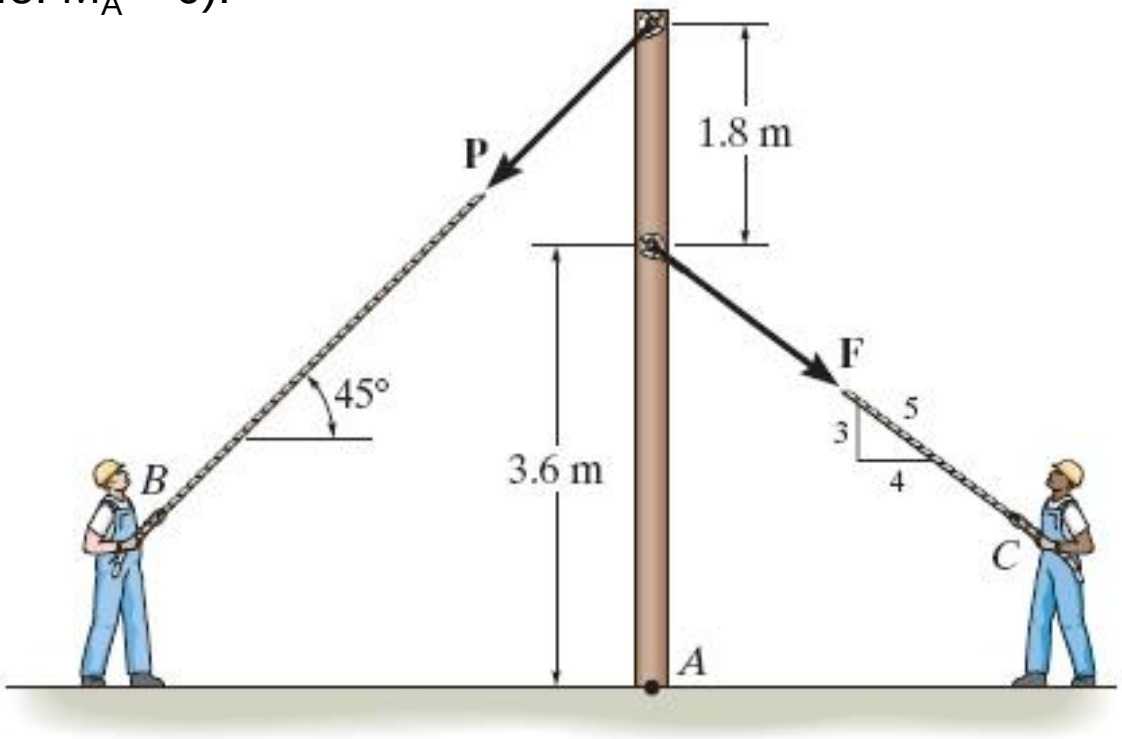
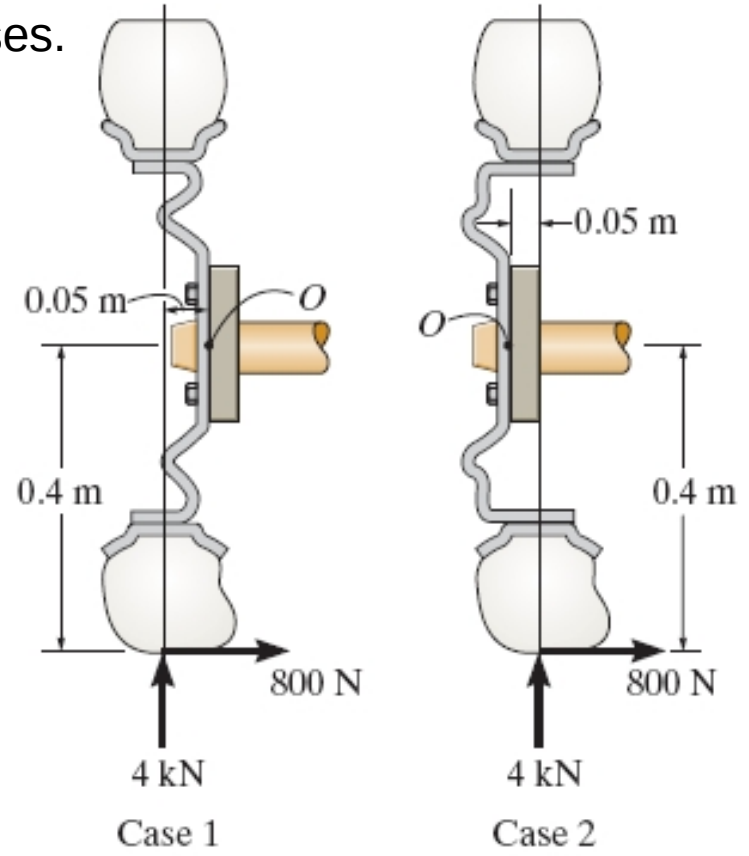
4-4. Two men exert forces of F = 400 N and P = 250 N on two ropes. Determine the moment of each force about A.

