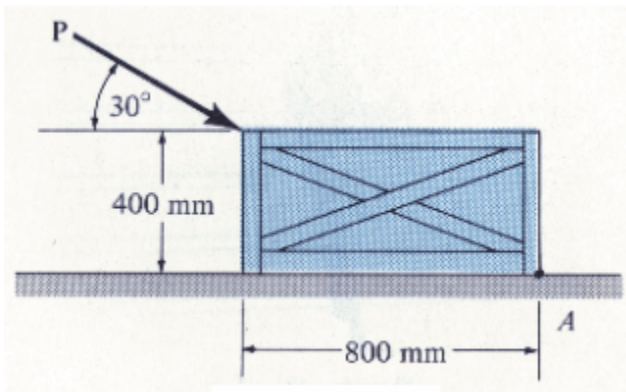


**Engineering Statics**  
**Homework 5**

1.

Determine the magnitude of force **P** needed to start moving the 50-kg crate. Also determine the location of the resultant normal force acting on the crate, measured from point *A*. The crate is symmetric with uniform mass.  $\mu = 0.3$

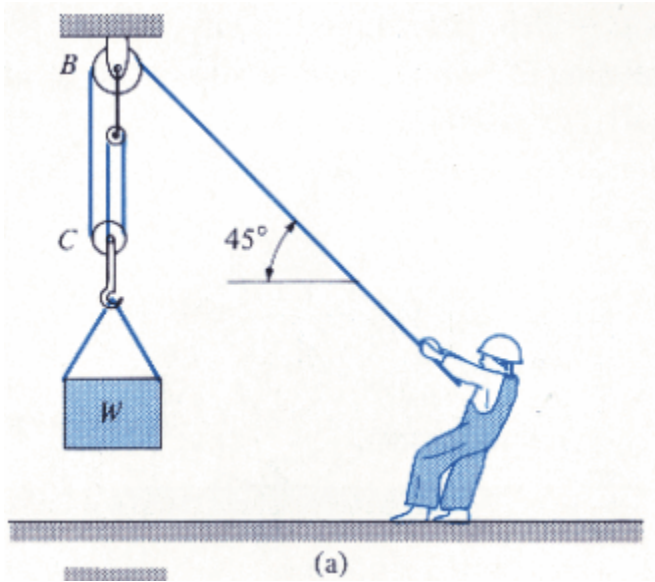


$|\mathbf{P}| = \underline{\hspace{2cm}}$  N

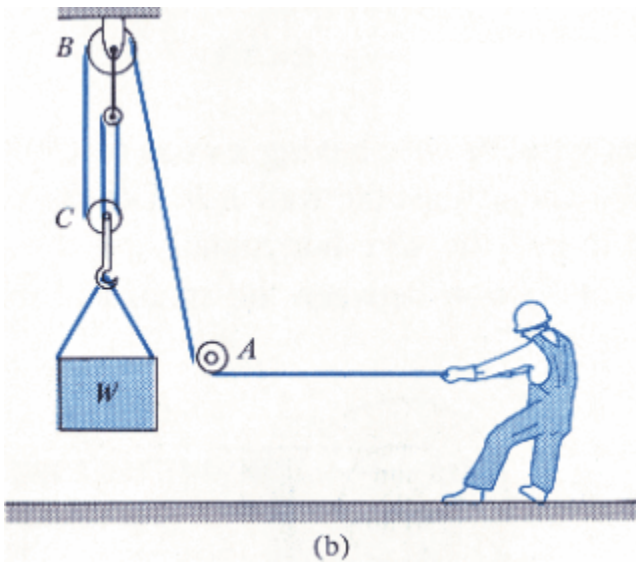
$d_N = \underline{\hspace{2cm}}$  mm

2.

Determine the maximum weight  $W$  the man can lift using the pulley system, without and then with the “leading block” or pulley at  $A$ . The man has a weight of 230 lb and the coefficient of friction between his feet and the ground is  $\mu=0.6$ .



