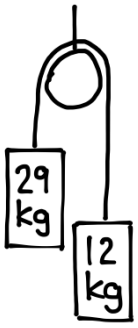
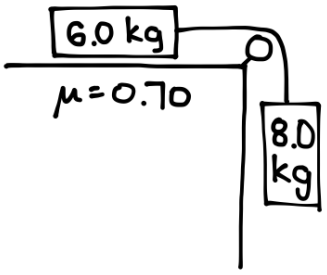
More Two-Body Systems

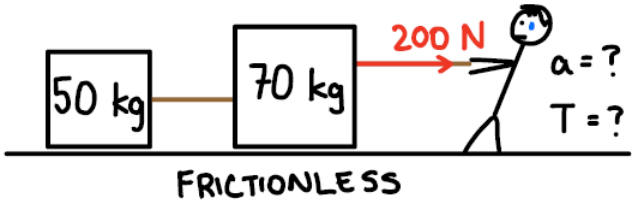
1. Two masses are connected by a **light, inextensible cord** that passes over a **frictionless pulley**. One mass is **29 kg** and the other is **12 kg**, as shown. Assume the system is released from rest.
   a) Determine the **acceleration of the system**. (State which mass moves upward and which moves downward.)
   b) Determine the tension in the cord.



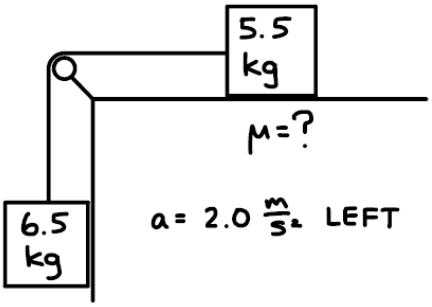
2. A 6.0 kg block rests on a horizontal surface where the coefficient of kinetic friction is $\mu = 0.70$. The block is connected by a light, inextensible rope that passes over a frictionless pulley to a hanging 8.0 kg mass, as shown. The system is released from rest.
   a. Determine the **acceleration of the system**. (State the direction of motion of each mass.)
   b. Determine the tension in the rope.



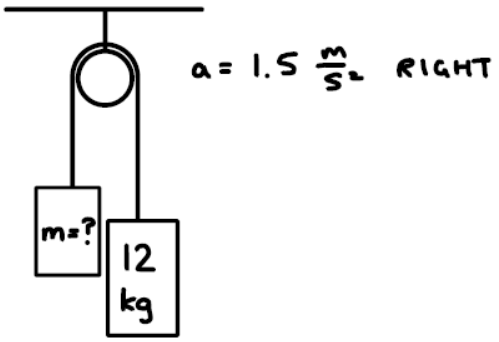
3. Two blocks of mass **50 kg** and **70 kg** sit on a **frictionless horizontal surface** and are connected by a **light rope**. A person pulls horizontally on the **70 kg block** with a **200 N force**, as shown. Assume the rope is massless and the surface is frictionless.
   a. Determine the **acceleration of the system**.
   b. Determine the **tension in the rope** between the two blocks.



4. A 5.5 kg block rests on a horizontal surface and is connected by a light rope over a frictionless pulley to a 6.5 kg hanging mass, as shown. When released, the system accelerates at 2.0 m/s^2 **to the left** for the block on the table.
   a. Determine the **coefficient of kinetic friction** between the 5.5 kg block and the surface.
   b. Determine the **tension in the rope**.



5. Two masses are connected by a **light, inextensible rope** that passes over a **frictionless pulley**, as shown. One mass is **12 kg**, and the other has **unknown mass** m. When released, the system accelerates at 1.5 m/s^2 to the **right** (meaning the **12 kg mass moves downward** and the unknown mass moves upward).



   a. Determine the **value of the unknown mass** m.
   b. Determine the **tension in the rope**.

6. A **10 kg block** rests on a **horizontal surface** where the **coefficient of kinetic friction is** $\mu = 0.50$. The block is connected by a **light rope over a frictionless pulley** to a **hanging 8 kg mass**, as shown. When released, the **8 kg mass would normally pull the 10 kg block toward the pulley**, but a person **pulls horizontally on the 10 kg block with a force of** 180 N**in the direction opposite the motion**. As a result of the person's pull, the system accelerates **to the right for the 10 kg block** and **upward for the 8 kg mass**.

   a) Determine the **acceleration of the system**.
   b) Determine the **tension in the rope**.