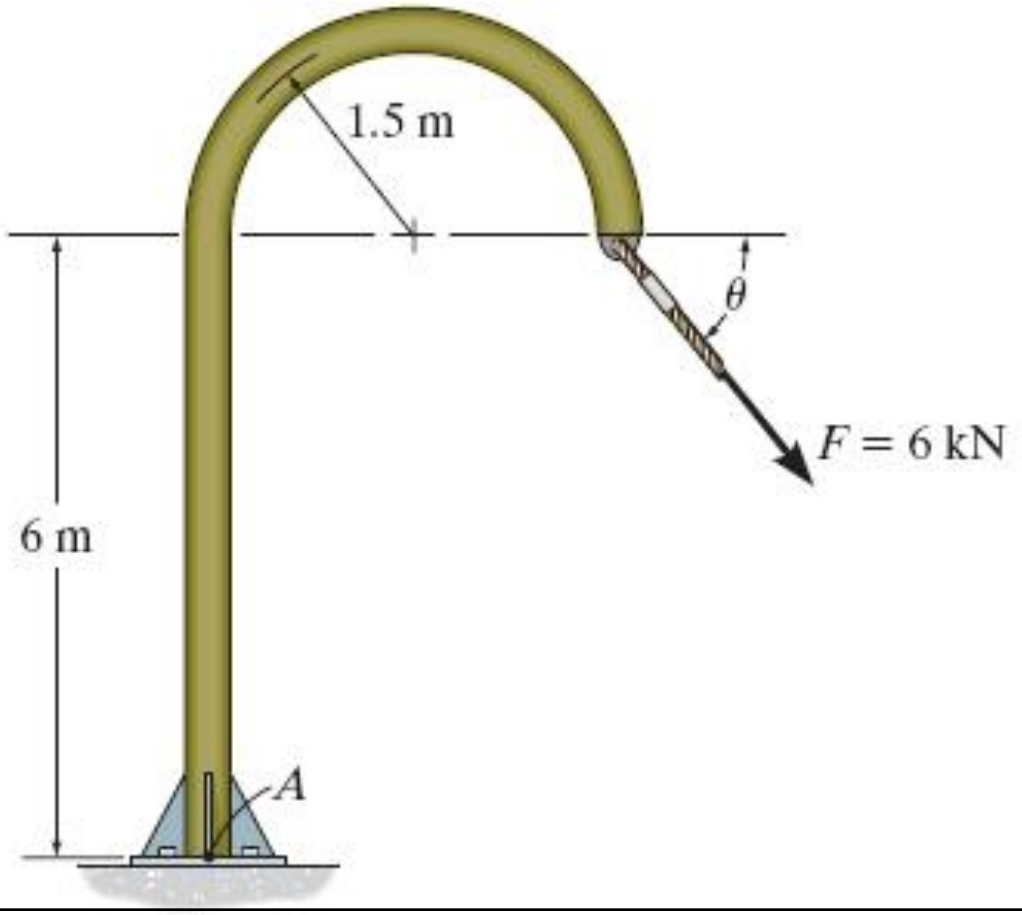
4-5. If the man at B exerts a force of P = 150 N on his rope, determine the magnitude of force F the man at C must exert to prevent pole from rotating (i.e. $M_A = 0$).



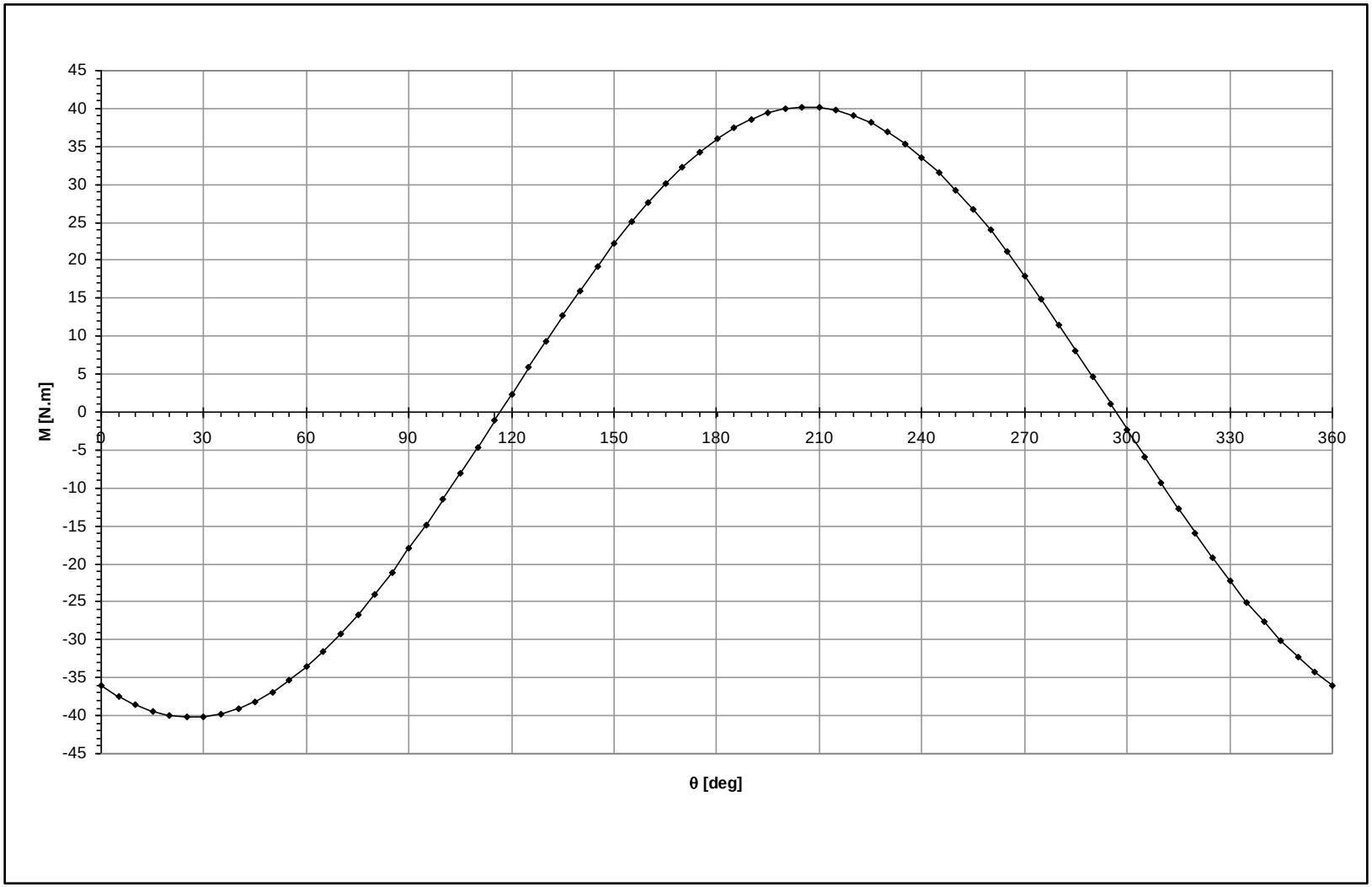
4-10. The hub of the wheel can b attached to the axle either with negative offset (left) or positive offset (right). If the tire is subjected to both a normal and radial force as shown, determine the resultant moment of these loads about point O on the axle for both cases.



