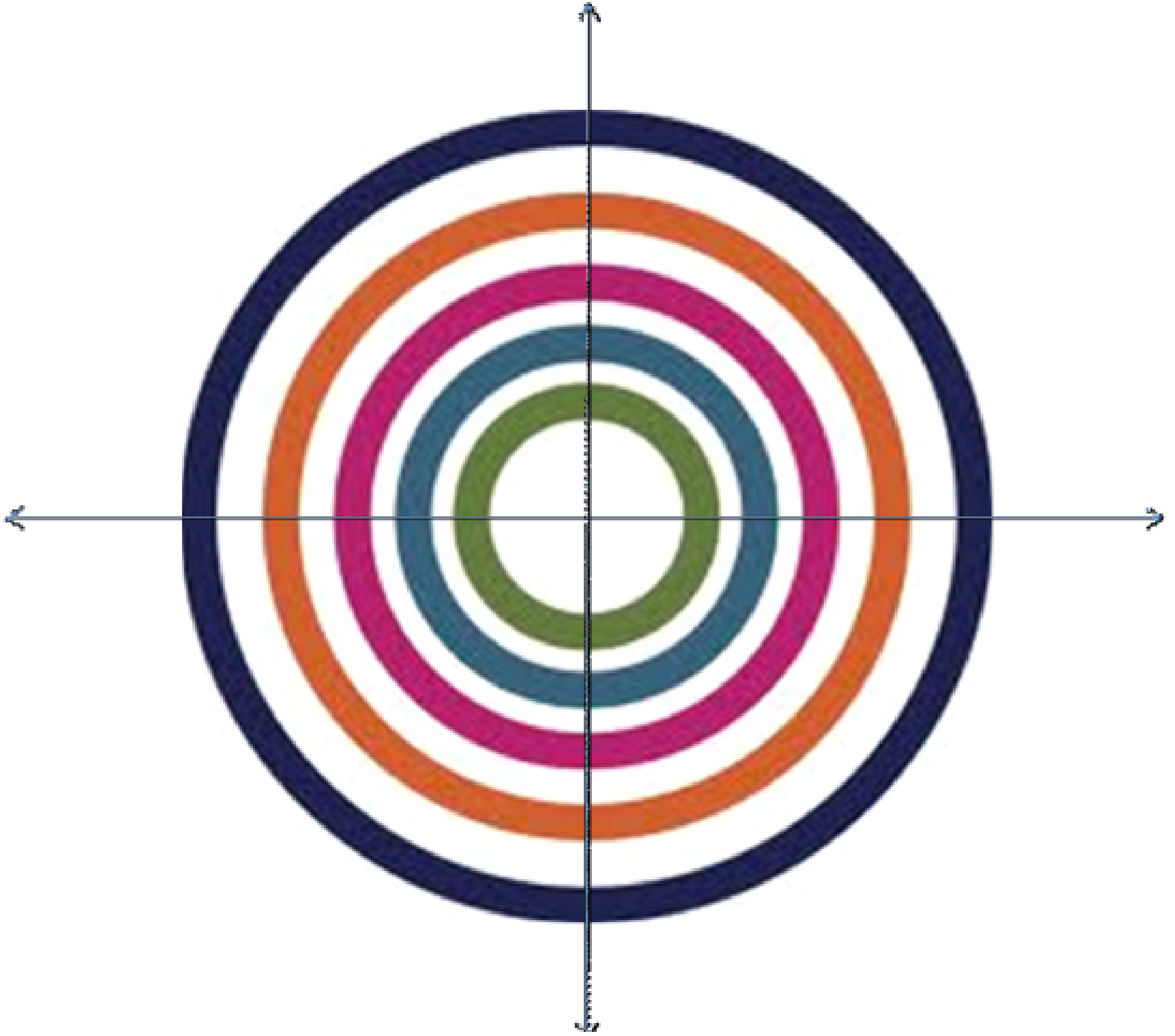
Thus negative angles rotate clockwise.

The sign simply indicates direction.



**There are two units of measure for angles with which we should be familiar.**

- Degrees ...  $360^\circ$  in a full circle.**
- Radians ...  $2\pi$ (radians)  $\approx 6.28$  in a full circle**



Example 1: What is the radian equivalent to  $180^\circ$ ?

$$\pi$$

Example 2: What is the radian equivalent to  $90^\circ$ ?

$$\frac{\pi}{2}$$

To convert from degree measure to radian measure and vice versa, multiply by a ratio using the following two numbers (180° and  $\pi$ )

**Example 3: Convert 38° into radians.**

$$38^\circ \cdot \frac{\pi}{180^\circ} = \frac{19\pi}{90} \text{ radians} \approx 0.663 \text{ radians}$$

**Example 4: Convert  $2\pi/7$  radians to degrees.**

$$\frac{2\pi}{7} \cdot \frac{180^\circ}{\pi} = 51.43^\circ$$



Each decimal portion of a degree can be broken up into **minutes** and **seconds**. These are **angular measures, not time**, although the analogy is certainly there. This conversion can be preformed by division, or with TI technology.

$$1 \text{ degree} = 60 \text{ minutes}$$

$$1 \text{ minute} = 60 \text{ seconds}$$

**Example 5:** Express an angle of 14 degrees, 57 minutes and 32 seconds in decimal form.

$$14.96^\circ$$

**Example 6:** Convert  $123^\circ 5' 49''$  into decimal form. decimal part

$$123. \underline{097}$$

**Example 7:** Convert  $86.725^\circ$  into DMS.

2nd  
Apps

→ DMS

86<sup>°</sup> 43<sup>'</sup> 30<sup>"</sup>

**Example 8:** Convert  $238.458^\circ$  into degrees, minutes, and seconds.

$$238^\circ \quad \underline{27} \quad \underline{28.8}''$$

Homework:

P280 #18-29

P348 #16-27