STUDY GUIDE

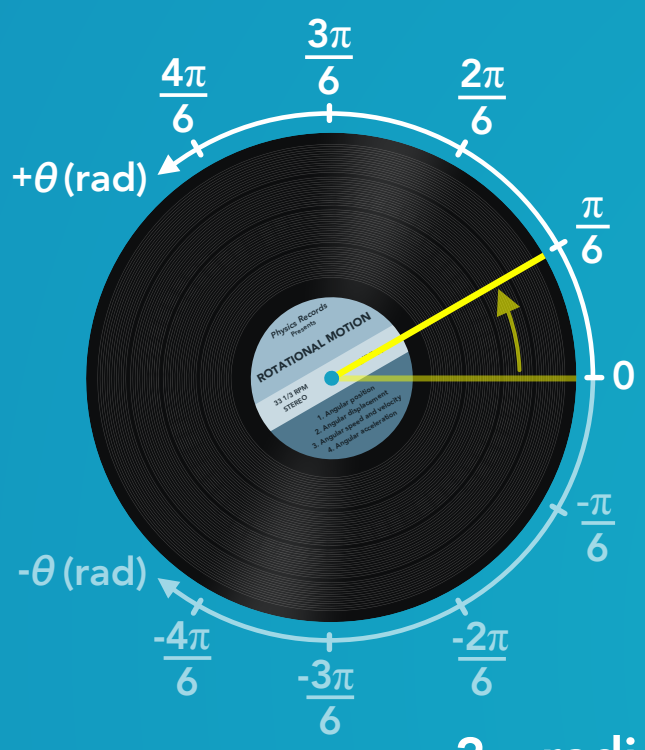
ROTATIONAL MOTION

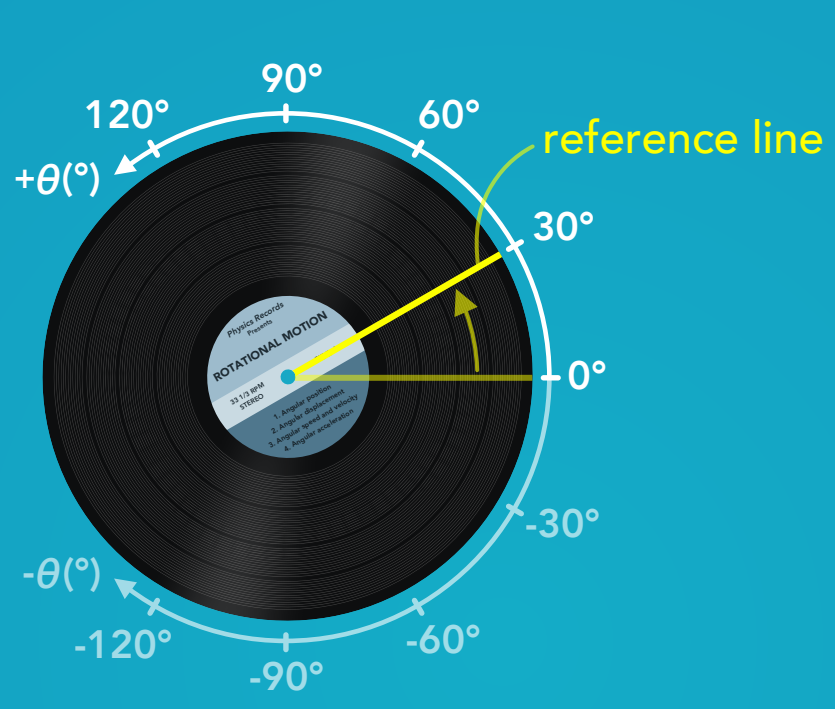
Rotational Motion (Angular Description)

- 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.

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	$\frac{\text{rad}}{\text{s}^2}$

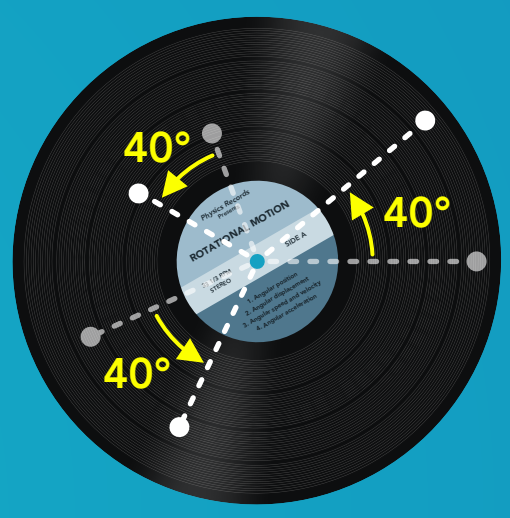
The angular description of rotational motion is based on how the angle of the object (or a reference line drawn on the object) is changing over time. The SI units use radians (rad) but we can also use the unit of degrees (°).





2π radians = 360°

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



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

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

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