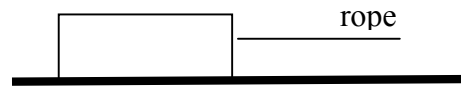


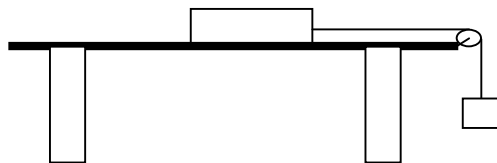
Friction I

1. A 10.0 kg box is sitting on a level floor with a rope attached (as shown) where $\mu_s = 0.40$ and $\mu_k = 0.20$ for the contact between the box and the floor. Describe the motion (quantitatively) of the box if each of the following forces is applied to the rope.



- a. 25 N horizontally, initially at rest
- b. 50 N horizontally, initially at rest
- c. 25 N horizontally, initially moving
- d. 40 N at 30° above the horizontal, initially at rest.
- e. 40 N at 30° below the horizontal, initially at rest.

2. Two blocks are connected by a string as shown. For the 5.0 kg block on the horizontal surface, $\mu_s = 0.30$ $\mu_k = 0.20$. The hanging mass doesn't touch the table.



a. What is the minimum mass of the hanging block in order to make the system move?

b. What is the acceleration for the arrangement (mass calculated in a) if the blocks are moving?

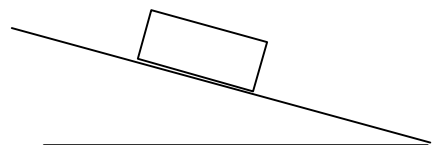
3. The coefficient of static friction between tires and the road is 0.75, while the coefficient of kinetic friction is 0.6 in dry weather. In rainy conditions, the coefficient of kinetic friction drops to 0.4.

a. What is the minimum stopping distance for a car traveling at 20 m/s with antilock brakes in dry conditions?

b. What is the minimum stopping distance for a car traveling at 20 m/s where the brakes lock the tires in dry conditions?

c. What is the minimum stopping distance for a car traveling at 20 m/s where the brakes lock the tires in wet conditions?

4. A 5 kg block sits on a ramp that is inclined 20° above the horizontal. The coefficients of friction between the block and the ramp are $\mu_s = 0.75$ and $\mu_k = 0.50$.



a. Will the block slide down the ramp? Explain.

b. What is the frictional force between the ramp and the block?