Monday warm-up: Forces II and Forces III

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1 Memory Bank

- Newton's Second Law: $\vec{F}_{net} = m\vec{a}$. (The net external force on an object is equal to the mass of the object times the acceleration of the object).
- The horizontal force of friction: $\vec{f} = -\mu N \hat{i}$. N is the magnitude of the normal force.

2 Forces, II

1. In Fig. 1, a man with mass m and weight w stands on a scale in an elevator. Which of the followinng is true, if the elevator is accelerating upwards?
   - A: $w = mg$
   - B: $w < mg$
   - C: $w > mg$
   - D: $w = 0$
2. Suppose the man's mass is 60 kg. He is standing on a scale in an elevator that is *accelerating upwards* at 0.2 m/s^2. What is the weight on the scale?

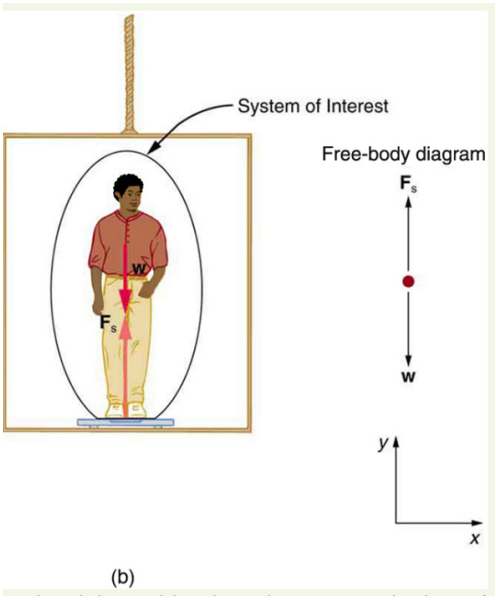

Figure 1: A person on a scale in an elevator.

3. Assume there is a force of friction on m_1 in Fig. 2. Derive an expression for the acceleration of m_2.
4. Let $m_1 = 200$ grams, $m_2 = 50$ grams, and the coefficient of friction be $\mu = 0.1$. What is the acceleration of m_2? Assume the string tension is constant.

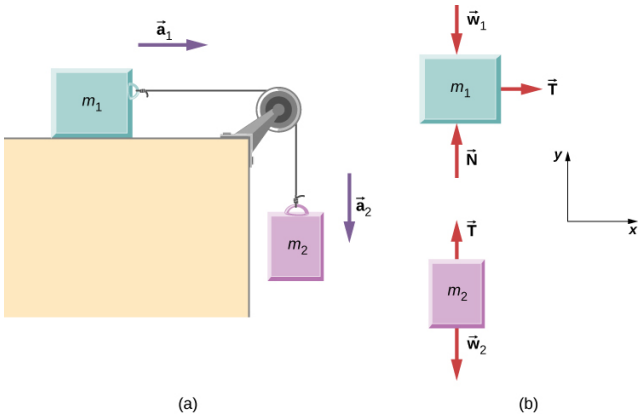

Figure 2: Friction acts on block m_1 and gravity acts on m_2. Note that the force of friction does not appear in the free-body diagram. We must add friction, $\vec{f}$, to m_1.