Statics Homework Handout 8:

Homework Assignment #8: 8.2, 8.14, 8.65, 8.121

8.1 Determine whether the block shown is in equilibrium and find the magnitude and direction of the friction force when $\theta = 30°$ and $P = 50$ lb.

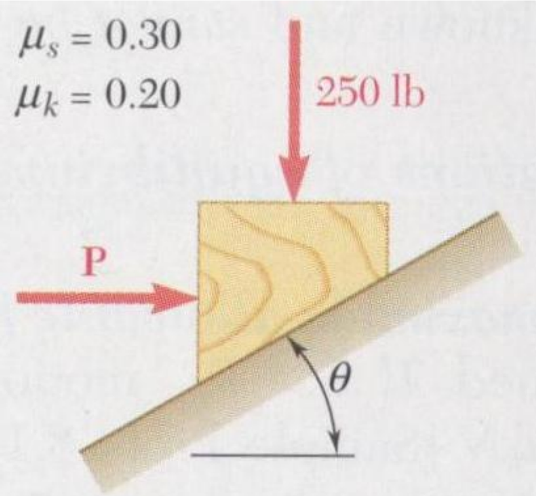

Fig. P8.1 and P8.2

8.2 Determine whether the block shown is in equilibrium and find the magnitude and direction of the friction force when $\theta = 35°$ and $P = 100$ lb. $P = 100$ lb.

8.3 Determine whether the block shown is in equilibrium and find the magnitude and direction of the friction force when $\theta = 40°$ and $P = 400$ N.

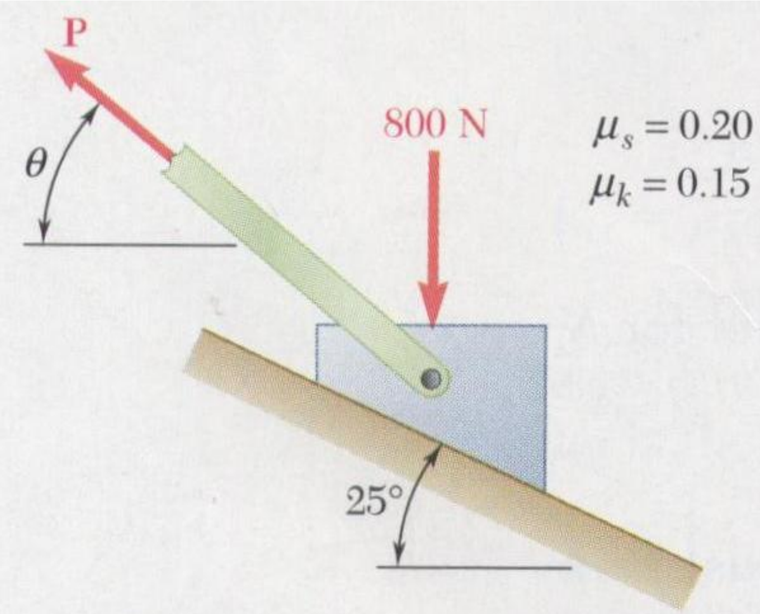

Fig. P8.3, P8.4, and *P8.5*

8.5 Knowing that $\theta = 45°$, determine the range of values of P for which equilibrium is maintained.

8.13 and 8.14 The coefficients of friction are $\mu_s = 0.40$ and $\mu_k = 0.30$ between all surfaces of contact. Determine the smallest force **P** required to start the 30-kg block moving if cable AB (a) is attached as shown, (b) is removed.

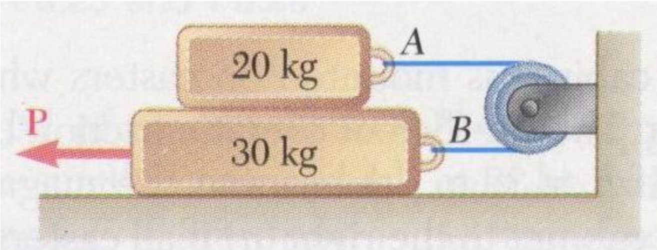

Fig. P8.13

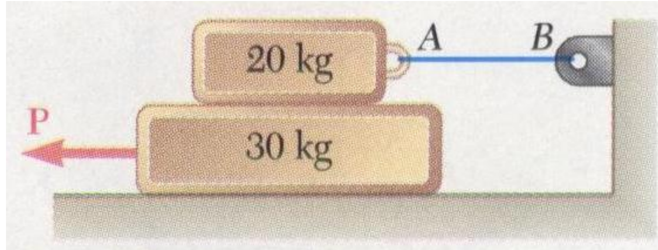

Fig. P8.14

8.17 A uniform crate of mass 30 kg must be moved up along the 15° incline without tipping. Knowing that the force **P** is horizontal, determine (*a*) the largest allowable coefficient of static friction between the crate and the incline, (*b*) the corresponding magnitude of the force **P**.

