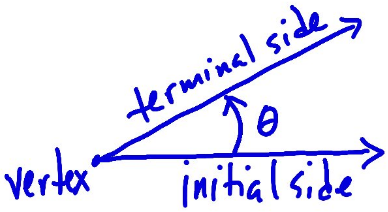
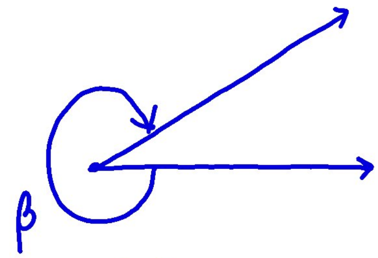
# Section 5.1 Angles and Their Measures

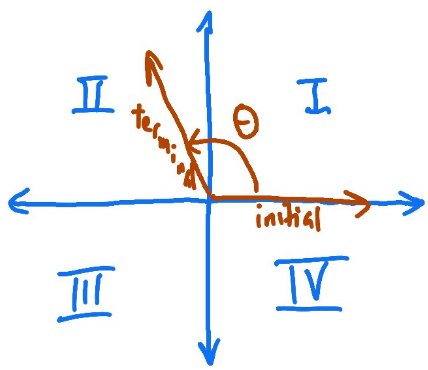



counterclockwise
positive angle measure




clockwise
negative angle measure

Standard position - initial side is the positive x-axis.



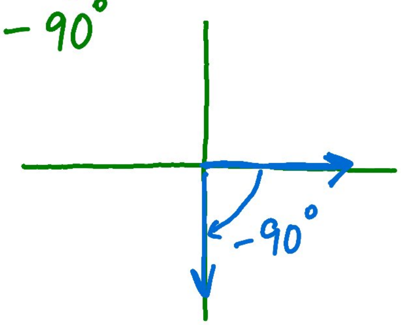

We say $\theta$ lies in Quadrant II because its terminal sides is in QII

When the terminal side lies on an axis we say the angle is a quadrantal angle.

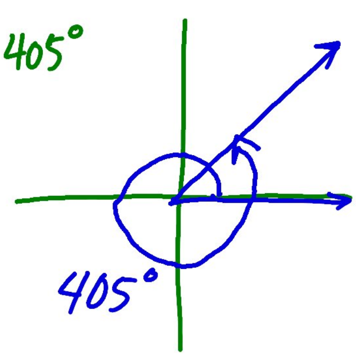
One way to measure angles is in degrees. There are 360° in one revolution. A straight angle is 180°. A right angle measures 90°.

Draw angle in standard position.

ex: $-90°$




405°



To get angle measures more precisely we use <u>minutes</u> and <u>seconds</u>

There are 60 minutes in 1 degree

There are 60 seconds in 1 minute

There are 3600 seconds in 1 degree

<u>Convert to decimal:</u>

$50^\circ 6' 21'' = 50.106^\circ$

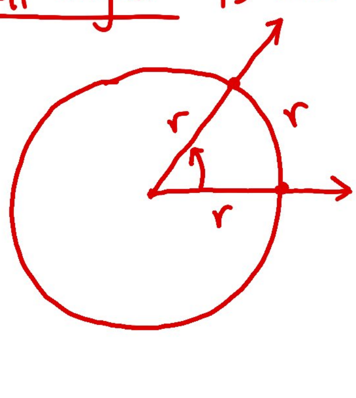
50 2nd angle ° 6 2nd angle ' 21 " enter

<u>Convert to degrees, minutes, seconds</u>

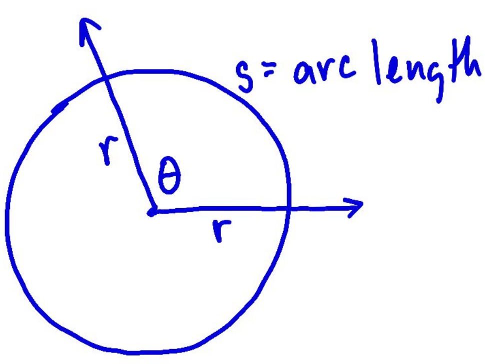
$21.256 = 21^\circ 15' 21.6''$

21.256 2nd angle ▶DMS enter

A <u>central angle</u> is one whose vertex is the center of a circle.




We can also measure angles in radians. If the radius of the circle and the arc length are the same, the central angle measures 1 radian.




If $\theta$ is in radians,

then $s = r\theta$

What is angle in radians that is one revolution?

one revolution has arc length = circumference

$$\cancel{r}\theta = 2\pi\cancel{r}$$

$$\theta = 2\pi \text{ radians}$$

$$360^\circ = 2\pi \text{ radians}$$

$$1^\circ = \frac{2\pi}{360} = \frac{\pi}{180} \text{ radians}$$

To convert from degrees to radians, multiply by $\frac{\pi}{180}$

To convert from radians to degrees, multiply by $\frac{180}{\pi}$

ex: Convert $315^\circ$ to radians

$$\frac{315}{1} \cdot \frac{\pi}{180} = \frac{7}{4}\pi = \frac{7\pi}{4} \text{ radians}$$

$$315 \cdot \frac{1}{180} \blacktriangleright \text{FRAC} = \frac{7}{4}$$

p379
5 - 40 multiples of 5,
69, 70, 75, 76

ex: Convert $\frac{5\pi}{6}$ to degrees

$$\frac{5\cancel{\pi}}{\cancel{6}_1} \cdot \frac{\cancel{180}^{30}}{\cancel{\pi}} = 150^\circ$$