NAME _____ DATE _____ CLASS _____

Chapter 8

HOLT PHYSICS

# Mixed Review

## *Rotational Equilibrium and Dynamics*

**1.** **a.** On some doors, the doorknob is in the center of the door. What would a physicist say about the practicality of this arrangement? Why would physicists design doors with knobs farther from the hinge?

_____

_____

**b.** How much more force would be required to open the door from the center rather than from the edge?

_____

**2.** Figure skaters commonly change the shape of their body in order to achieve spins on the ice. Explain the effects on each of the following quantities when a figure skater pulls in his or her arms.

**a.** moment of inertia

_____

**b.** angular momentum

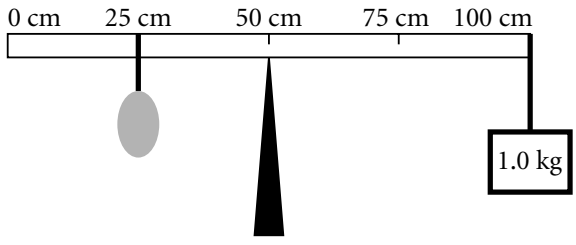
_____

**c.** angular speed

_____

**3.** For the following items, assume the objects shown are in rotational equilibrium.

**a.** What is the mass of the sphere to the right?

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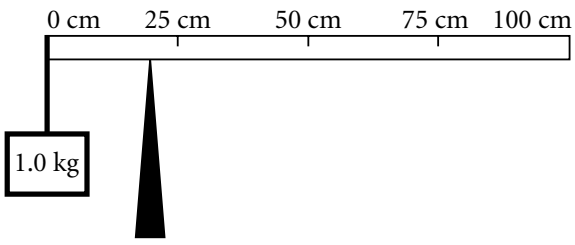
**b.** What is the mass of the portion of the meterstick to the left of the pivot? (Hint: 20% of the mass of the meterstick is on the left. How much must be on the right?)

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# Mixed Review *continued*

**4.** A force of 25 N is applied to the end of a uniform rod that is 0.50 m long and has a mass of 0.75 kg.

**a.** Find the torque, moment of inertia, and angular acceleration if the rod is allowed to pivot around its center of mass. _____

**b.** Find the torque, moment of inertia, and angular acceleration if the rod is allowed to pivot around the end, away from the applied force. _____

**5.** A satellite in orbit around Earth is initially at a constant angular speed of $7.27 \times 10^{-5}$ rad/s. The mass of the satellite is 45 kg, and it has an orbital radius of $4.23 \times 10^{7}$ m.

**a.** Find the moment of inertia of the satellite in orbit around Earth. _____

**b.** Find the angular momentum of the satellite. _____

**c.** Find the rotational kinetic energy of the satellite around Earth. _____

**d.** Find the tangential speed of the satellite. _____

**e.** Find the translational kinetic energy of the satellite. _____

**6.** A series of two simple machines is used to lift a 13300 N car to a height of 3.0 m. Both machines have an efficiency of 0.90 (90 percent). Machine A moves the car, and the output of machine B is the input to machine A.

**a.** How much work is done on the car? _____

**b.** How much work must be done on machine A in order to achieve the amount of work done on the car? _____

**c.** How much work must be done on machine B in order to achieve the amount of work from machine A? _____

**d.** What is the overall efficiency of this process? _____