Worksheet 16: Rotational Kinetic Energy

1. A point particle with mass m travels in a circle of radius R with angular frequency (radians per second) ω.
   a. What is its tangential speed v?

   b. What is its kinetic energy?

2. A point particle with mass m travels in a circle of radius $2R$ with angular frequency (radians per second) ω.
   a. What is its tangential speed v?

   b. What is its kinetic energy?

3. A rectangular 18-kg door has a height of 2.1 m and a width of 0.92 m. It is mounted vertically with hinges along its long edge.
   a. What is its moment of inertia when it swings open or closed?

   b. What is its kinetic energy when it swings at a speed of 0.50 rad/s?

4. My grandfather had a treadle-driven grindstone that he used to sharpen tools like axes, splitting wedges, and mower blades. The grindstone was a cylindrical stone wheel of radius 20 cm and mass 25 kg with an axle through its center.
   a. What is its moment of inertia?

   b. What is its kinetic energy when rotating at a speed of 50 rpm?