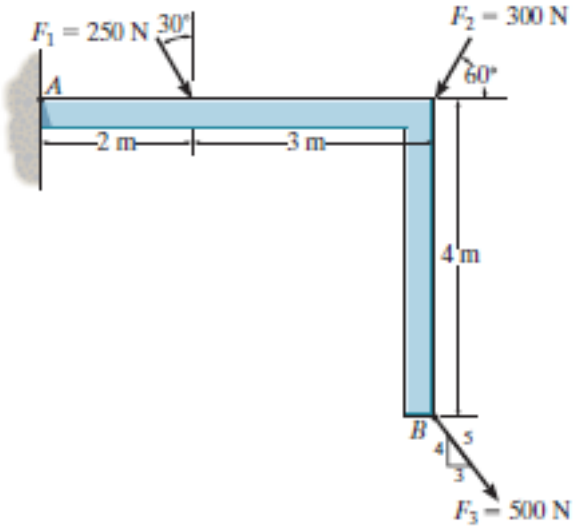
ENGINEERING MECHANICS
BAA1113

TUTORIAL 4(CO2)

by
Pn.Rokiah Bt Othman
Faculty of Civil Engineering & Earth Resources
nadrah@ump.edu.my

TUTORIAL 4

T1) Determine the moment of each of the three forces about point A



ans: $(M_{F1})_A = 433$ N.m CW , $(M_{F2})_A = 1299$ N.m CW, $(M_{F3})_A = 800$ N.m CW

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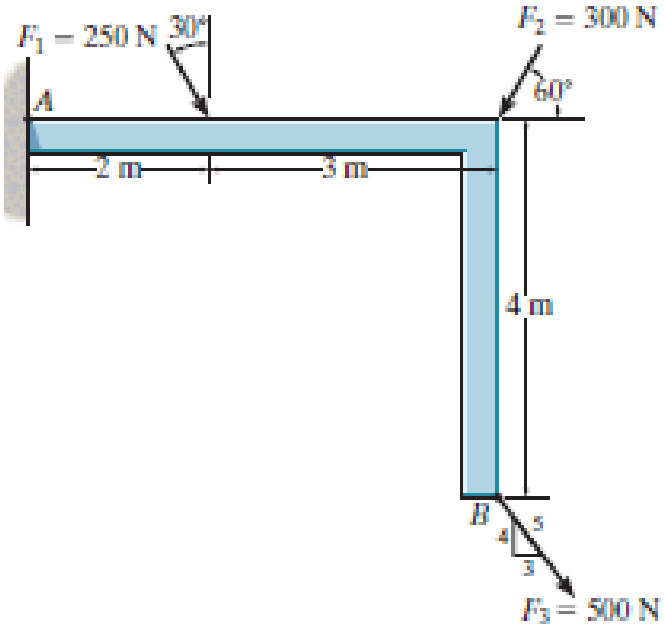
T2) Determine the moment of each of the three forces about point B



ans: $(M_{F1})_B = 150$ N.m CCW , $(M_{F2})_B = 600$ N.m CCW, $(M_{F3})_B = 0$ N.m

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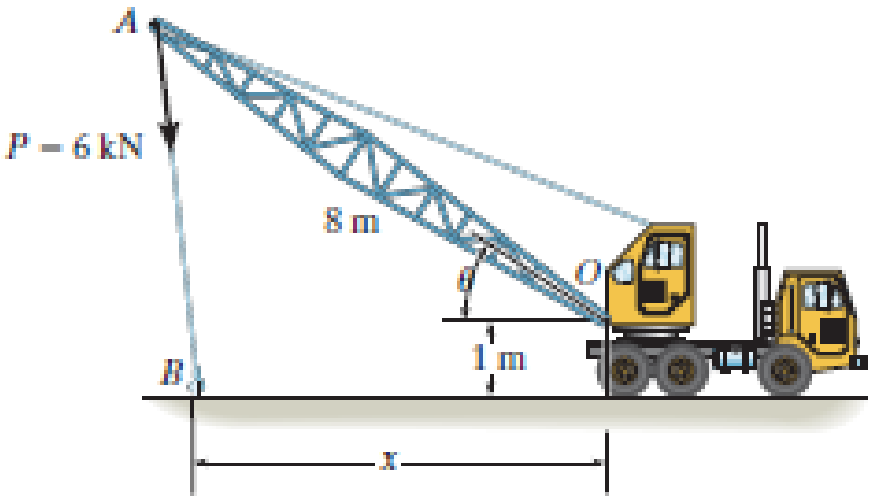
T3) The towline exerts a force of P = 6 kN at the end of the 8 m long crane boom. If $\theta = 30°$, determine the placement x of the hook at B so this force creates a maximum moment about point O. what is this momnet?