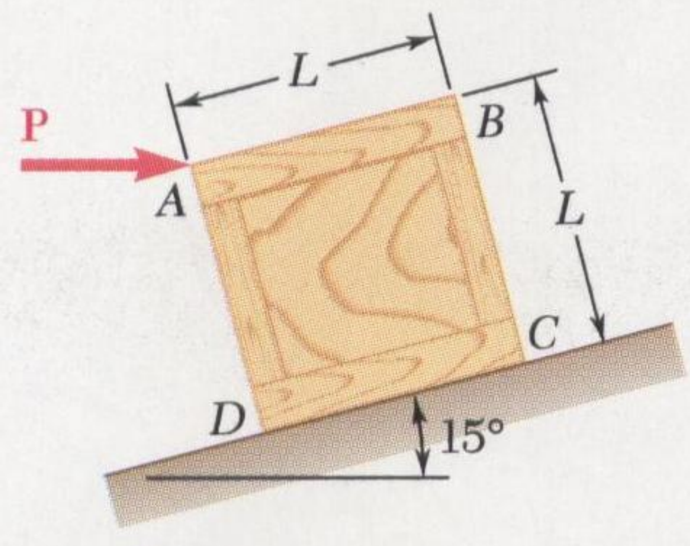

Fig. *P8.17*

8.18 A worker slowly moves a 50-kg crate to the left along a loading dock by applying a force **P** at corner *B* as shown. Knowing that the crate starts to tip about the edge *E* of the loading dock when $a = 200$ mm, determine (*a*) the coefficient of kinetic friction between the crate and the loading dock, (*b*) the corresponding magnitude *P* of the force.

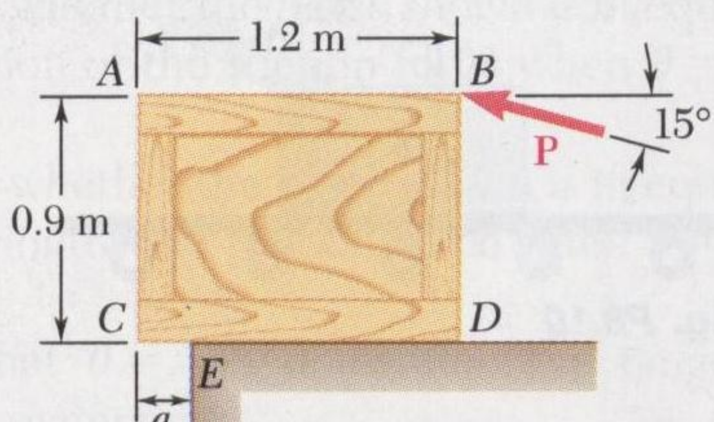

Fig. *P8.18*

8.64 and 8.65 Two 10° wedges of negligible weight are used to move and position the 400-lb block. Knowing that the coefficient of static friction at all surfaces of contact is 0.25, determine the smallest force **P** that should be applied as shown to one of the wedges.

