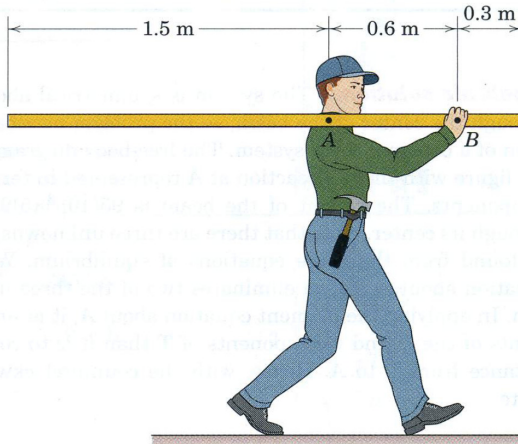


# 四造一甲靜力學 HW6

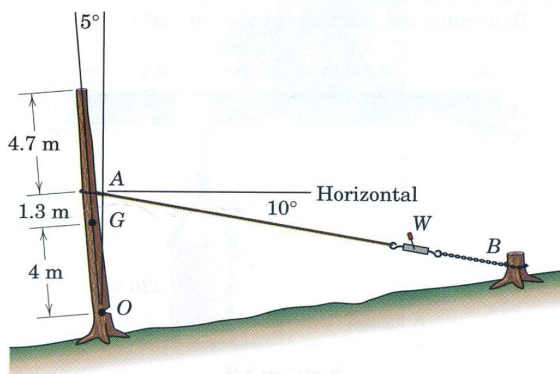
- 3/3** A carpenter carries a 6-kg uniform board as shown. What downward force does he feel on his shoulder at A?

*Ans.*  $N_A = 88.3 \text{ N}$



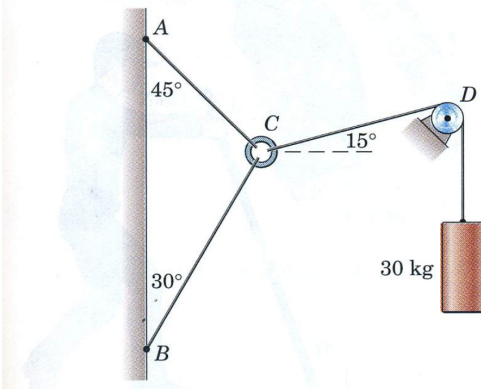
- 3/13** A woodcutter wishes to cause the tree trunk to fall uphill, even though the trunk is leaning downhill. With the aid of the winch  $W$ , what tension  $T$  in the cable will be required? The 600-kg trunk has a center of gravity at  $G$ . The felling notch at  $O$  is sufficiently large so that the resisting moment there is negligible.

*Ans.*  $T = 401 \text{ N}$



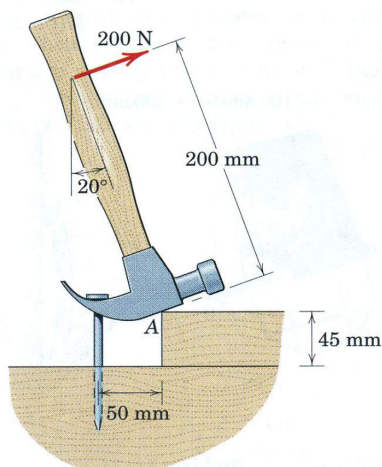
**3/15** Three cables are joined at the junction ring  $C$ . Determine the tensions in cables  $AC$  and  $BC$  caused by the weight of the 30-kg cylinder.

*Ans.*  $T_{AC} = 215 \text{ N}$ ,  $T_{BC} = 264 \text{ N}$



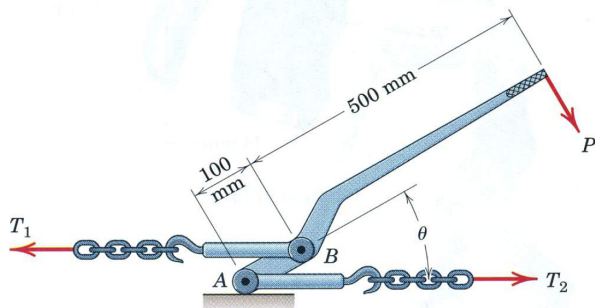
**3/25** A block placed under the head of the claw hammer as shown greatly facilitates the extraction of the nail. If a 200-N pull on the handle is required to pull the nail, calculate the tension  $T$  in the nail and the magnitude  $A$  of the force exerted by the hammer head on the block. The contacting surfaces at A are sufficiently rough to prevent slipping.

