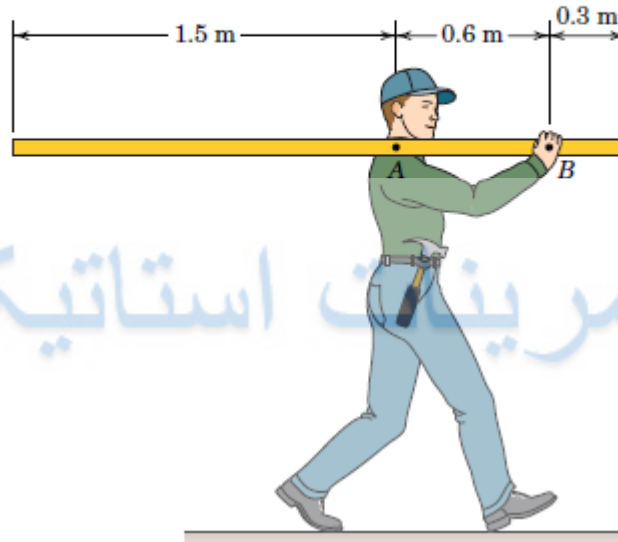


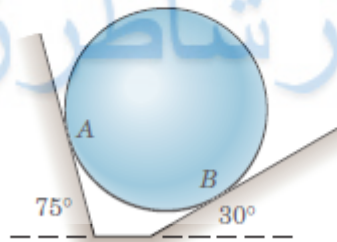
1

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

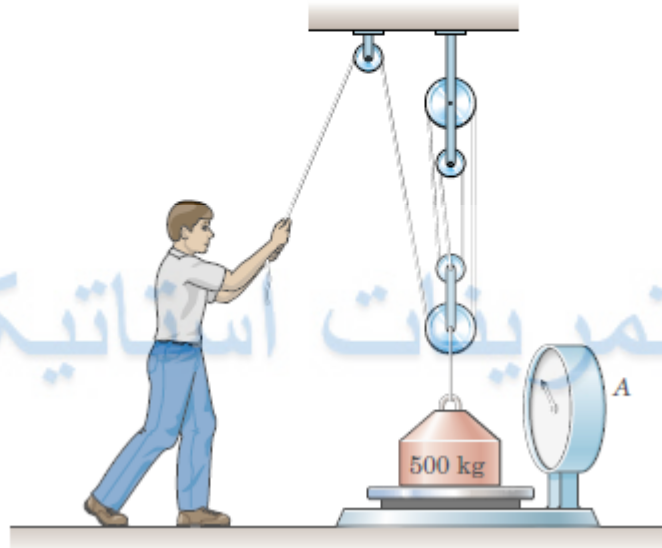


2

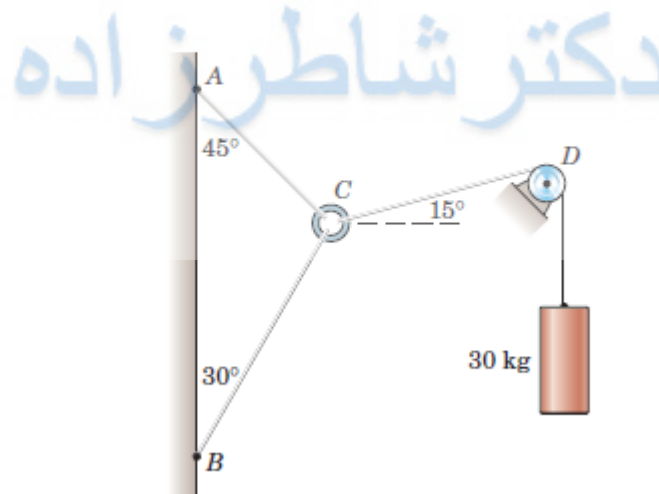
The 20-kg homogeneous smooth sphere rests on the two inclines as shown. Determine the contact forces at  $A$  and  $B$ .



With what force magnitude  $T$  must the person pull on the cable in order to cause the scale  $A$  to read 2000 N? The weights of the pulleys and cables are negligible. State any assumptions.

