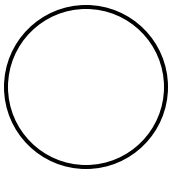
TYPES OF MOTION AND ENERGY



● A Point Mass (R=0) in a circular path has ***rotational*** speed **(w).**

- It also has a ***tangential*** speed **($v_{,TAN}$),** which is ***linear*** →

- Does it mean that it has both LINEAR Kinetic Energy and ROTATIONAL Kinetic Energy**? _____**

- We have ONE type of motion, so only ONE type of Energy → **$v_{,TAN}$** is just the ***linear equivalent*** of **w.**

EXAMPLE**:** For each of the following**,** indicate it whether has **(i)** linear kinetic energy**, (ii)** rotational kinetic energy**.**

(a) Box in a straight line **(b)** Disc spinning around itself **(c)** Earth around itself **(d)** Earth around Sun

(e) Moon spinning around the Earth **(f)** A roll of toilet paper rolling on the floor

KINETIC ENERGY OF A POINT MASS

● A Point Mass in a circular path has ***rotational*** speed **(w)** and a ***linear equivalent*** **($v_{,TAN}$),** BUT only ONE type of motion**.**

- So it only has ONE type of kinetic energy, BUT you can calculate it using EITHER equations **(K_L** or **K_R).**
- This is because the 2 equations are equivalent. What you can't do is have BOTH **–** it would be **"**double counting**".**

EXAMPLE**:** A small 2-kg object spins horizontally around a vertical axis at a rate of 3 rad/s, maintaining a constant distance of 4 m to the axis. Calculate the object's kinetic energy using**: (a) K_L; (b) K_R.**

PRACTICE: ROTATIONAL ENERGY / ENERGY OF EARTH

PRACTICE**:** The Earth has mass 5.97 x 10^{24} kg, radius 6.37 x 10^{6} m. The Earth-Sun distance is 1.5 x 10^{11} m. Calculate the Earth's kinetic energy as it spins around itself**.** → BONUS**:** Find the Earth's kinetic energy as it goes around the Sun**.**