*Ans.*  $T = 800 \text{ N}$ ,  $A = 755 \text{ N}$



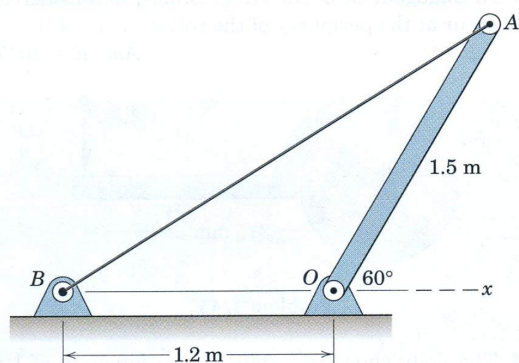
- 3/29 The chain binder is used to secure loads of logs, lumber, pipe, and the like. If the tension  $T_1$  is 2 kN when  $\theta = 30^\circ$ , determine the force  $P$  required on the lever and the corresponding tension  $T_2$  for this position. Assume that the surface under  $A$  is perfectly smooth.

Ans.  $P = 166.7 \text{ N}$ ,  $T_2 = 1.917 \text{ kN}$



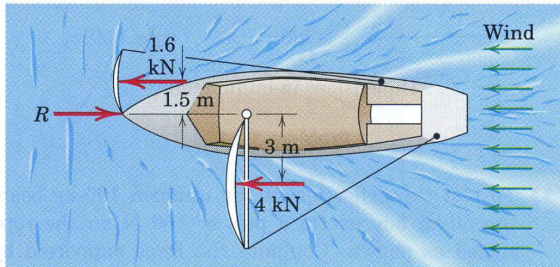
- 3/37 The uniform 18-kg bar  $OA$  is held in the position shown by the smooth pin at  $O$  and the cable  $AB$ . Determine the tension  $T$  in the cable and the magnitude and direction of the external pin reaction at  $O$ .

Ans.  $T = 99.5 \text{ N}$ ,  $O = 246 \text{ N}$ ,  $70.3^\circ$  CCW from  $x$ -axis



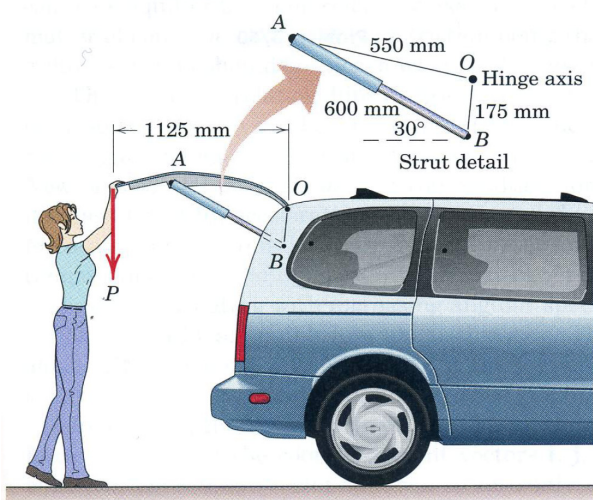
- 3/45** In sailing at a constant speed with the wind, the sailboat is driven by a 4-kN force against its mainsail and a 1.6-kN force against its staysail as shown. The total resistance due to fluid friction through the water is the force  $R$ . Determine the resultant of the lateral forces perpendicular to motion applied to the hull by the water.

*Ans.  $M = 9.6 \text{ kN} \cdot \text{m}$*



- 3/55** It is desired that a person be able to begin closing the van hatch from the open position shown with a 40-N vertical force  $P$ . As a design exercise, determine the necessary force in each of the two hydraulic struts  $AB$ . The mass center of the 40-kg door is 37.5 mm directly below point  $A$ . Treat the problem as two-dimensional.

*Ans.  $F = 803 \text{ N}$*



- 3/57** Determine the tension  $T$  in the turnbuckle for the pulley-cable system in terms of the mass  $m$  of the body which it supports. Neglect the mass of the pulleys and cable.

*Ans.*  $T = \frac{2}{7}mg$

