

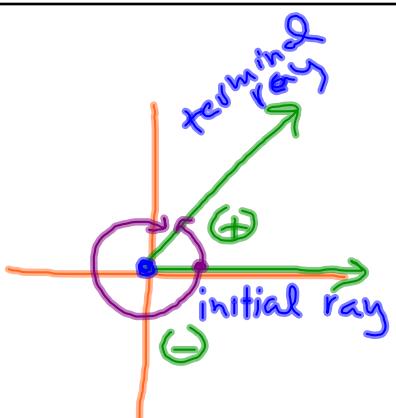
$$\pi = 180^\circ$$

Angles

Rotational distance
between 2 rays

Standard position

initial ray is \oplus x-axis
Vertex is on origin



\oplus angles \llw
 \ominus angles \llw

Angle Measures

Degrees $1^\circ = \frac{1}{360}$ of a circle

DMS $1^\circ = 60'$
 $1' = 60''$
 $23^\circ 47' 22''$

Convert DMS \rightarrow Decimal form

$$32^\circ 5' 28''$$

$$32^\circ + \frac{5}{60} + \frac{28}{60 \cdot 60}$$

$$32^\circ + 0.083 + 0.008 = 32.091^\circ$$

Conversion Decimal \rightarrow DMS

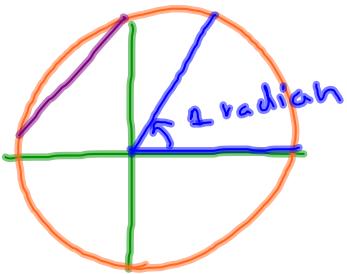
$$56.735^\circ$$

$$56^\circ + 0.735 \times 60$$

$$56^\circ + 44.\underline{1}' + 0.1 \cdot 60 = 6$$

$$56^\circ 44' 6''$$

Radians measures angles as part of a circle
(angle measure)



1 radian is the measure, θ , of the angle that subtends an arc length equal to the radius of the circle.

$$\pi \text{ radians} = 180^\circ$$

Circumference
 $C = 2\pi r$

$$2\pi \text{ radians} = 1 \text{ full circle}$$

Rad

Radians are usually given as fractional multiples of π .

Degrees	Radians	$\theta = \frac{5\pi}{4}$	$\frac{5\pi}{4}$ radians rads r
360°	2π	3.14 radian	
180°	π	3.14 \leftarrow no degree $^\circ$ assume angle is in radians	
90°	$\frac{\pi}{2}$		common angles
60°	$\frac{\pi}{3}$		are multiples of 30° or 45°
45°	$\frac{\pi}{4}$		
30°	$\frac{\pi}{6}$		

Conversions

Degrees to Radians - multiply by $\frac{\pi}{180^\circ}$

$$120^\circ \times \frac{\pi}{180^\circ} = \frac{120}{180} \pi = \frac{2\pi}{3}$$

$$315^\circ \times \frac{\pi}{180^\circ} = \frac{315}{180} \pi = \frac{7\pi}{4} \quad \text{--- } \textcolor{blue}{\cancel{+}} \textcolor{red}{\cancel{-}} \textcolor{green}{\cancel{\pi}}$$

Radians to degrees - multiply by $\frac{180^\circ}{\pi}$

$$\frac{3\pi}{4} \times \frac{180^\circ}{\pi} = \frac{3(180^\circ)}{4} = 135^\circ$$

$$\frac{5\pi}{6} \times \frac{180^\circ}{\pi} = 150^\circ$$

$$\frac{5\pi}{4} = 225^\circ \quad \frac{5\pi}{3} = 300^\circ$$

