ENGINEERING MECHANICS
BAA1113

TUTORIAL 3 (CO2)

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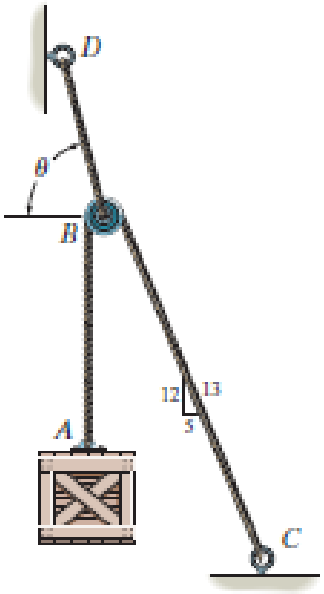
TUTORIAL 3

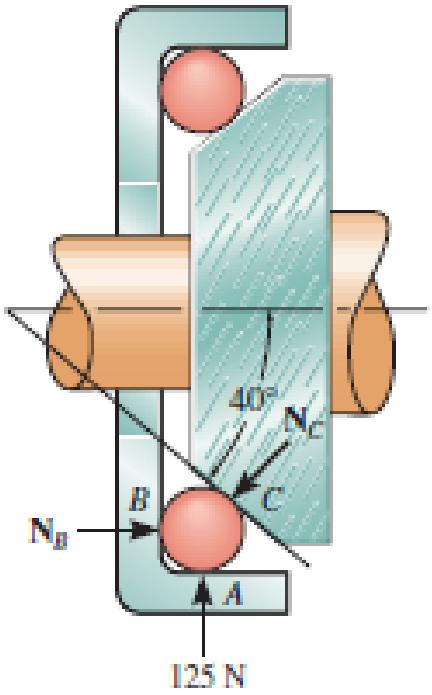
T1) The cords ABC and BD can each support a maximum load of 100 lb. Determine the maximum weight of the crate and the angle θ for equilibrium



ans: W = 51 lb , θ = 78.7°

TUTORIAL 3

T2) The bearing consists of rollers, symmetrically confined within the housing. The bottom one is subjected to a 125 N force at its contact A due to the load on the shaft. Determine the normal reactions N_B and N_C on the bearing at its contact points B and C for equilibrium



ans: N_B = 105 N and N_C = 163 N

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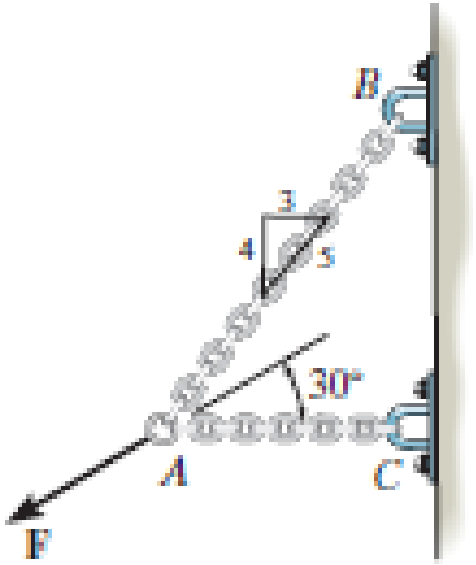
T3) Determine the maximum force **F** that can be supported in the position shown if each chain can support a maximum tension of 600 lb before it fails



ans: $T_{AB} = 0.625\ F$, $T_{AC} = 0.4910\ F$, $F = 960\text{lb}$

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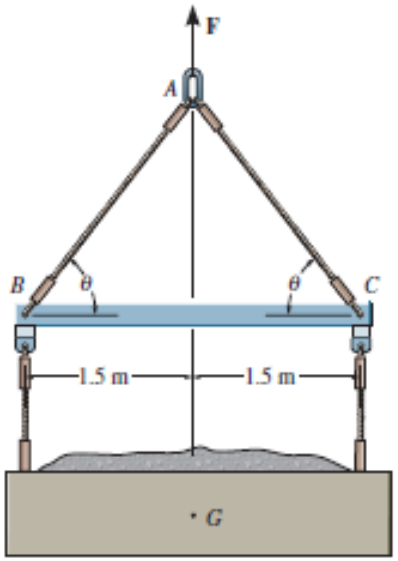
T4) The lift sling is used to hoist a container having a mass of 500 kg. Determine the **force** in each of the cables AB and AC as a function of θ. If the maximum tension allowed in each cable is 5 kN, determine the shortest **lengths** of cables AB and AC that can be used for the lift. The center of gravity of the container is located at G



