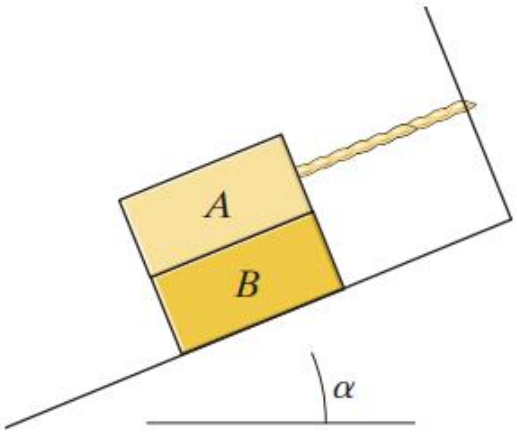
GEN_ENG 205-2: Engineering Analysis II Points – 60

Homework #9

Problem 1 (9.19)

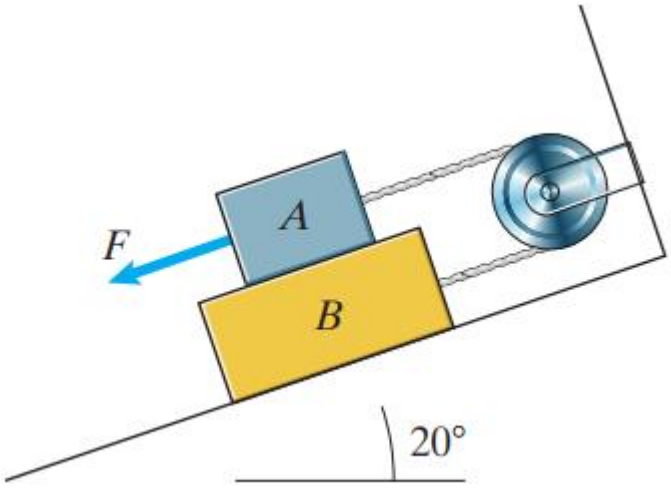
Each box weighs 10 lb. The coefficient of static friction between box A and box B is 0.24, and the coefficient of static friction between box B and the inclined surface is 0.3. What is the largest angle for which box B will not slip?

Strategy: Draw individual free-body diagrams of the two boxes and write their equilibrium equations assuming that slip of box B is impending



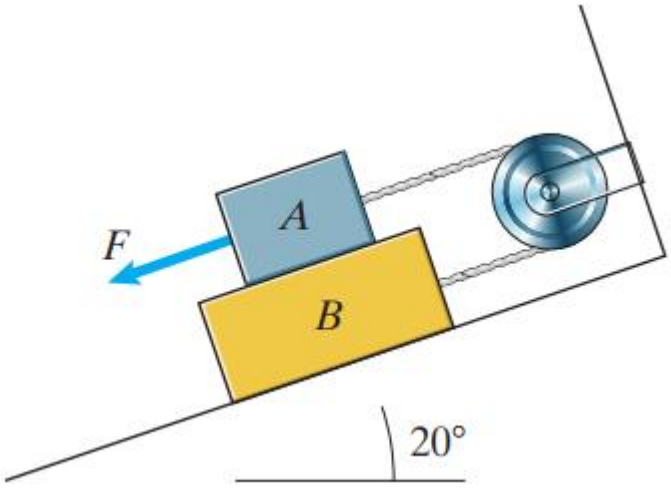
Problem 2 (9.20)

The masses of the boxes are $m_A = 15kg$ and $m_B = 60kg$. The coefficient of static friction between boxes A and B and between box B and the inclined surface is 0.12. What is the largest force F for which the boxes will not slip?



Problem 3 (9.21)

In Problem 9.20, what is the smallest force F for which the boxes will not slip?



Problem 4 (9.27)

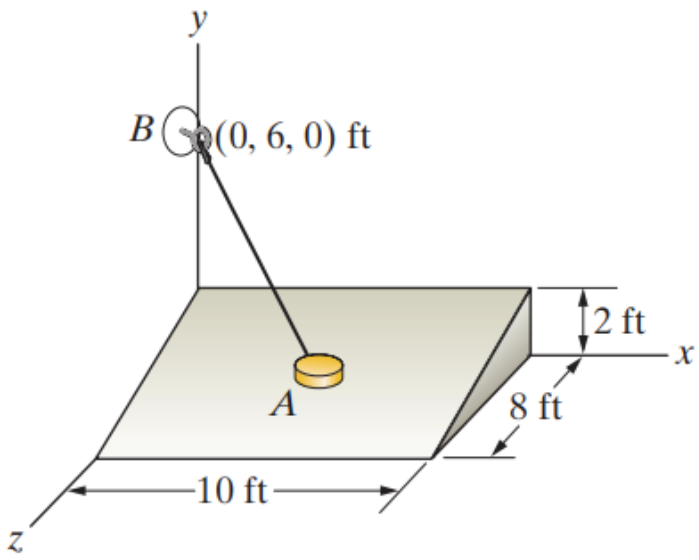
The ladder and the person weigh 30 lb and 180 lb, respectively. The center of mass of the 12-ft ladder is at its midpoint. The angle $\alpha = 30°$. Assume that the wall exerts a negligible friction force on the ladder.

(a) If $x = 4$ ft, what is the magnitude of the friction force exerted on the ladder by the floor?

(b) What minimum coefficient of static friction between the ladder and the floor is necessary for the person to be able to climb to the top of the ladder without slipping?

Problem 5 (9.62)

The 10-lb metal disk A is at the center of the inclined surface. The tension in the string AB is 5 lb. What minimum coefficient of static friction between the disk and the surface is necessary to keep the disk from slipping?



Problem 6 (9.63)

The 5-kg box is at rest on the sloping surface. The y axis points upward. The unit vector $0.557\boldsymbol{i} + 0.743\boldsymbol{j} + 0.371\boldsymbol{k}$ is perpendicular to the sloping surface. What is the magnitude of the friction force exerted on the box by the surface?