ROTATIONAL ENERGY / ROLLING ON A SURFACE VS. ON AIR

● Remember: If a wheel-like object moves on a surface while rotating around itself → Rolling Motion → $v_{,CM}$ = _____

- If an object is on air, its $v_{,CM}$ is NOT tied to **w.** This tie ONLY happens if it rolls on a surface (and without slipping).

EXAMPLE: A solid sphere of mass 2 kg and radius 0.3 m rolls without slipping on a horizontal surface with 10 m/s. Calculate the sphere's linear, rotational, and total kinetic energy.

PRACTICE: ROTATIONAL ENERGY / BASEBALL ON AIR

PRACTICE**:** A 150-g baseball, 3.85 cm in radius, leaves the pitcher's hand with 30 m/s horizontal and 20 rad/s clockwise. Calculate the ball's linear, rotational, and total kinetic energy**.**

EXAMPLE: RATIO OF ENERGIES / CYLINDER ON SURFACE

EXAMPLE**:** A solid cylinder of mass M and radius R rolls without slipping on a horizontal surface with speed V. Calculate the ratio of its rotational kinetic energy to its total kinetic energy**.**

PRACTICE: RATIO OF ENERGIES / SPHERE ON SURFACE

PRACTICE**:** A hollow sphere of mass M and radius R rolls without slipping on a horizontal surface with angular speed W. Calculate the ratio of its linear kinetic energy to its total kinetic energy**.**