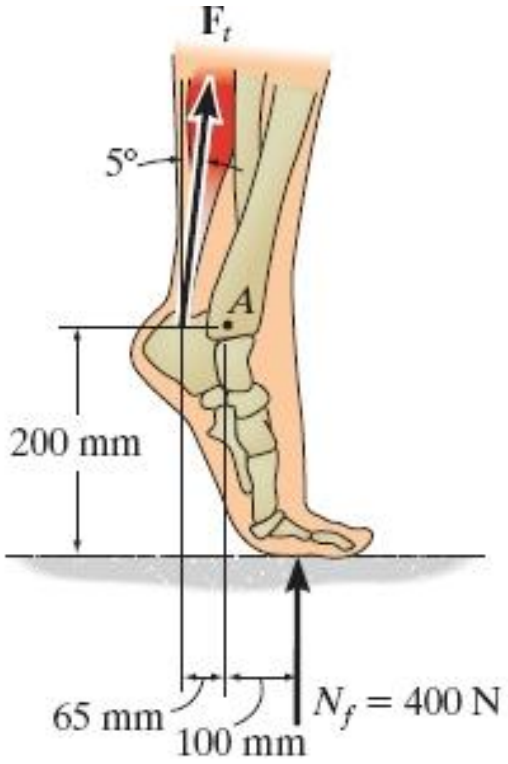
4-13. Determine the moment produced by the force F about point A in terms of the angle q. Plot the graph of M_A versus q.



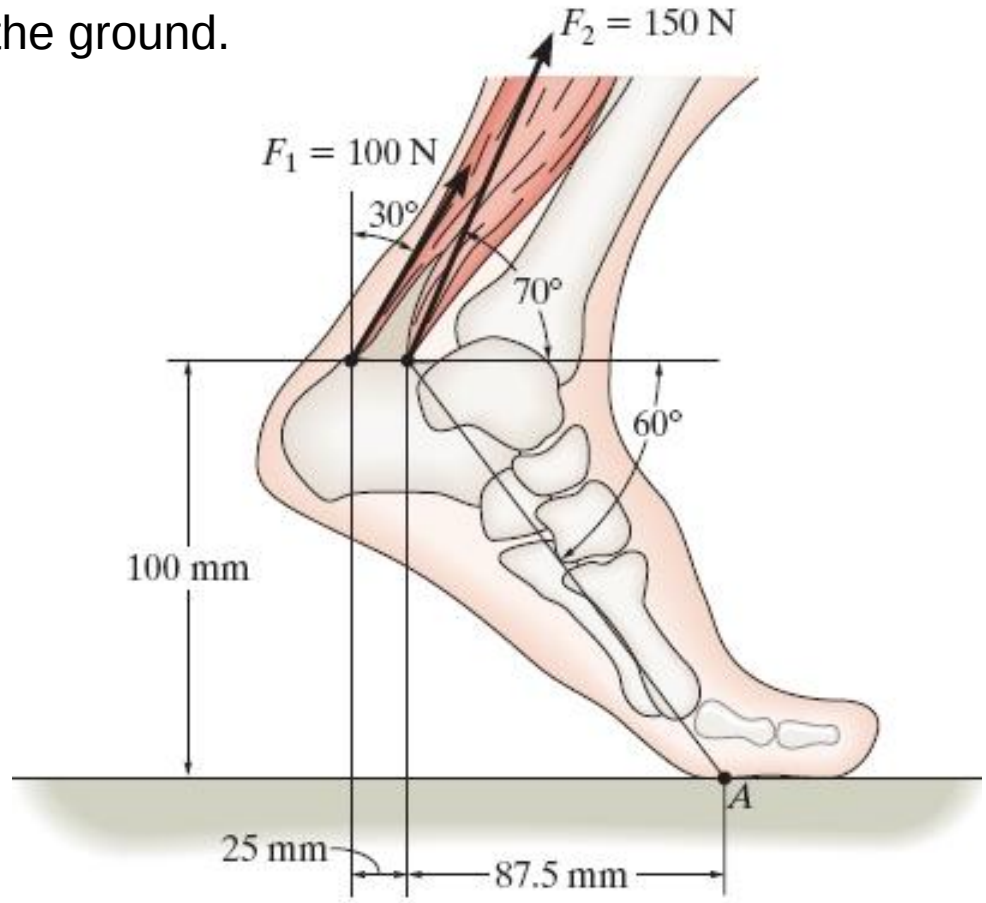
θ [deg]	M_0 [N.m]														
0	-36	=-36*COS(A2*PI()/180)-18*SIN(A2*PI()/180)													
5	-37.4318	=-36*COS(A3*PI()/180)-18*SIN(A3*PI()/180)													
10	-38.5787														
15	-39.4321														
20	-39.9853														
25	-40.2342														
30	-40.1769														
35	-39.8138														
40	-39.1478														
45	-38.1838														
50	-36.9292														
55	-35.3935														
60	-33.5885														
65	-31.5278														
70	-29.2272														
75	-26.7042														
80	-23.9779														
85	-21.0691														
90	-18														
