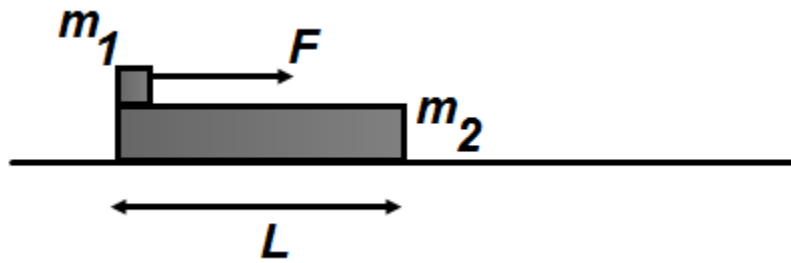


1. A block of mass m , acted on by a force F directed horizontally, slides up an inclined plane that makes an angle θ with the horizontal. The coefficient of sliding friction between the block and the plane is μ .
 - a. On the diagram of the block below, draw and label all the forces that act on the block as it slides up the plane.



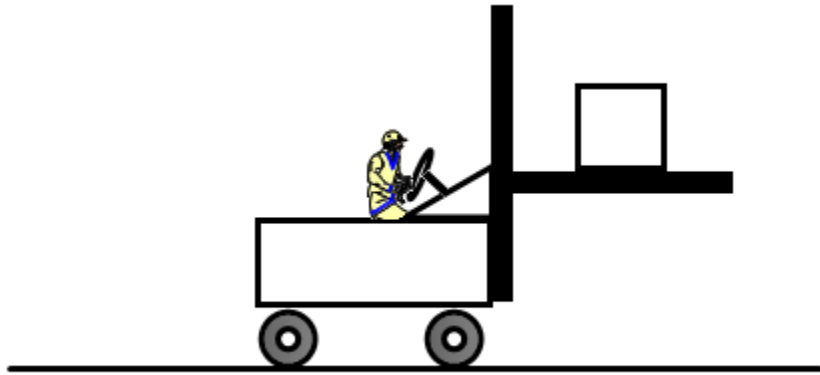
- b. Develop an expression in terms of m , θ , μ , F , and g for the block's acceleration up the incline.
 - c. Develop an expression for the magnitude of the force F that will allow the block to slide up the plane with a constant velocity. What relation must θ and μ satisfy in order for the solution to be physically meaningful?



2. 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 kinetic friction between the blocks is μ . The larger block slides without friction along a horizontal surface. The blocks start from rest with the smaller block at one end of the larger block.
- On the diagram below draw and label all the forces acting on each block.



- Find the acceleration of each block: a_1 and a_2 , relative to the horizontal surface.
- 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.
- Find the expression for the energy dissipated as heat because of the friction between the blocks.



3. A 500 kg box rests on a platform of the electrical fork-lift. Starting from rest at time $t = 0$, the box is lowered with a downward acceleration of 1.4 m/s^2 .
- Determine the upward force exerted by the horizontal platform on the box as it is lowered.

At time $t = 0$, the fork-lift also begins to move forward with an acceleration of 1.9 m/s^2 while lowering the box. The box doesn't slip or tip over.

- Determine the friction force on the box.
- If the box doesn't slip, determine the minimum coefficient of static friction between the box and the platform.
- Determine the expression that describes the path of the box (y as a function of x), assuming, at time $t = 0$ the box has a horizontal position $x_0 = 0$ and a vertical position $y = 2.5 \text{ m}$ above the ground, with zero velocity.
- On the coordinate system below sketch the path taken by the box.

