- **Theme Music: Blood, Sweat, and Tears**

  Spinning Wheel

- **Cartoon: Bill Watterson**

  Calvin & Hobbes

ILD 6:
Rotational Kinetic Energy

Rotational Energy

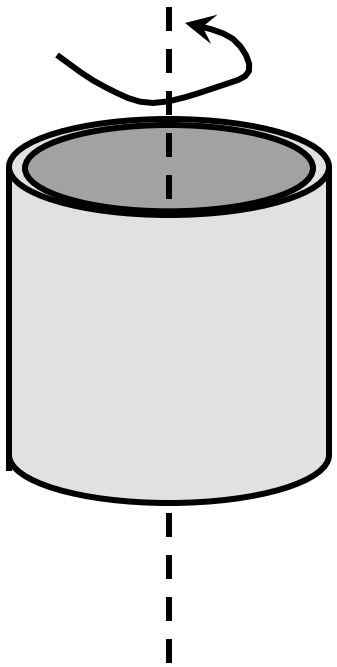
- When an object is moving, it has kinetic energy. When an object is rotating, each part of it is moving so it has kinetic energy.
- For each piece of the object rotating about an axis with an angular velocity ω

$$v_i = r_i\omega$$

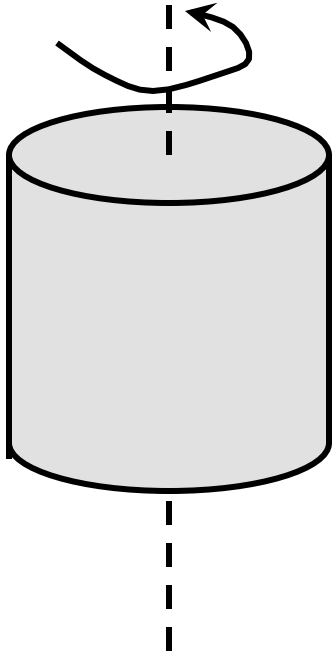
$$\tfrac{1}{2}m_i v_i^2 = \tfrac{1}{2}m_i\left(r_i\omega\right)^2 = \tfrac{1}{2}(m_i r_i^2)\omega^2$$

$$KE_{rot} = \sum_i \tfrac{1}{2}(m_i r_i^2)\omega^2 = \tfrac{1}{2}\left(\sum_i m_i r_i^2\right)\omega^2 = \tfrac{1}{2}I\omega^2$$

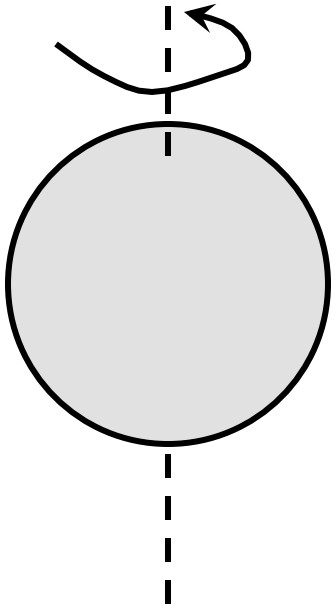
Moments of Inertia



$$I = MR^2$$



$$I = \tfrac{1}{2} MR^2$$



$$I = \tfrac{2}{5} MR^2$$