ans: $(M_O)_{max}$= 480 kN.m CCW , X = 9.814 m = 9.81 m

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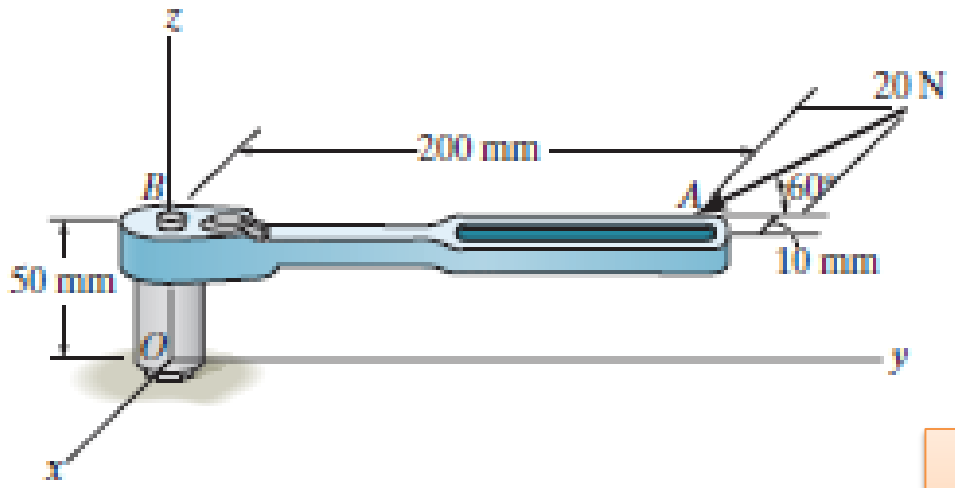
T4) The 20 N horizontal force acts on the handle of the socket wrench. What is the moment of this force about point B. Specify the coordinate direction angles α, β, γ of the moment axis



$\alpha = \cos^{-1}(0) = 90°$

$\beta = \cos^{-1}(0) = 90°$

$\gamma = \cos^{-1}(-1) = 108°$

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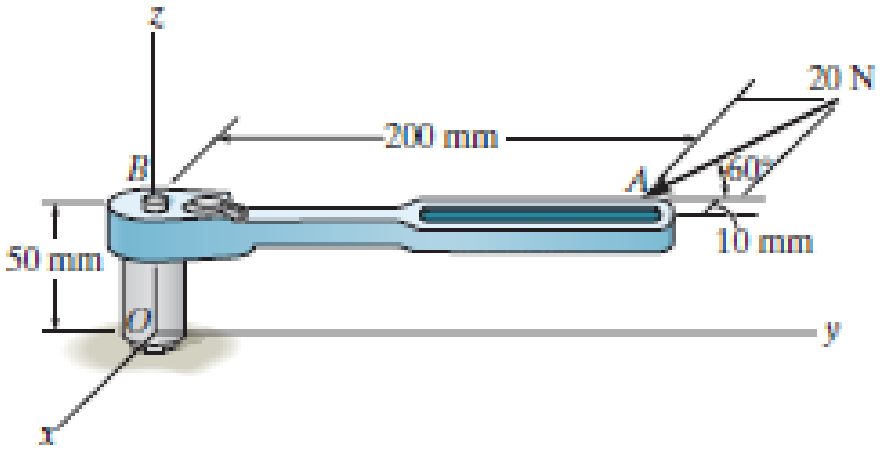
T5) The 20 N horizontal force acts on the handle of the socket wrench. Determine the moment of this force about point O. Specify the coordinate direction angles α, β, γ of the moment axis



ans: $M_O = [0.5\,i + 0.866j - 3.36\,k]$ N.m

$\alpha = 81.8°$

$\beta = 75.7°$

$\gamma = 163°$

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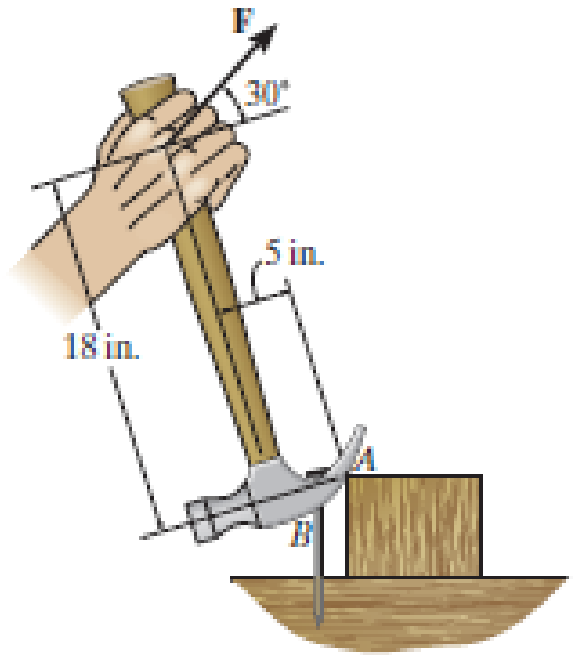
T6) The handle of the hammer is subjected to the force of F = 20 lb. Determine the moment of this force about the point A