ans: $F_{AC} = F_{AB} = F = \{2.45 \cos \theta\}$ kN , l = 1.72 m

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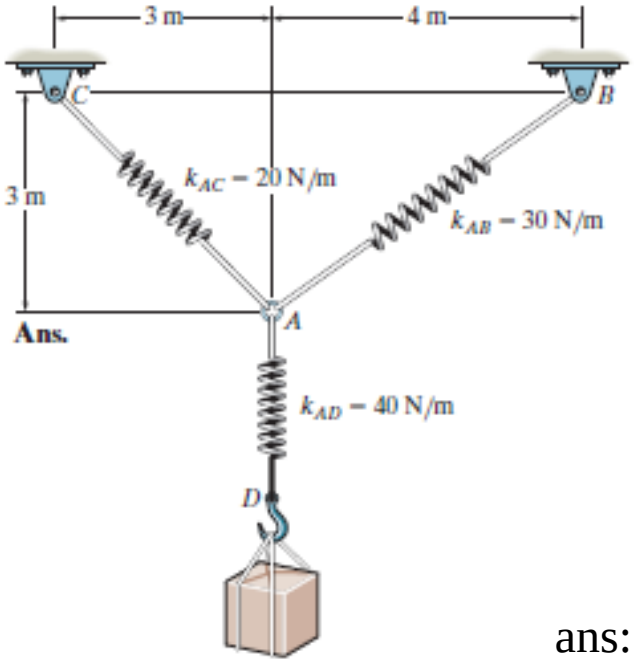
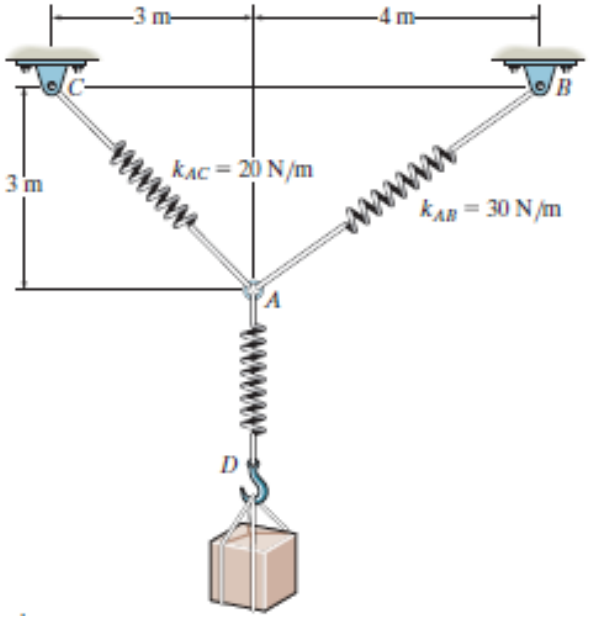
T5) Determine the stretch in each spring for equilibrium of the 2 kg block. The springs are shown in the equilibrium position



ans: F_{AC} = 15.86 N, *s* = *0.793* m, F_{AB} = 14.01 N , *s* = *0.467* m,

TUTORIAL 3

T6) The upstretched length of spring AB is 3m . If the block is held in the equilibrium position shown, determine the mass of the block at D



ans: T = 67.88 N, W= 84 N, m = *8.56 kg*

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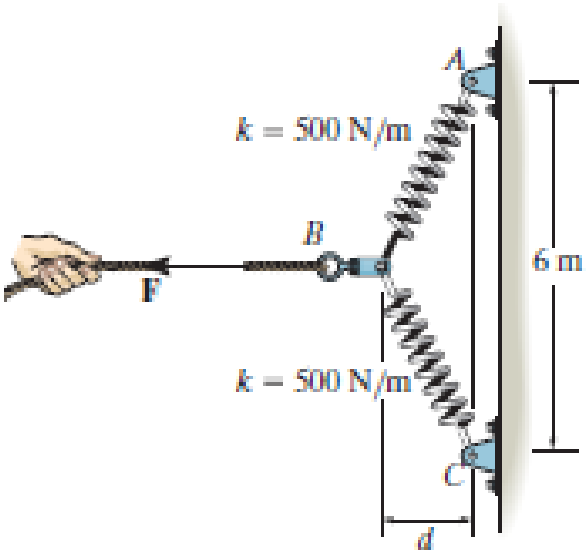
T7) The spring BA and BC each have a stiffness of 500 N/m and an unstretched length of 3m . Determine the horizontal force **F** applied to the cord which is attached to the small ring B so that the displacement of the ring from the wall is d = 1.5 m