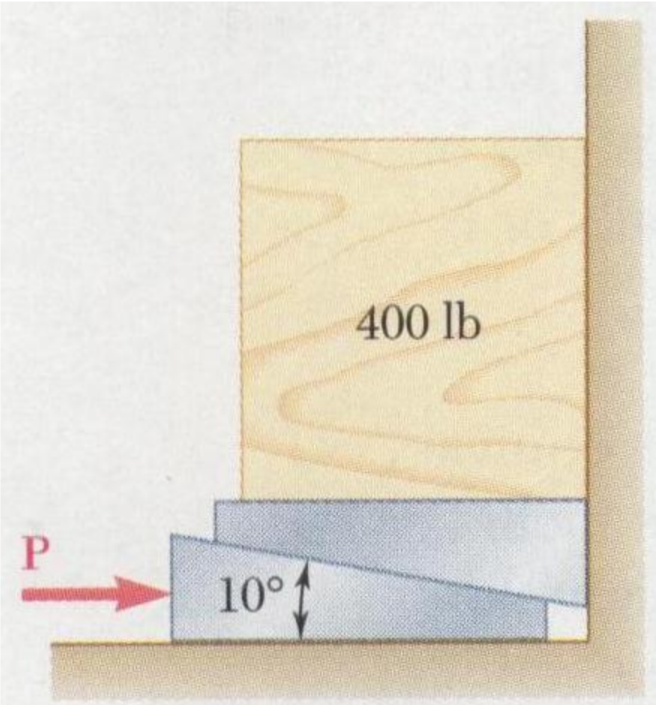

Fig. P8.64

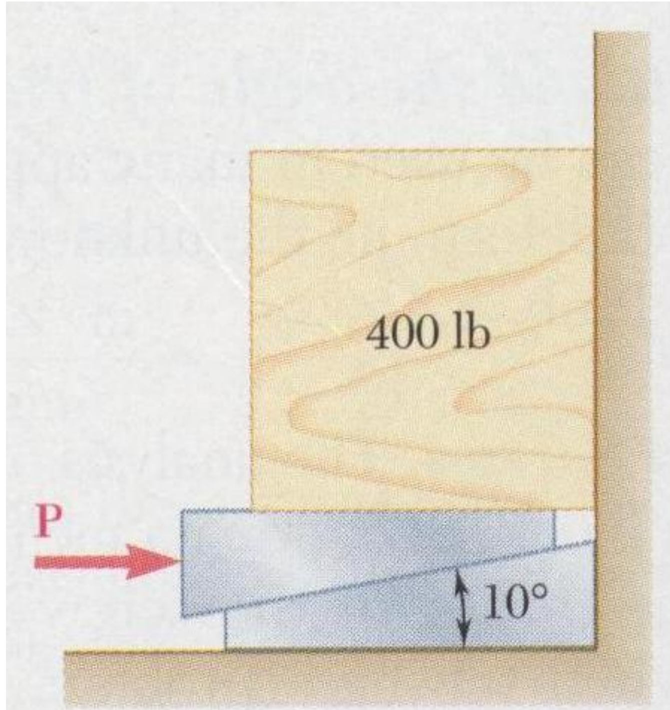

Fig. P8.65

8.66 and 8.67 The elevation of the end of the steel beam supported by a concrete floor is adjusted by means of the steel wedges E and F. The base plate CD has been welded to the lower flange of the beam, and the end reaction of the beam is known to be 100 kN. The coefficient of static friction is 0.30 between two steel surfaces and 0.60 between steel and concrete. If the horizontal motion of the beam is prevented by the force **Q**, determine (*a*) the force **P** required to raise the beam, (*b*) the corresponding force **Q**.

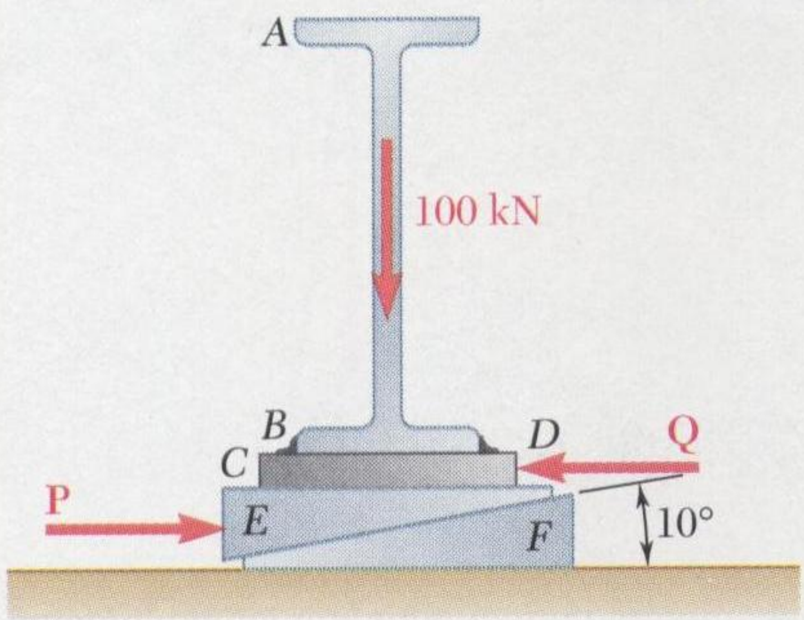

Fig. *P8.66*

8.121 A 300-lb block is supported by a rope which is wrapped $1\frac{1}{2}$ times around a horizontal rod. Knowing that the coefficient of static friction between the rope and the rod is 0.15, determine the range of values of P for which equilibrium is maintained.

