Problem 3.2

An object is lowered very slowly onto a conveyor belt that is moving to the right. What is the direction of the friction force acting on the object at the instant the object touches the belt?

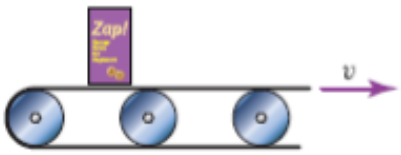


Figure P3.2

Problem 3.3

A person is trying to move a heavy crate by pushing on it. While the person is pushing, what is the resultant force acting on the crate if the crate does not move?

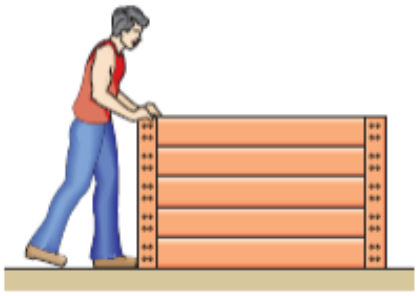
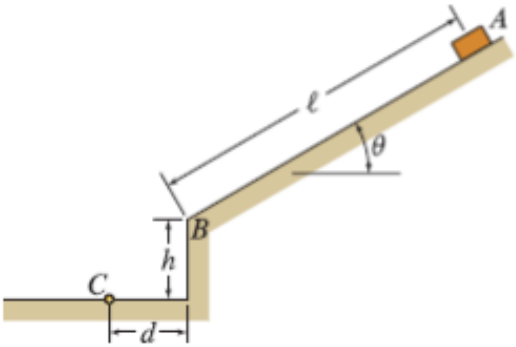


Figure P3.3

3.15

A suitcase is released from rest at A on the $\theta = 30°$ ramp. It slides a distance $\ell = 25$ ft and then goes over the edge at B and drops a height $h = 5$ ft. Determine the horizontal distance d to the landing spot at C.



Problem 3.15 Assume that the coefficient of static friction is insufficient to prevent slipping and that the coefficient of kinetic friction on the incline between A and B is $\mu_k = 0.3$.

Problem 3.4

A person is lifting a 75 lb crate *A* by applying a constant force *P* = 40 lb to the pulley system shown. Neglecting friction and the inertia of the pulleys, determine the acceleration of the crate. Treat all rope segments as purely vertical.

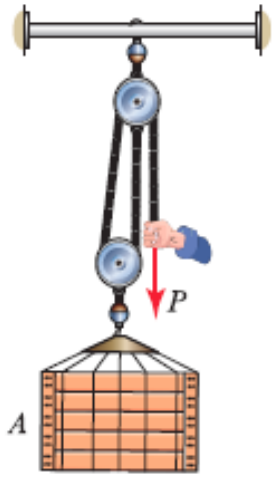


Figure P3.4

Problem 3.5

The motor *M* is at rest when someone flips a switch and it starts pulling in the rope. The acceleration of the rope is uniform and is such that it takes 1 s to achieve a retraction rate of 4 ft/s. After 1 s the retraction rate becomes constant. Determine the tension in the rope during and after the initial 1 s interval. The cargo *C* weighs 130 lb, the weight of the ropes and pulleys is negligible, and friction in the pulleys is negligible.

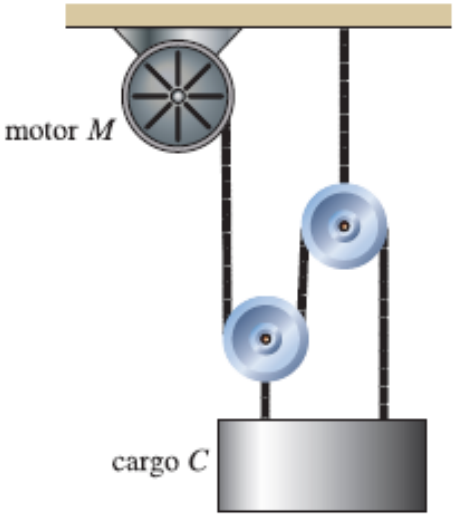


Figure P3.5

Problem 3.18

As the skydiver moves downward with a speed v, the air drag exerted by the parachute on the skydiver has a magnitude $F_d = C_d v^2$ (C_d is a drag coefficient) and a direction opposite to the direction of motion. Determine the expression of the skydiver's acceleration in terms of C_d, v, the mass of the skydiver m, and the acceleration due to gravity.

Figure P3.18