95	-14.7939														
100	-11.4752														
105	-8.06918														
110	-4.60174														
115	-1.09928														
120	2.411543														
125	5.904015														
130	9.351554														
135	12.72792														
140	16.00742														
145	19.1651														
150	22.17691														
155	25.01995														


45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
M [N.m]
0
30
60
90
120
150
180
210
240
270
300
330
360
θ [deg]

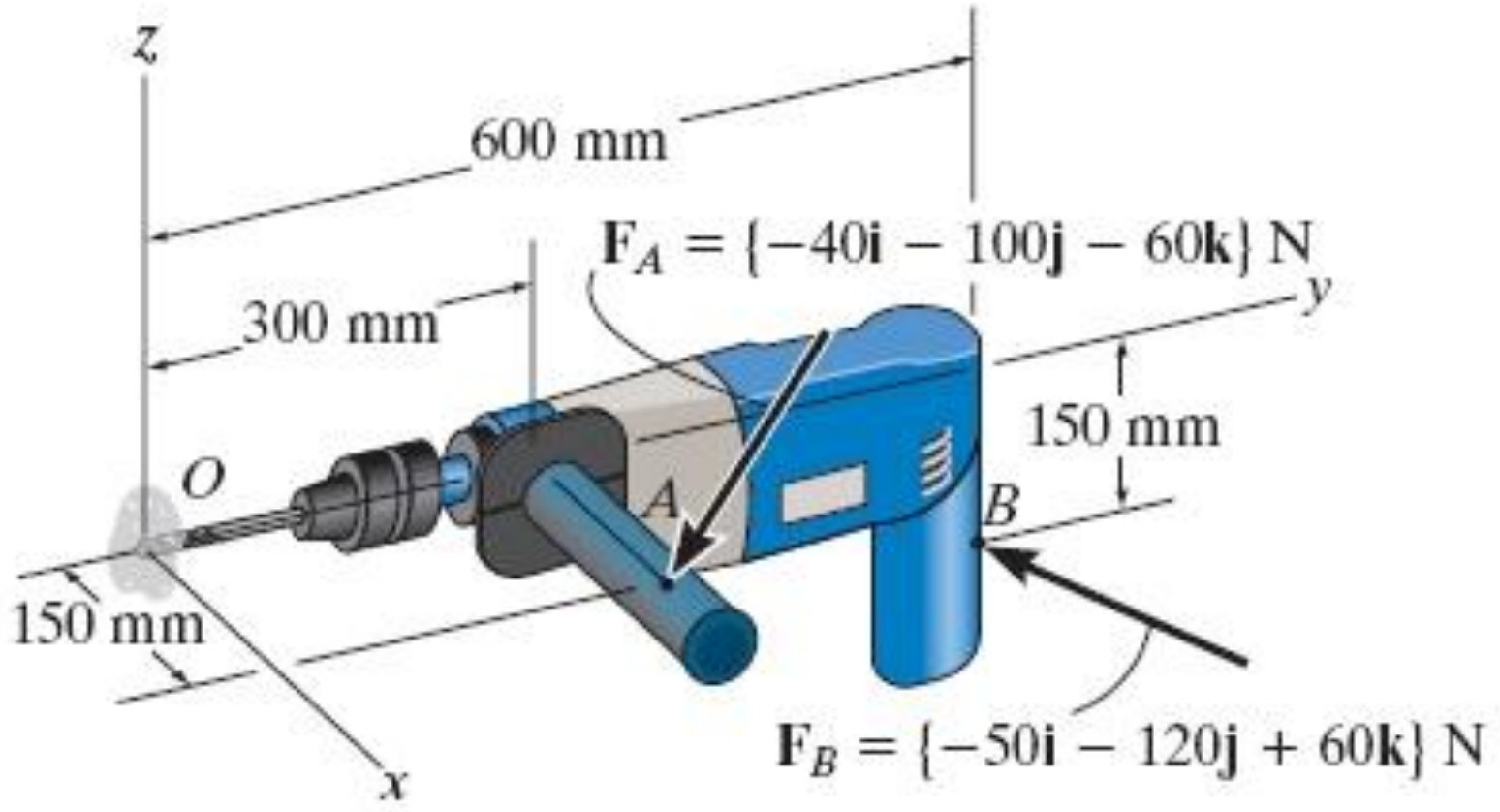
4-16. The Achilles tendon force F_t is mobilized when one stands on toes. As this is done foot is subjected to a ground reaction force of N_t = 400 N The resultant of these two forces about the ankle joint has to be zero. Determine the magnitude of the Achilles tendon force F_t.