ans: T = 177.05 N, F = 158 N

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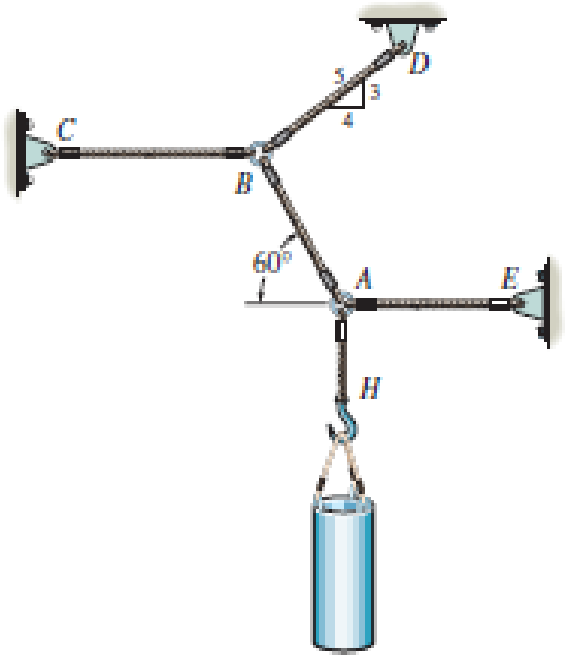
T8) Each cord can sustain a maximum tension of 500 N. Determine the largest mass of pipe that can be supported



ans: W = 261.69 N, m = 26.7 kg

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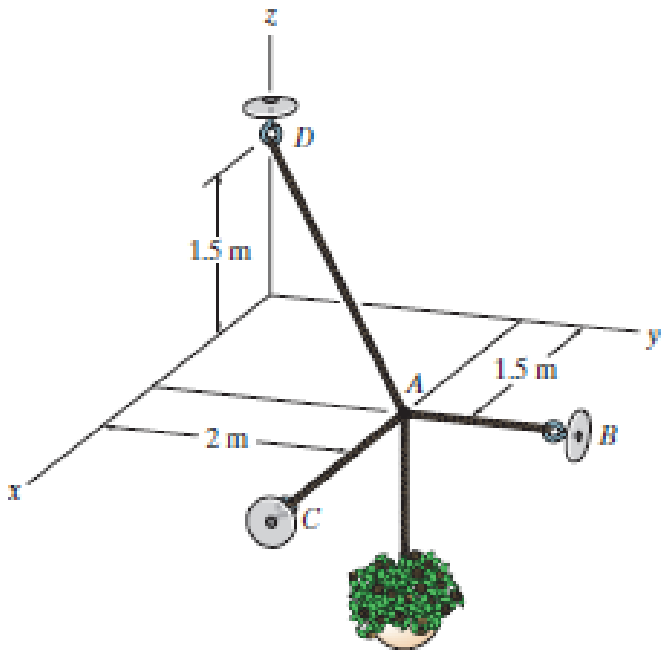
T9) The three cables are used to support the 40 kg flower pot. Determine the force developed in each cable for equilibrium



ans: F_{AD} = 763 N, F_{AC} = 392 N , F_{AB} = 532 N

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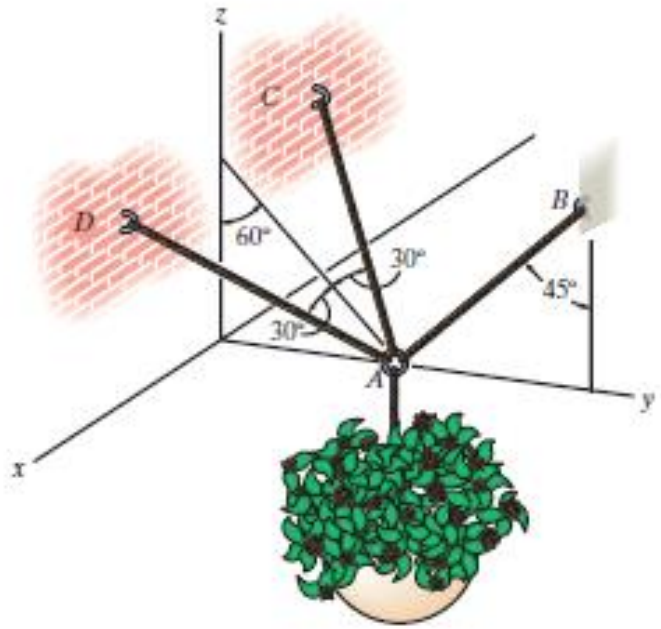
T10) The three cables are used to support the 25 kg flower pot. Determine the force developed in each cable for equilibrium



