CONVERTING BETWEEN LINEAR AND ROTATIONAL

● There are tiny equations that **"LINK"** linear (aka tangential) and rotational (aka angular) variables**:**

LINEAR	ROTATIONAL	"LINK"
x	Θ	--
$\Delta x = x - x_o$	$\Delta\Theta = \Theta - \Theta_o$	$\Delta x = r\ \Delta\Theta$
$v = \Delta x / \Delta t$	$w = \Delta\Theta / \Delta t$	$v_{,T} =$
$a = \Delta v / \Delta t$	$\alpha = \Delta w / \Delta t$	$a_{,T} =$

- There are 4 types of acceleration. The equation $\mathbf{a_{,T}} =$ ______ refers to ______________ acceleration. More soon!

- When a Shape/Rigid Body rotates around itself, ALL rotational quantities **(ΔΘ, w, α)** are the same at every point**.**

- Linear speeds **($v_{,T} = r\ w$)** may be different, since they depend on ________________________________**.**

EXAMPLE 1**:** A wheel of radius 8 m spins around its central axis at 10 rad/s. Find the angular AND linear speeds at a point**:**

(i) at the middle of the wheel (on its central axis)**;**
(ii) at a distance of 4 m from the wheel's center**;**
(iii) at the edge of the wheel**.**

EXAMPLE 2**:** A small object rotates at the end of a light string. The object reaches 120 RPM from rest in just 4 seconds**.** If the object's tangential acceleration after the 4 seconds is 15 m/s^2, calculate the length of the string**.**

PRACTICE: CONVERTING BETWEEN LINEAR AND ROTATIONAL

PRACTICE**:** A disc of radius 10 m rotates around itself with a constant 180 RPM. Calculate the linear speed at a point 7 m from the center of the disc**.**

PRACTICE: CONVERTING BETWEEN LINEAR AND ROTATIONAL

PRACTICE**:** A rock rotates around a light, 4-m long string. The rock is initially at rest, but reaches 150 RPM in 3 seconds**.**
Calculate its tangential acceleration after 3 s**.** → BONUS**:** Calculate its tangential speed after 3 s**.**

PRACTICE: ROTATIONAL KINEMATICS

PRACTICE**:** A 4 m long blade initially at rest begins to spin with 3 rad/s^2 around its axis, which is located at the middle of the blade. It accelerates for 10 s. Find the tangential speed of a point at the tip of the blade 10 s after it starts rotating.