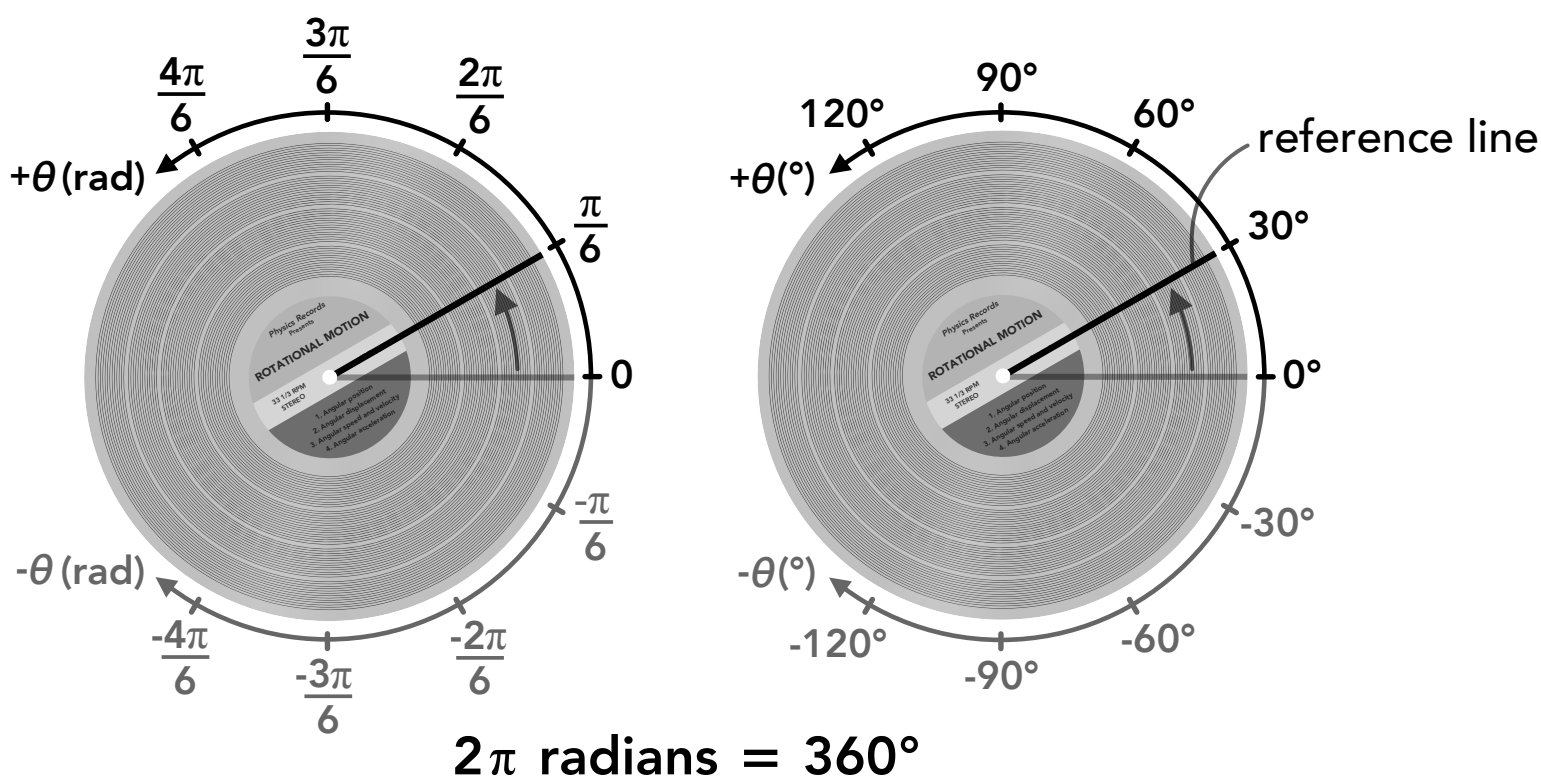


ROTATIONAL MOTION

Rotational Motion (Angular Description)

- In **rotational motion** an object rotates about an axis.
- We typically use the **angular description** of motion, which refers to how the angle of the object is changing over time as the object rotates.
- Drawing a reference line on the object can help us see how the angle of the object is changing.
- All points on the same rotating object have the same angular displacement, angular velocity and angular acceleration.

The angular description of rotational motion is based on how the angle of the object (or a reference line drawn on the object) is changing over time. The SI units use radians (rad) but we can also use the unit of degrees (°).



Angular displacement

$$\Delta\theta = \theta_f - \theta_i$$

Angular velocity

$$\omega = \frac{\Delta\theta}{\Delta t}$$

Angular acceleration

$$\alpha = \frac{\Delta\omega}{\Delta t}$$

Kinematic equations with constant acceleration

$$\theta_f = \theta_i + \omega_i t + \frac{1}{2} \alpha t^2$$

$$\omega_f^2 = \omega_i^2 + 2\alpha(\theta_f - \theta_i)$$

Variables		SI Unit	
theta → θ	angular position	rad	
	$\Delta\theta$	angular displacement	rad
omega → ω	angular velocity	$\frac{\text{rad}}{\text{s}}$	
alpha → α	angular acceleration	$\frac{\text{rad}}{\text{s}^2}$	

As the object rotates, any line or point on the object will sweep out the same angle.