M_A = 362 lb.in CW

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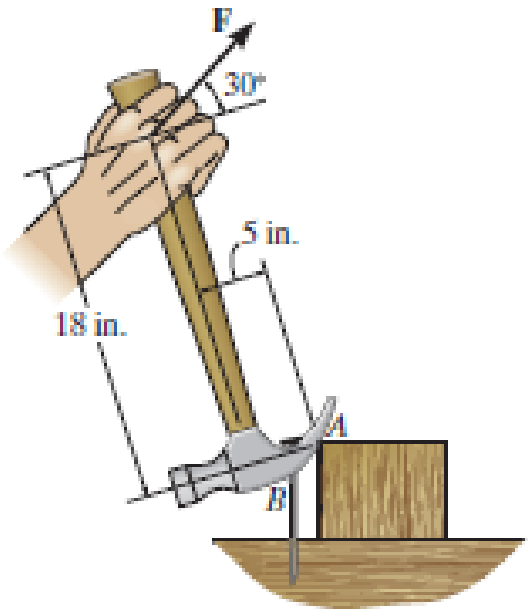
T7) In order to pull out the nail at B, the force F exerted on the handle of the hammer must produce a clockwise moment of the 500 lb. in about point A. Determine the required magnitude of force F.



ans: F = 27.6 lb

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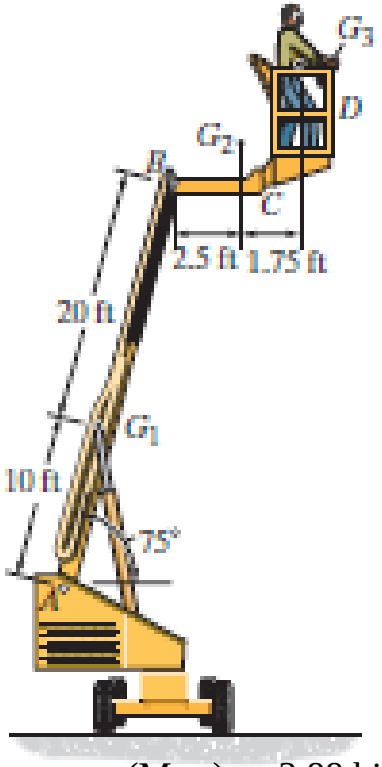
T8) If the 1500 lb boom AB, the 200 lb cage BCD, and the 175 lb man have centers of gravity located at points G1,G2 and G3, respectively, determine the resultant moment produced by each weight about point A



ans: $(M_{AB})_A$= 3.88 kip.ft CW , $(M_{BCD})_A$= 2.05 kip.ft CW, $(M_{MAN})_A$= 210 kip.ft CW

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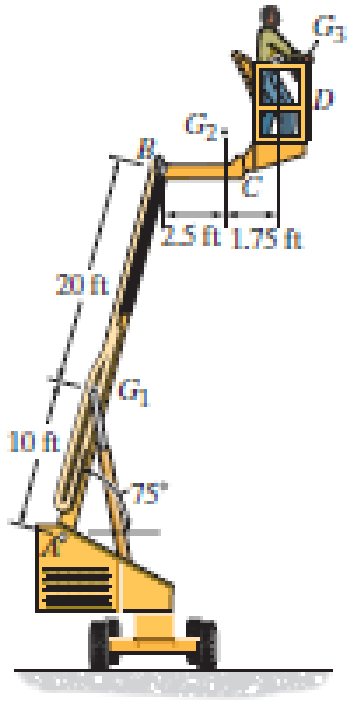
T9) If the 1500 lb boom AB, the 200 lb cage BCD, and the 175 lb man have centers of gravity located at points G1,G2 and G3, respectively, determine the resultant moment produced by all the weights about point A



