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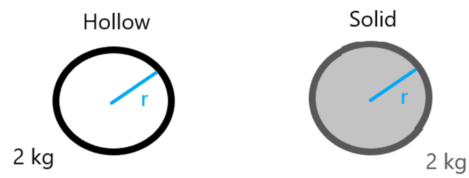
(9.02) - Rotational Inertia and Center of Mass Worksheet

1. A student is wondering where she should grab a meter stick so that, when rotated, the stick has the largest rotational inertia. Where should she grab the stick with her hand before rotating?
    a. 0 cm
    b. 25 cm
    c. 50 cm
    d. The inertia would be the same for all choices A-C.
    e. Impossible to answer without knowing the exact mass of the meter stick

2. Fill in the chart below. Based on the written scenario, determine where the axis of rotation would be, and write in the corresponding inertia formula

Scenario	**Where is the axis?**	**Inertia Formula**
A bowling ball rolls without slipping across a horizontal bowling lane		
The minute hand of a clock rotating once every hour.		
A hamster wheel spins as a hamster runs on its inside		
The Earth while rotating around the Sun once every year.		
A soccer ball rolls along a level, grassy surface.		
A tennis ball is tied to the end of a massless string and spun in a vertically-aligned circle.		
A seesaw oscillates up and down on top of a triangular pivot at its center.		
A frisbee spins as it flies through the air		



3. A hollow wheel and solid disc share the same overall mass and radius from center, as shown above. Both are initially at rest. The hollow wheel has all of its mass located at its edge, while the solid disc has its mass distributed uniformly throughout its shape. Which of the two objects would be more difficult to set into motion if they were to spin about their respective centers?
    a. The hollow wheel
    b. The solid disc
    c. They would be equally difficult to set into motion

4. A 1 kg sphere is connected to a 2 kg sphere by a rod with negligible mass, as shown below.
    a. Which lettered position represents the center of mass?
    b. Which position should be grabbed so that, when rotated, the system is hardest to rotate (has largest rotational inertia)?