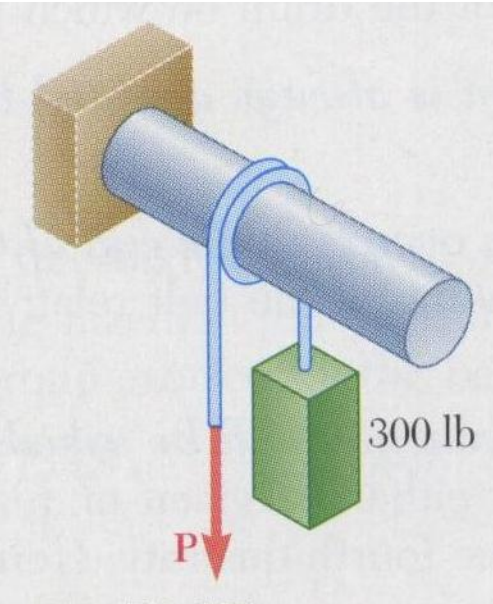

Fig. P8.121

8.122 The coefficient of static friction between block B and the horizontal surface and between the rope and support C is 0.40. Knowing that $m_A = 12$ kg, determine the smallest mass of block B for which equilibrium is maintained.

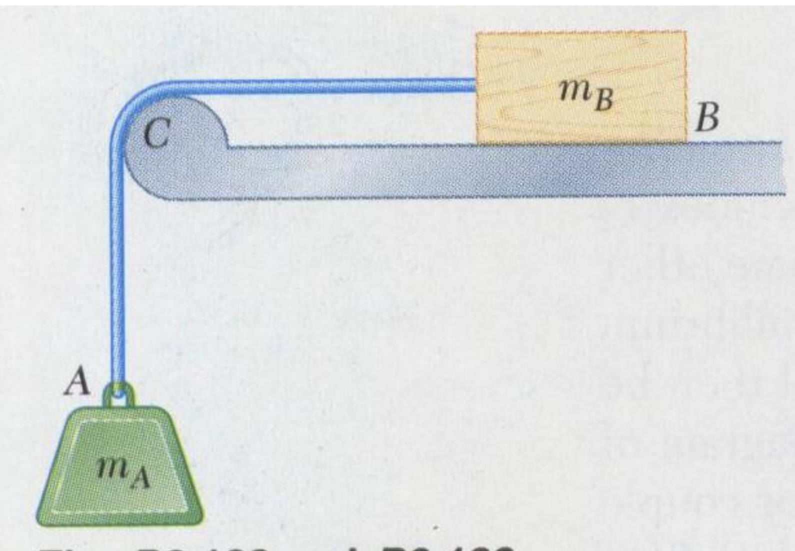

Fig. *P8.122* and *P8.123*

8.124 A flat belt is used to transmit a torque from drum B to drum A. Knowing that the coefficient of static friction is 0.40 and that the allowable belt tension is 450 N, determine the largest torque that can be exerted on drum A.

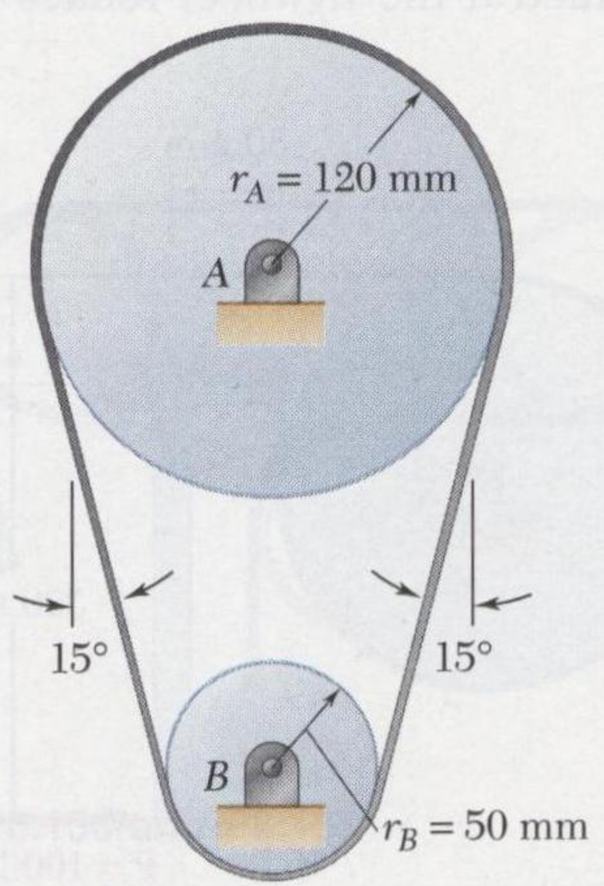

Fig. P8.124

8.127 A flat belt is used to transmit a torque from pulley A to pulley B. The radius of each pulley is 60 mm, and a force of magnitude $P = 900$ N is applied as shown to the axle of pulley A. Knowing that the coefficient of static friction is 0.35, determine (*a*) the largest torque which can be transmitted, (*b*) the corresponding maximum value of the tension in the belt.