$(M_R)_A$ = 804 kip.ft CW

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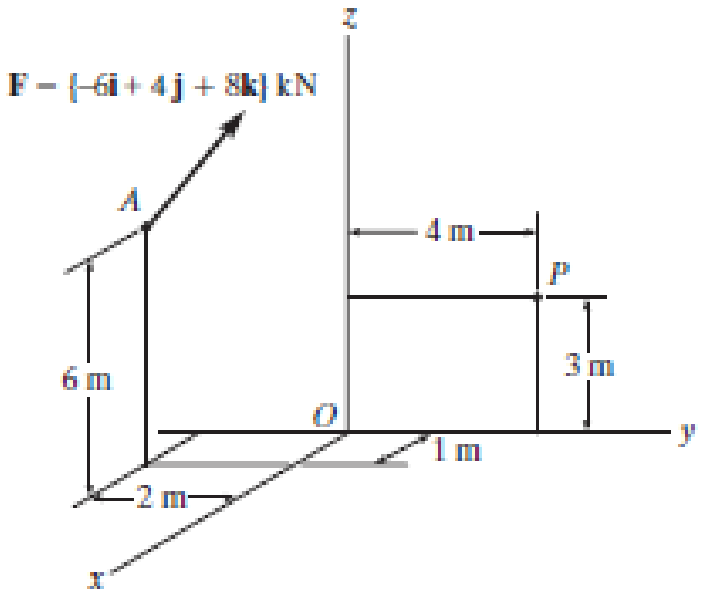
T10)Determine the moment of the force F about point O. Express the result as a Cartesian vector



ans: M_O= [-40 i - 44j -8 k] kN.m

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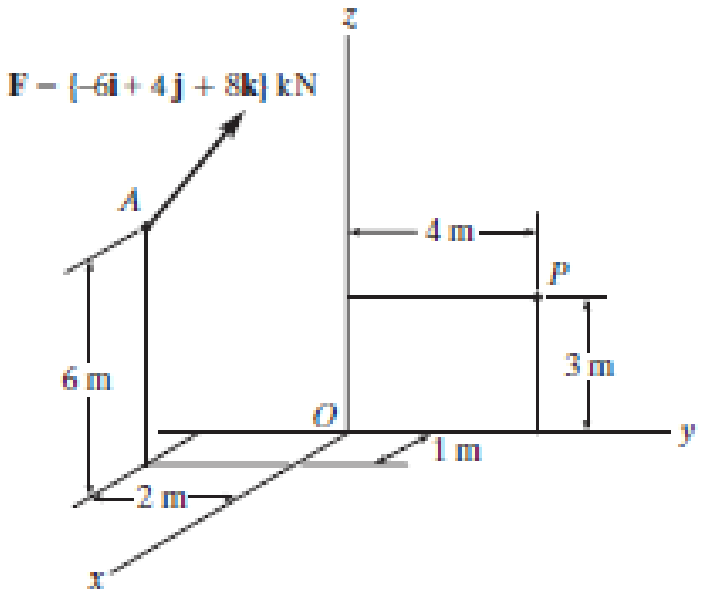
T11)Determine the moment of the force F about point P. Express the result as a Cartesian vector



ans: M_P= [-60 i - 26 j- 32k] kN.m

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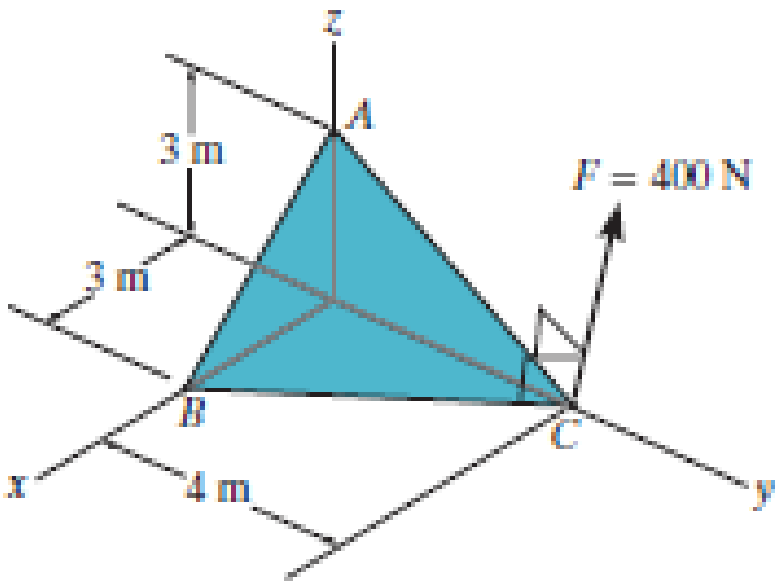
T12) Force F acts perpendicular to the inclined plane. Determine the moment produced by F about point B.



ans: M_B= {1 i + 0.750 j- 1.56 k} kN.m