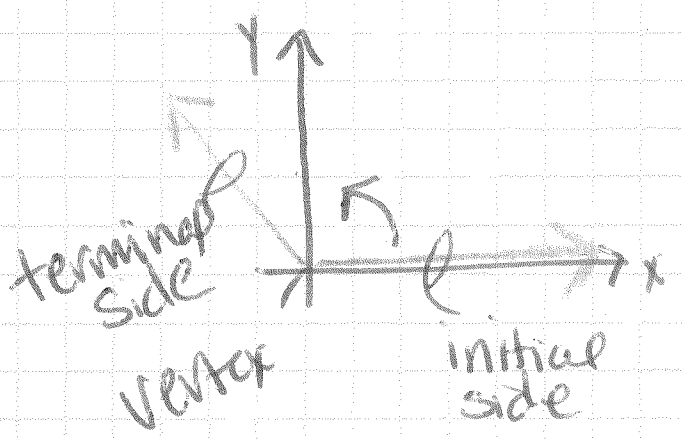
4.2 Degrees & Radians

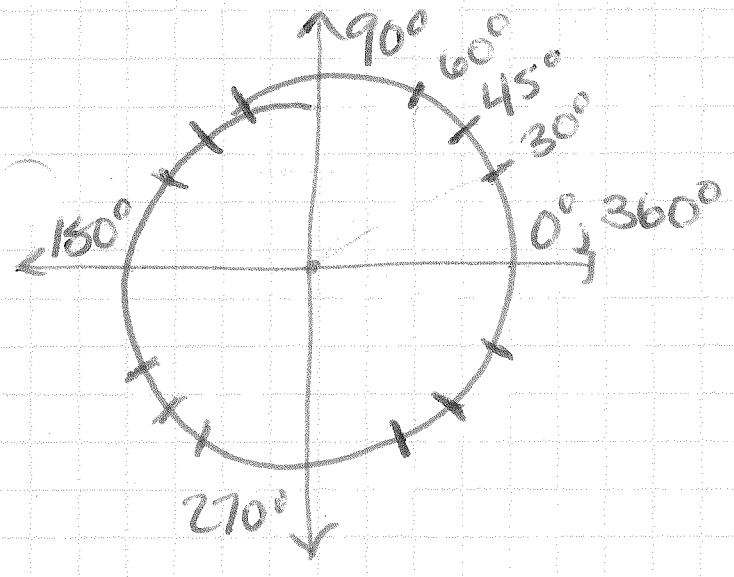
Standard Position for angles



Standard Position

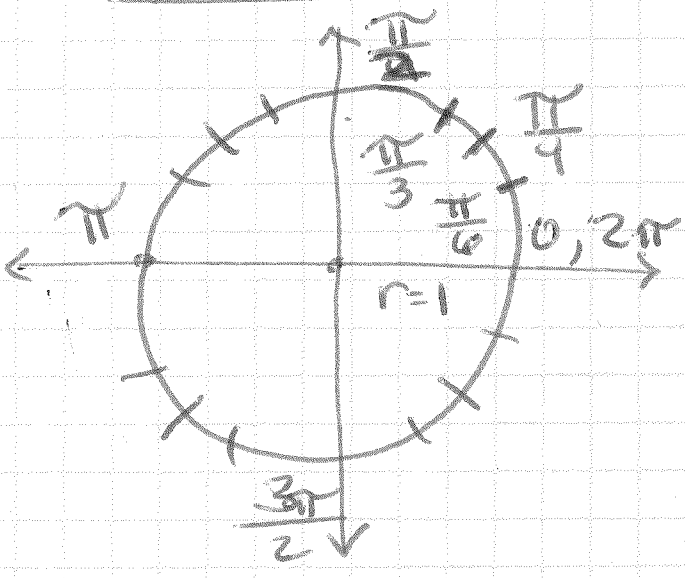
- → initial side on positive x axis
- → vertex at the origin
- → measure counter-clockwise (↺) clockwise

Degree



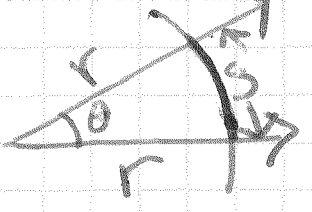
$\frac{1}{360}$ th around the circle

Radians



ratio of the intercepted arc & length to the radius.

$$\theta = \frac{s}{r} \quad \leftarrow \text{arc}, \ \leftarrow \text{radius}$$



Finding an arc length

$\theta = \frac{s}{r}$ ← arc length, ← radius

↑ radians

$$s = r\theta$$

Ex Find the length of the intercepted arc

a. central angle $\frac{\pi}{4}$, radius 5cm

$s = \frac{\pi}{4} \cdot 5 = \boxed{\frac{5\pi}{4} \text{ cm}}$

b. central angle 60°, r = 2in

$60° \cdot \frac{\pi}{180°} = \frac{\pi}{3}$ $\quad s = \boxed{\frac{2\pi}{3} \text{ in}}$

Converting Degrees to Radians

D → R

$X^\circ \cdot \frac{\pi}{180^\circ}$ or $X^\circ \cdot \frac{2\pi}{360^\circ}$

$X_{rad} = \frac{180^\circ}{\pi}$ or

$X_{rad} \cdot \frac{360^\circ}{2\pi}$

Examples

a D → R

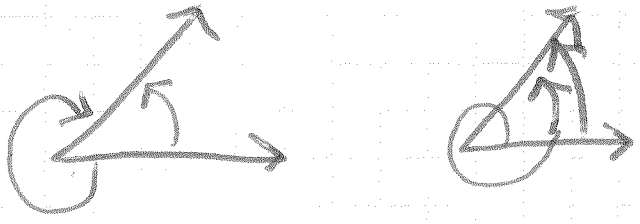
$120^\circ \cdot \frac{\pi}{180^\circ} = \frac{2\pi}{3}$

b R → D

$\frac{5\pi}{4} \cdot \frac{180^\circ}{\pi} = 225^\circ$

Coterminal angles

angles that share a terminal side, with different measures



Degrees:

$\alpha + 360^\circ n$ — # of revolutions

"alpha" angle

Radians:

$\theta + 2\pi n$