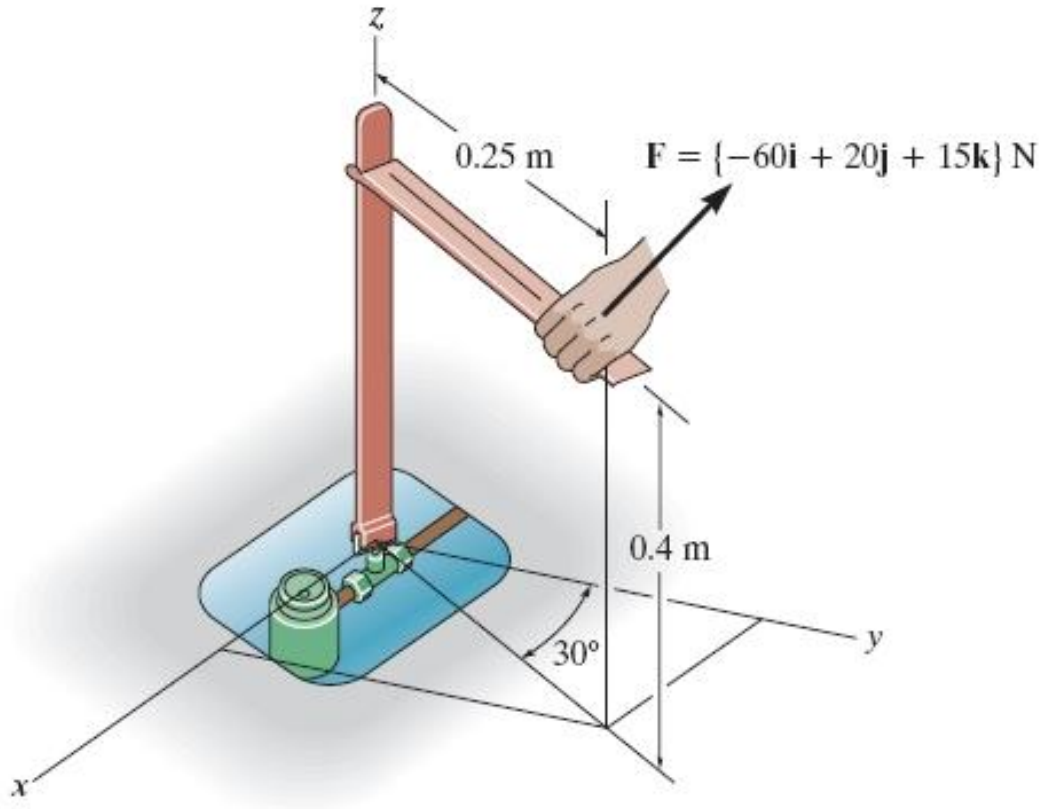
4-26. The foot segment is subjected to the pull of the two plantarflexor muscles. Determine the moment of each of these forces about the point of contact A on the ground.



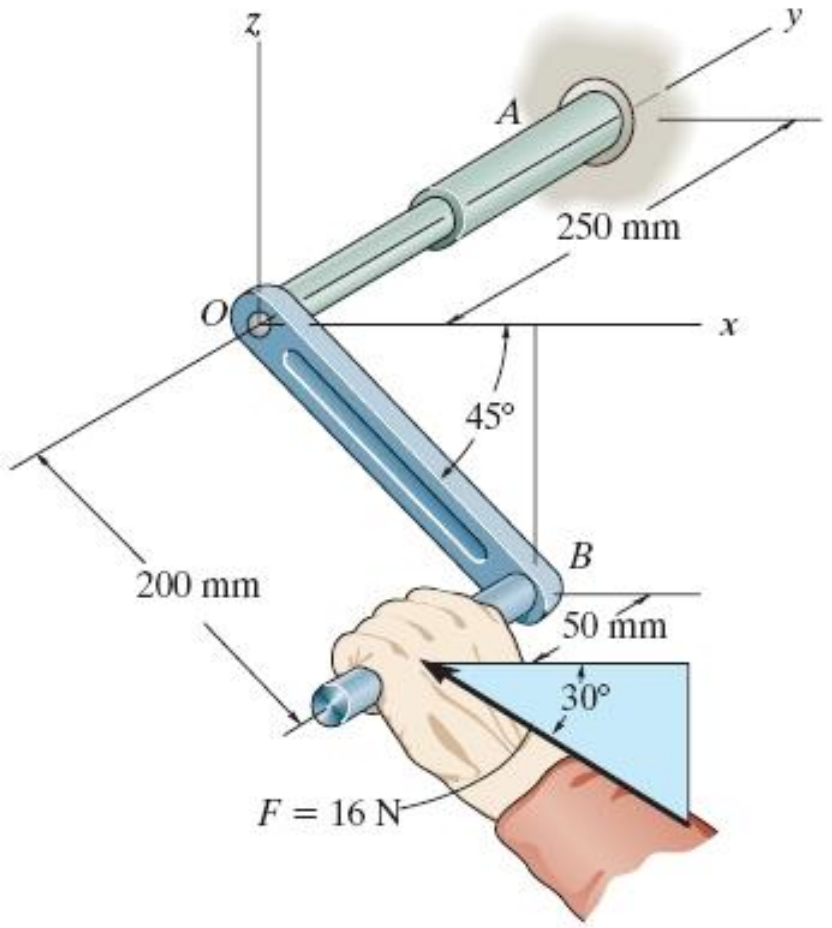
4-43. Determine the moment produced by each force about point O located on the drill bit. Express results as Cartesian vectors.



