# Problem Set 3

Instructions:

1. Answer all questions below. Show your work for full credit.

2. All problems are due by the end of the day on 12 Sept 2014.

3. You may collaborate, but everyone must turn in their own work.

1. In the figure below, a slab of mass $m_1 = 40\,\text{kg}$ rests on a frictionless floor, and a block of mass $m_2 = 10\,\text{kg}$ rests on top of the slab. Between block and slab, the coefficient of static friction is 0.60, and the coefficient of kinetic friction is 0.40. A horizontal force $\vec{F}$ of magnitude $100\,\text{N}$ begins to pull directly on the block, as shown. What are the resulting accelerations of **(a)** the block, and **(b)** the slab?
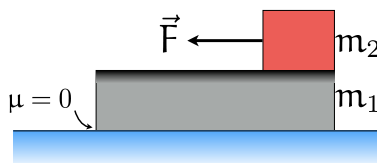
2. In the figure below, blocks A and B have **weights** of $44\,\text{N}$ and $22\,\text{N}$, respectively. **(a)** Determine the minimum weight of block C to keep A from sliding if μ_s between the table and A is 0.20. **(b)** Block C is suddenly lifted off A. What is the acceleration of block A if μ_k between A and the table is 0.15?
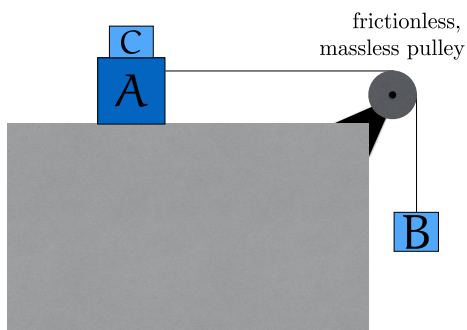
3. An old streetcar rounds a flat corner of radius $9.1\,\text{m}$ at $16\,\text{km/h}$. What angle with the vertical will be made by the loosely hanging hand straps?

4. An $85\,\text{kg}$ man lowers himself to the ground from a height of $10.0\,\text{m}$ by holding onto a rope that runs over a frictionless pulley to a $65\,\text{kg}$ sandbag. With what speed does the man hit the ground if he started from rest?