

Rotational Kinetic Energy Practice

Name: _____

1. The turntable in a microwave oven has a moment of inertia of $0.040 \text{ kg}\cdot\text{m}^2$ and is rotating once every 4.0 seconds. What is its kinetic energy?

2. An energy storage system based on a flywheel (a rotating disk) can store a maximum of 4.0 MJ when the flywheel is rotating at 20,000.0 revolutions/minute. What is the moment of inertia of the flywheel?

3. A hollow sphere is released from rest on top of a 1.5 meter tall ramp. Calculate the hollow sphere's linear speed at the bottom of the ramp (assuming it rolls downhill without slipping).

4. Use the conservation of energy to derive an expression for the linear speed of a disk at the bottom of an incline of height h . Assume the disk rolls without slipping and starts from rest.

5. Using your expression for the linear speed of a disk in the last question, make an argument that supports Julius Sumner Miller's statement "All disks roll alike."

6. Use the conservation of energy to derive an expression for the linear speed of a solid sphere at the bottom of an incline of height h . Assume the sphere rolls without slipping and starts from rest.

7. Using your expressions for the linear speed of a solid sphere and a disk found in questions 4 & 6, make an argument that supports Julius Sumner Miller's statement "All spheres beat all disks."

(Although just barely...why?)