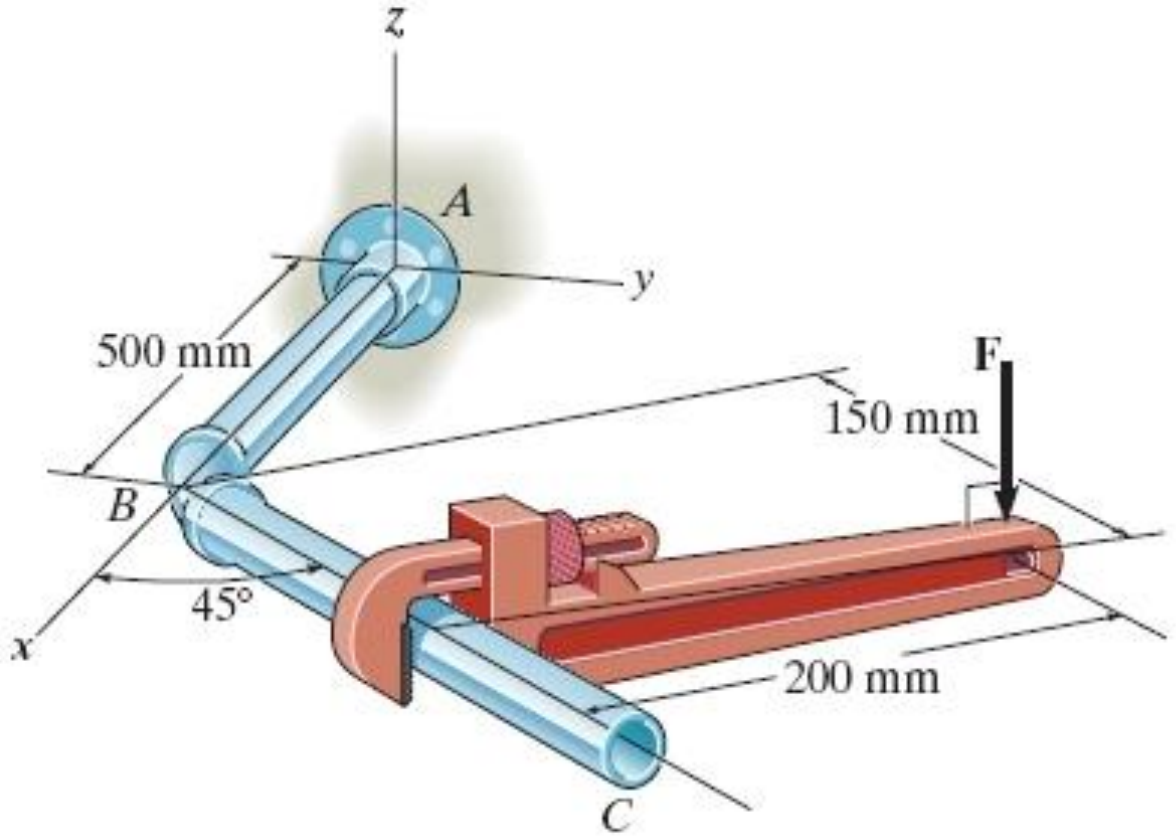
4-53. The tool is used to shut off gas valves which are difficult to access. If the force F is applied to the handle, determine the component of the moment created about the rotation axis (z-axis) of the valve.



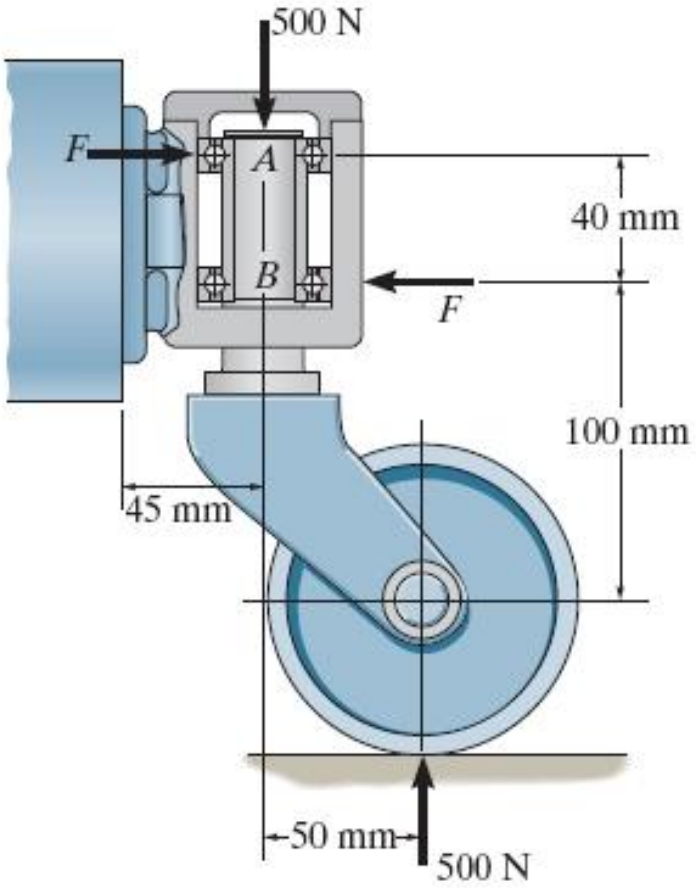
4-57. Determine the magnitude of the moment that the force F exerts about the y axis of the shaft.



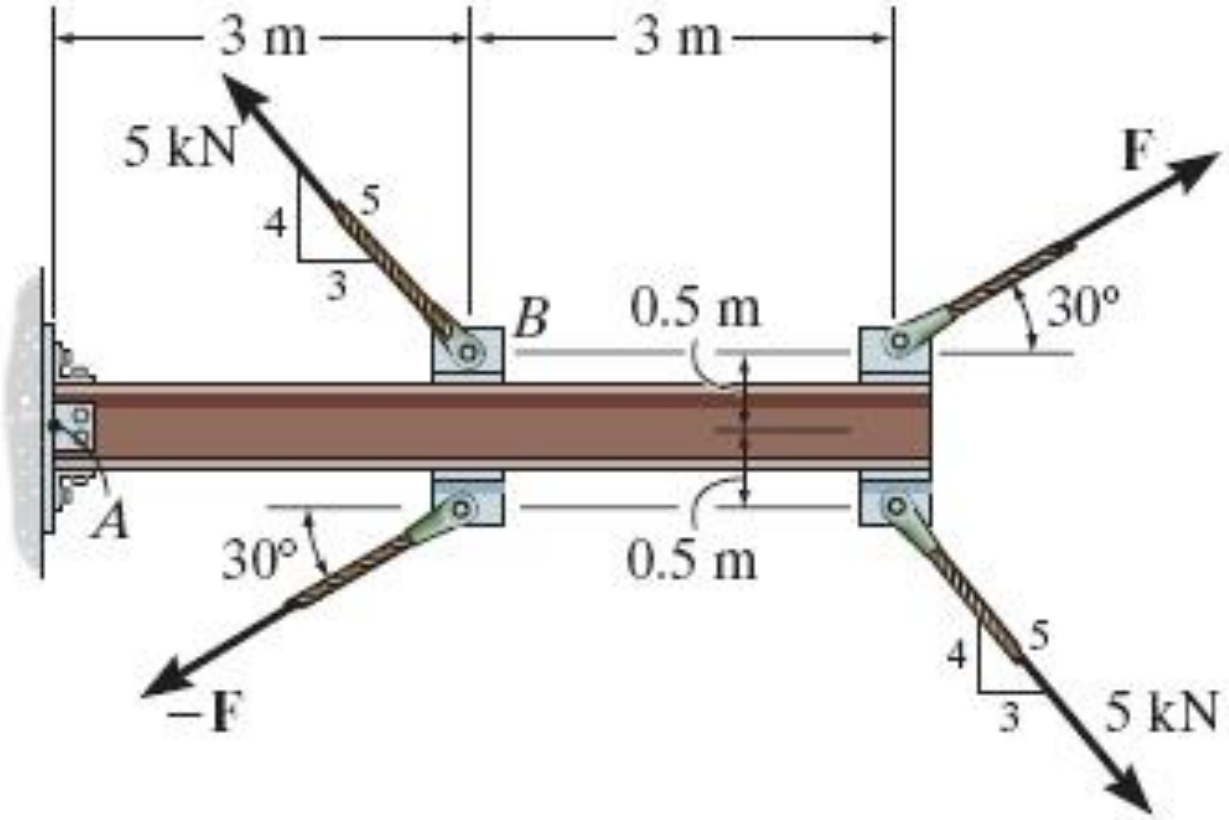
4-71. Determine the magnitude of the vertical force **F** acting on the handle of the wrench so that this force produces a component of moment along the AB axis of the pipe assembly of M_{Ax} = -5**i** N.m.



