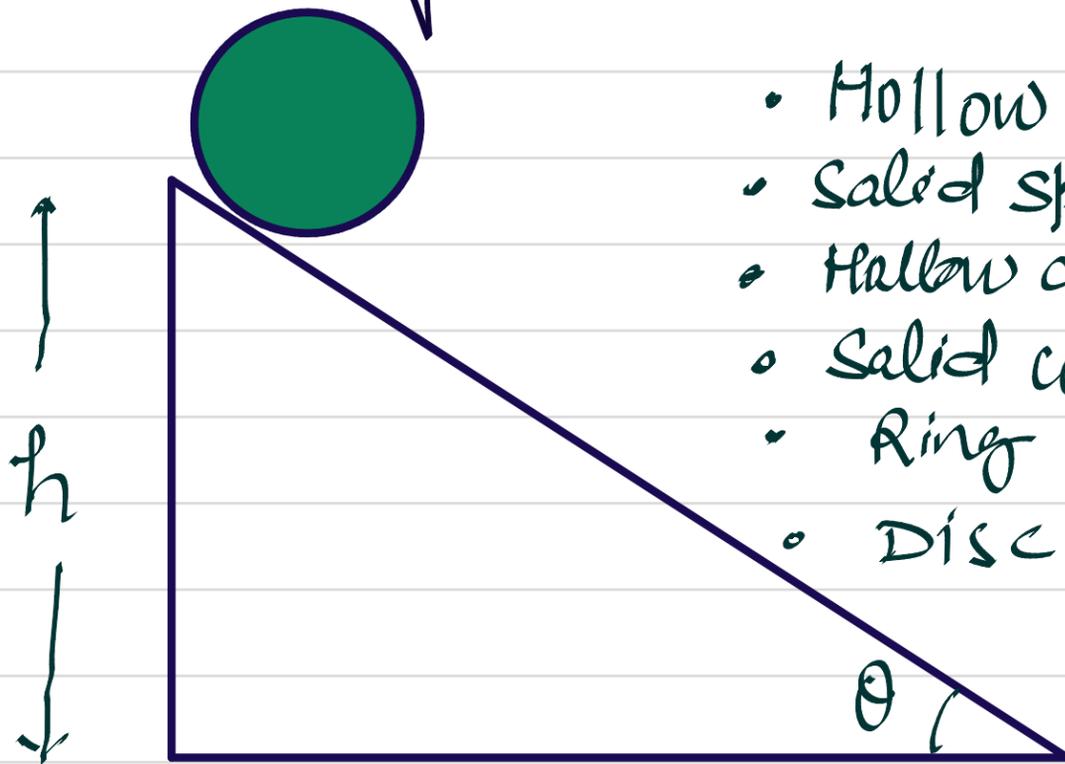


# # Rolling Motion on inclined pl



- Hollow Sphere  $\rightarrow K^2/R^2 = 2/3$
- Solid sphere  $\rightarrow K^2/R^2 = 2/5$
- Hollow cylinder  $\rightarrow K^2/R^2 = 1/2$
- Solid cylinder  $\rightarrow K^2/R^2 = 1/4$
- Ring  $\rightarrow K^2/R^2 = 1$
- Disc  $\rightarrow K^2/R^2 = 1/2$

① Velocity  $v = \sqrt{\frac{2gh}{1 + K^2/R^2}}$

② Acceleration  $a = \frac{g \sin \theta}{1 + K^2/R^2}$

③ Rotational Kinetic Energy —

$$K.E_R = \frac{1}{2} I \omega^2 = \frac{1}{2} m v^2 \left( \frac{K^2}{R^2} \right)$$

④ Translational Kinetic Energy

$$K.E_T = \frac{1}{2} m v^2$$

⑤ Total Kinetic Energy —

$$I.E_T = \frac{1}{2} m v^2 + \frac{1}{2} m v^2 \frac{K^2}{R^2} = \frac{1}{2} m v^2 \left( 1 + \frac{K^2}{R^2} \right)$$