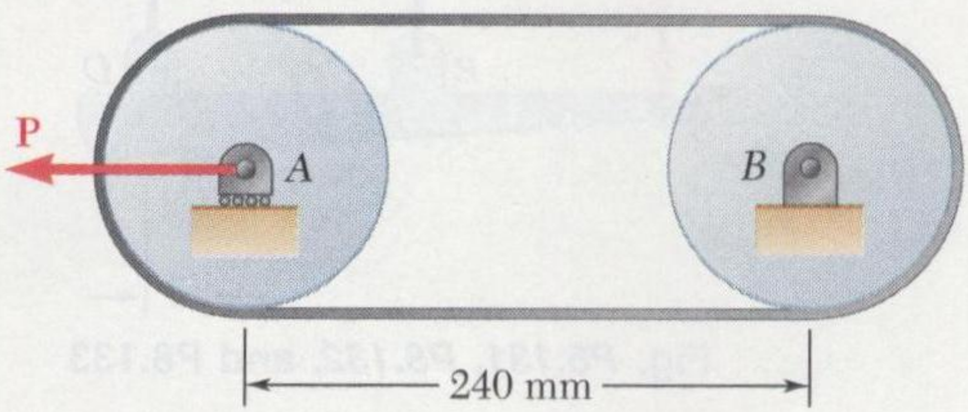

Fig. P8.127

8.140 A recording tape passes over the 20-mm-radius drive drum B and under the idler drum C. Knowing that the coefficients of friction between the tape and the drums are $\mu_s = 0.40$ and $\mu_k = 0.30$ and that drum C is free to rotate, determine the smallest allowable value of P if slipping of the tape on drum B is not to occur.

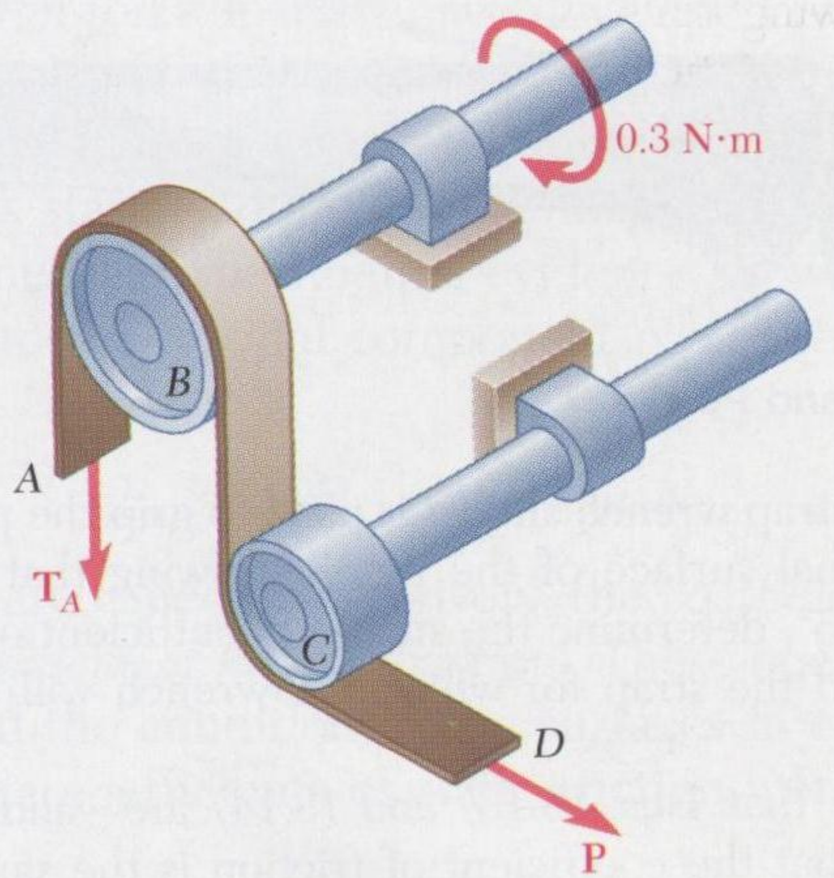

Fig. P8.140