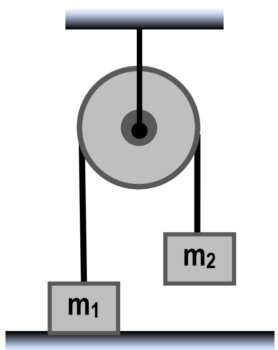
EXAMPLE: TWO BLOCKS ON A PULLEY / ATWOOD'S MACHINE

EXAMPLE**:** Two blocks are connected by a light string, which is ran around a pulley, as shown below. The blocks have masses m_1 = 3 kg and m_2 = 5 kg. The pulley is a solid cylinder (mass 4 kg and radius 8 m), that is free to rotate about a fixed, perpendicular axis through its center. The system is released from rest, with $\mathbf{m_2}$ 5 m above the ground. Calculate**:**

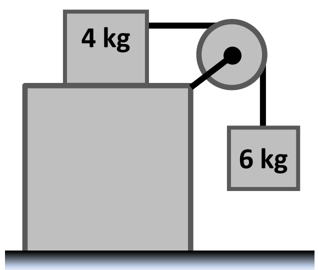
(a) the speed of $\mathbf{m_2}$ just before it hits the ground**;**

(b) the pulley's speed just before $\mathbf{m_2}$ hits the ground**.**



PRACTICE: TWO BLOCKS ON A PULLEY / ROUGH TABLE

PRACTICE**:** Two blocks are connected by a light rope, which passes through a pulley, as shown. The pulley is a solid cylinder 10 kg in mass and 2 m in radius. The 4 kg block is on a horizontal surface, and the surface-block coefficient of friction is 0.5. The system is released from rest, with the 6 kg block initially 8 m above the floor. Calculate the speed the 6 kg block will have just before hitting the floor**.**



EXAMPLE: CONSERVATION OF ENERGY / SPEED OF YO-YO

EXAMPLE**:** When you release a simple 100-g yo-yo from rest, it falls and rolls, unwinding the light string around its cylindrical shaft, which is 2 cm in radius. If the yo-yo can be modeled after a solid disc, calculate its**: (a)** linear speed after it has dropped 50 cm**; (b)** angular speed after its dropped 50 cm**.**

PRACTICE: CONSERVATION OF ENERGY / SWINGING ROD

PRACTICE**:** A small 10-kg object is connected to the right end of a thin rod of length 4 m and mass 5 kg. The rod is free to rotate about a fixed perpendicular axis on its left end, as shown below. The rod is initially held at rest, horizontally. When the rod is released, it falls, rotating about its axis, similar to a pendulum. What is the speed at the rod's center of mass when the rod is vertical**?** → BONUS**:** What is object's speed when the rod is vertical**?**