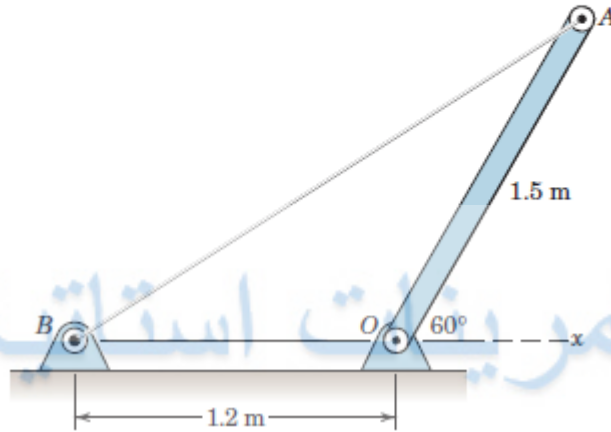


Three cables are joined at the junction ring  $C$ . Determine the tensions in cables  $AC$  and  $BC$  caused by the weight of the 30-kg cylinder.



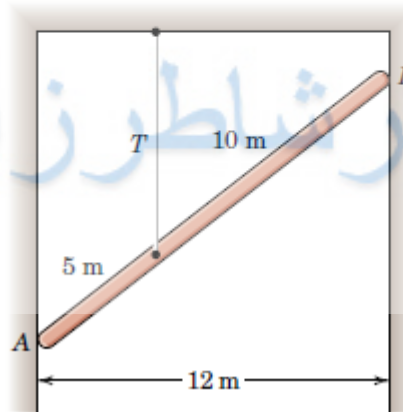
5

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  $O$ .



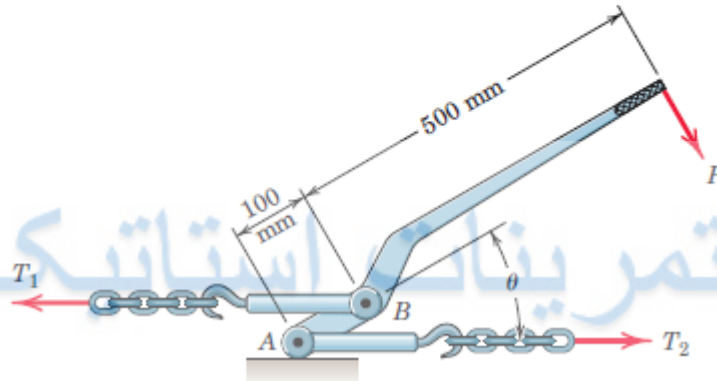
6

The uniform 15-m pole has a mass of 150 kg and is supported by its smooth ends against the vertical walls and by the tension  $T$  in the vertical cable. Compute the reactions at  $A$  and  $B$ .



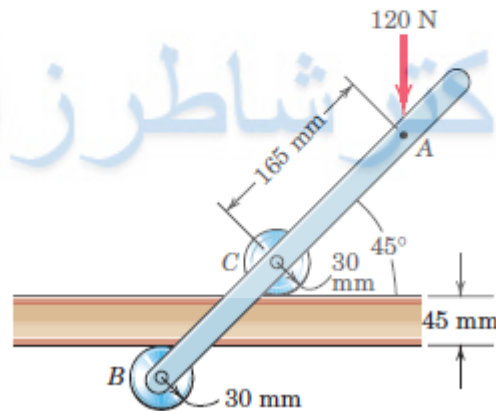
7

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.



8

The device shown is designed to apply pressure when bonding laminate to each side of a countertop near an edge. If a 120-N force is applied to the handle, determine the force which each roller exerts on its corresponding surface.



9

The exercise machine is designed with a lightweight cart which is mounted on small rollers so that it is free to move along the inclined ramp. Two cables are attached to the cart—one for each hand. If the hands are together so that the cables are parallel and if each cable lies essentially in a vertical plane, determine the force  $P$  which each hand must exert on its cable in order to maintain an equilibrium position. The mass of the person is 70 kg, the ramp angle  $\theta$  is  $15^\circ$ , and the angle  $\beta$  is  $18^\circ$ . In addition, calculate the force  $R$  which the ramp exerts on the cart.



10

The member  $OBC$  and sheave at  $C$  together have a mass of 500 kg, with a combined center of mass at  $G$ . Calculate the magnitude of the force supported by the pin connection at  $O$  when the 3-kN load is applied. The collar at  $A$  can provide support in the horizontal direction only.