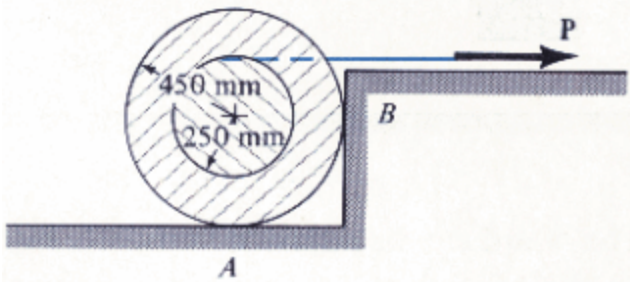
(Without pulley  $A$ )  $W_{max} =$  \_\_\_\_\_ lb



(With pulley  $A$ )  $W_{max} =$  \_\_\_\_\_ lb

3.

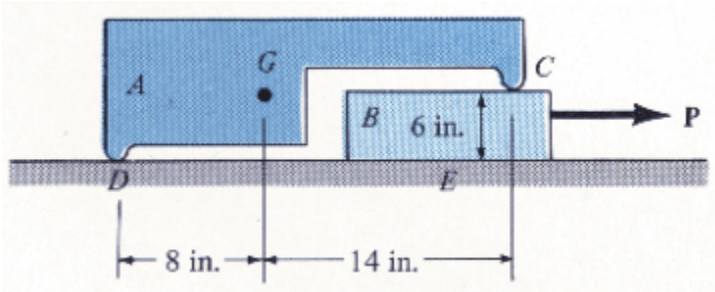
The spool of wire having a mass of 150 kg rests on the ground  $A$  and against the wall at  $B$ . Determine the force  $\mathbf{P}$  required to pull the wire horizontally off the spool. The coefficient of friction between the spool and its points of contact is  $\mu=0.25$ .



$|\mathbf{P}| = \underline{\hspace{2cm}}$  kN

4.

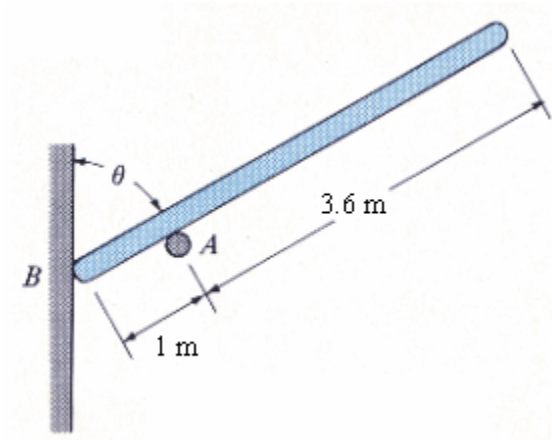
Block  $B$  has a weight of 6 lb and  $A$  weighs 10 lb. If  $A$  has a center of gravity at  $G$ , determine the greatest horizontal force  $\mathbf{P}$  which may be applied to  $B$  without causing movement of  $B$ . The coefficients of friction at  $C$ ,  $D$ , and  $E$  are  $\mu_C = 0.42$ ,  $\mu_D = 0.2$ , and  $\mu_E = 0.59$ .



$|\mathbf{P}| = \underline{\hspace{2cm}}$  lb

5.

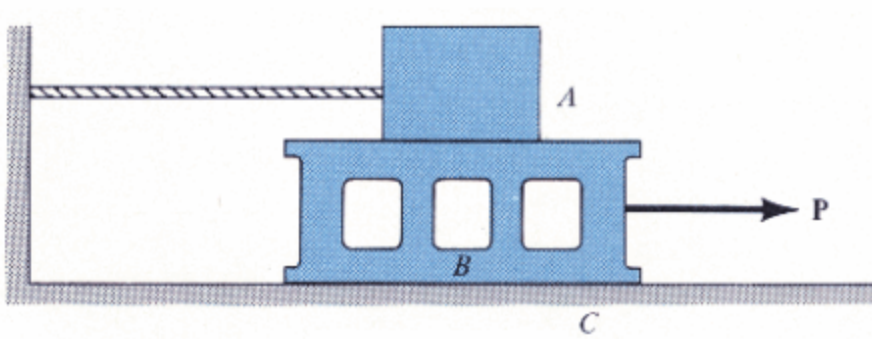
The uniform rod has a weight  $W$  and rests on a smooth peg at  $A$  and against a wall at  $B$  for which  $\mu=0.22$ . Determine the greatest angle  $\theta$  for placement of the rod so that it does not slip.