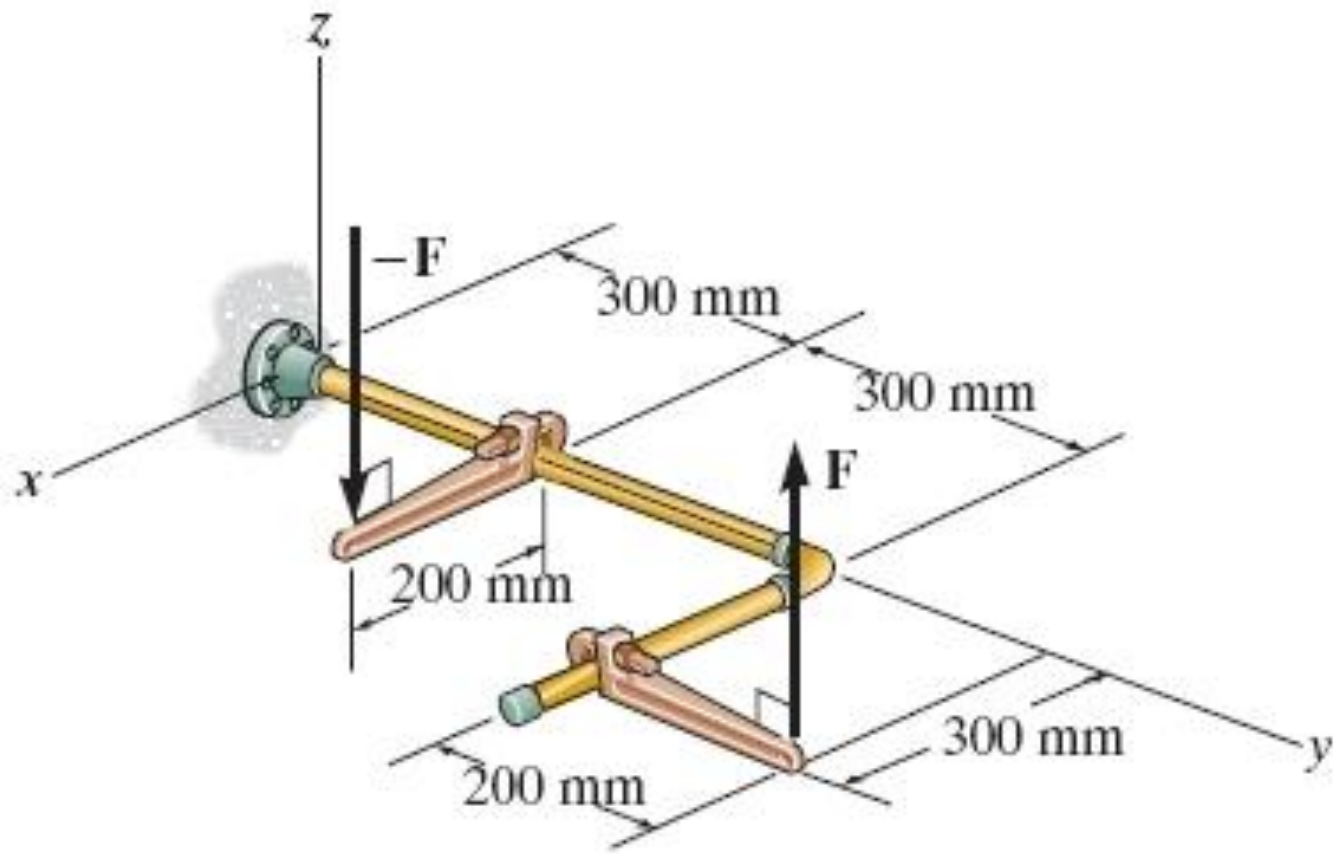
4-75. The caster wheel is subjected to two couples. Determine the forces F that the bearings exert on shaft so that the resultant couple moment on the caster is zero.