ans: $F_{AD} = F_{AC} = 104$ N , $F_{AB} = 220$ N

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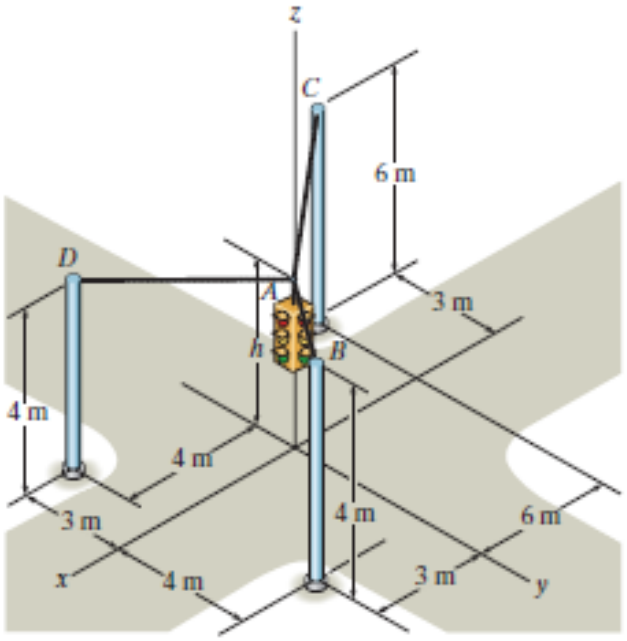
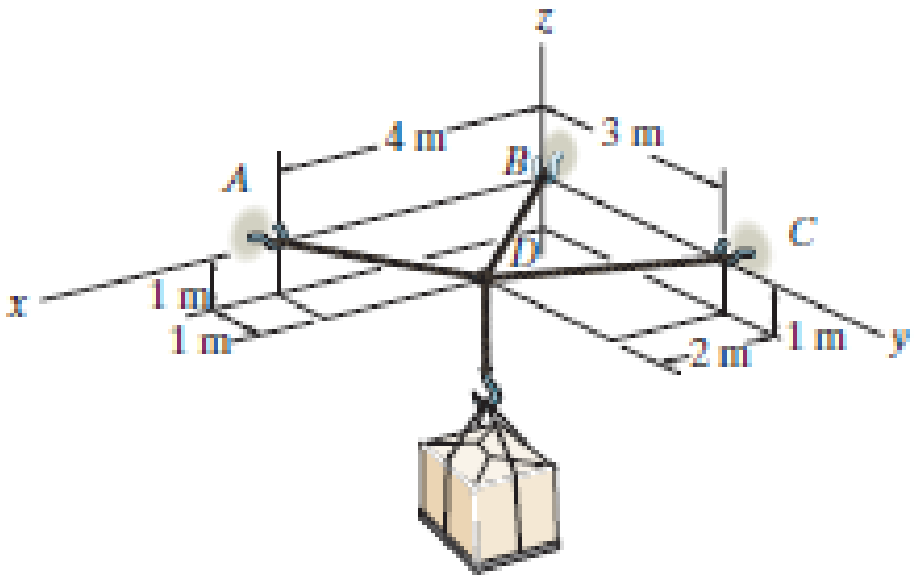
T11) Determine the tension developed in the three cables required to support the traffic light, which has a mass of 15 kg. Take h = 4 m



ans: F_{AB} = 441 N, F_{AC} = 515 N , F_{AD} = 221 N

TUTORIAL 3

T12) The crate has a mass of 130 kg. Determine the tension developed in the three cables.



ans: F_{AD} = 1.56 kN, F_{BD} = 521 N , F_{CD} = 1.28 k N