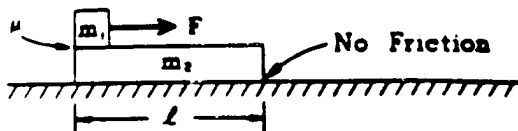


AP Physics C
Sliding Blocks Problem

Name _____

Directions: Show all of your work in order to receive full credit. Include all of your givens, units, and original equations used in each solution. All answers should fit in the space provided.



A horizontal force F is applied to a small block of mass m_1 to make it slide along the top of a larger block of mass m_2 and length l . The coefficient of friction between the blocks is μ . The larger block slides without friction along a horizontal surface. The blocks start from rest with the small block at one end of the larger block, as shown.

- a. On the diagrams below draw all of the forces acting on each block. Identify each force.



- b. Find the acceleration of each block, a_1 and a_2 , relative to the horizontal surface.

$$a_1 = \frac{F - \mu m_1 g}{m_1}$$

$$a_2 = \frac{\mu m_1 g}{m_2}$$

- c. In terms of l , a_1 , and a_2 , find the time t needed for the small block to slide off the end of the larger block.

$$t = \sqrt{\frac{2l}{\frac{F - \mu m_1 g}{m_1} - \frac{\mu m_1 g}{m_2}}}$$

- d. Find an expression for the energy dissipated as heat because of the friction between the two blocks.

$$W = \mu m_1 g l$$