$\theta =$  \_\_\_\_\_ deg

6.

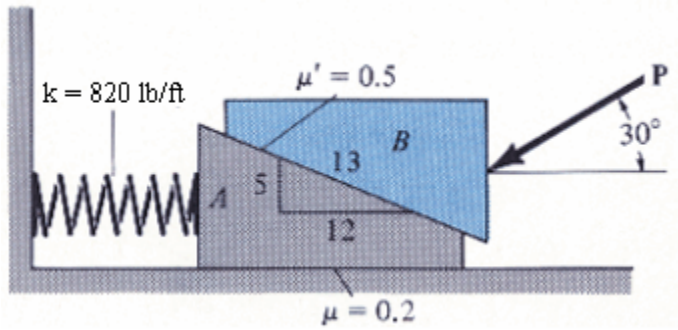
Blocks  $A$  and  $B$  weight 10 lb and 25 lb, respectively. If the coefficient of friction between  $A$  and  $B$  is  $\mu_{AB} = 0.6$  and between  $B$  and the floor  $C$ ,  $\mu_{BC} = 0.5$  determine the maximum horizontal force  $\mathbf{P}$  that can be applied without causing motion.



$|\mathbf{P}| = \underline{\hspace{2cm}}$  lb

7.

Each wedge has a weight of 440 lb. Determine how far the force  $\mathbf{P}$  can compress the spring until wedge  $B$  slips on wedge  $A$ . What is the magnitude of  $\mathbf{P}$  for this to occur?

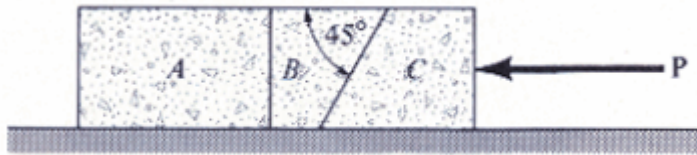


$d =$  \_\_\_\_\_ ft

$|\mathbf{P}| =$  \_\_\_\_\_ lb

8.

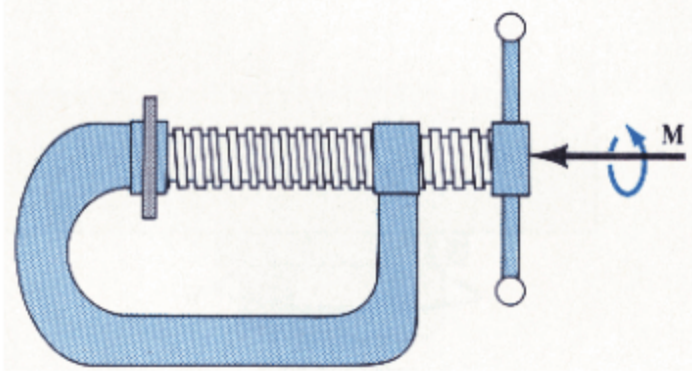
The three stone blocks have weights of  $W_A = 580$  lb,  $W_B = 180$  lb, and  $W_C = 470$  lb. Determine the smallest horizontal force  $\mathbf{P}$  that must be applied to block  $C$  in order to move this block. The coefficient of friction between the blocks is  $\mu = 0.3$  and between the floor and each block  $\mu = 0.5$ .



$|\mathbf{P}| = \underline{\hspace{2cm}}$  lb

9.

Determine the clamping force on the block of wood if the screw on the “C” clamp is tightened with a twist of  $M = 7 \text{ Nm}$ . The single square-threaded screw has a mean radius of 10 mm, a pitch of 3 mm, and the coefficient of friction is  $\mu = 0.2$ .



$F_{clamp} =$  \_\_\_\_\_ N