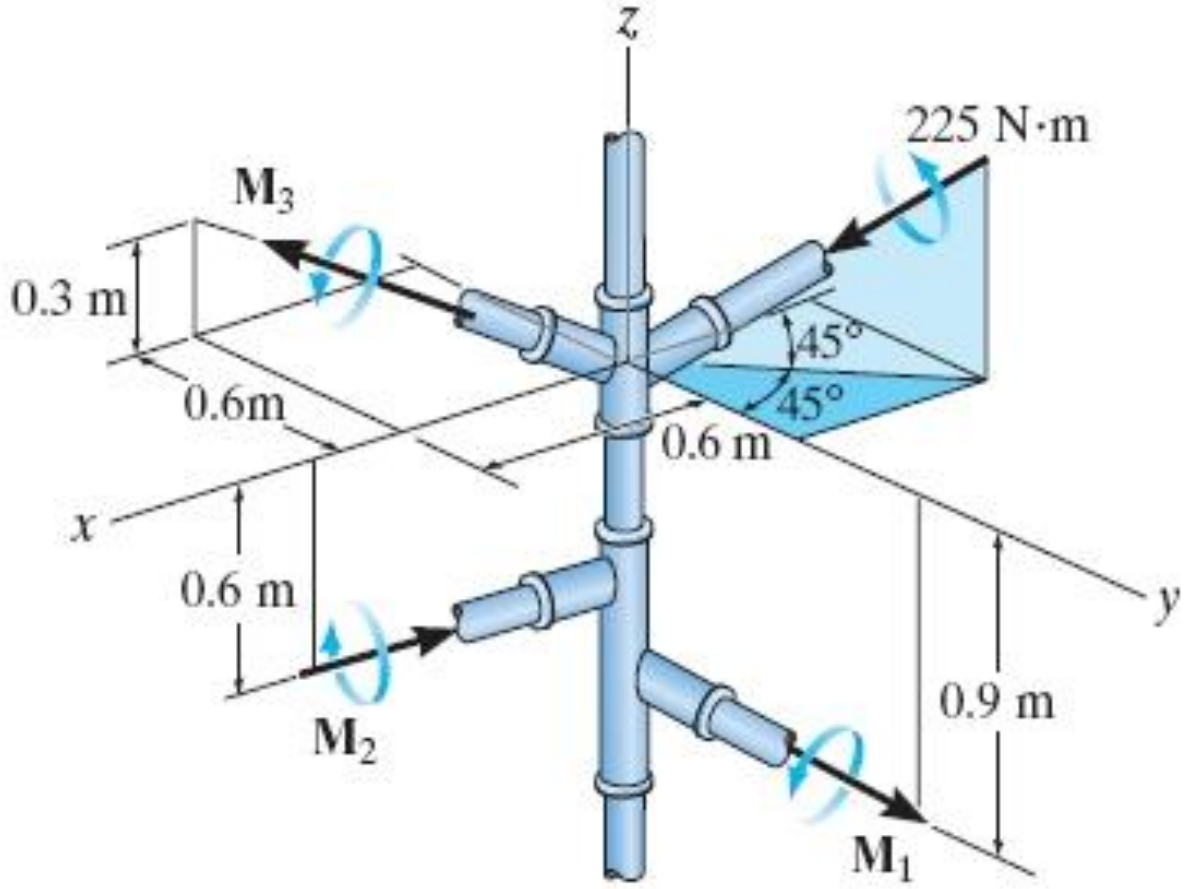
4-87. Determine the required magnitude of force **F**, if the resultant couple moment on the beam is to be zero.



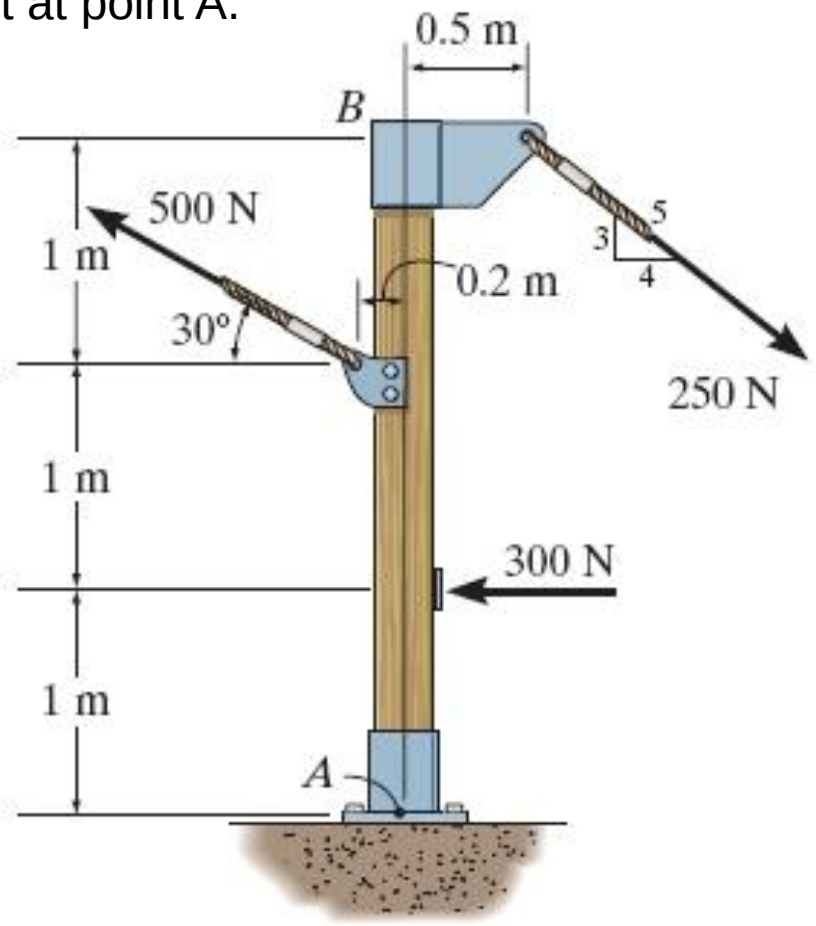
4-93. If F = 80 N, determine the magnitude and coordinate direction angles of the couple moment. The pipe assembly lies in the x-y plane.



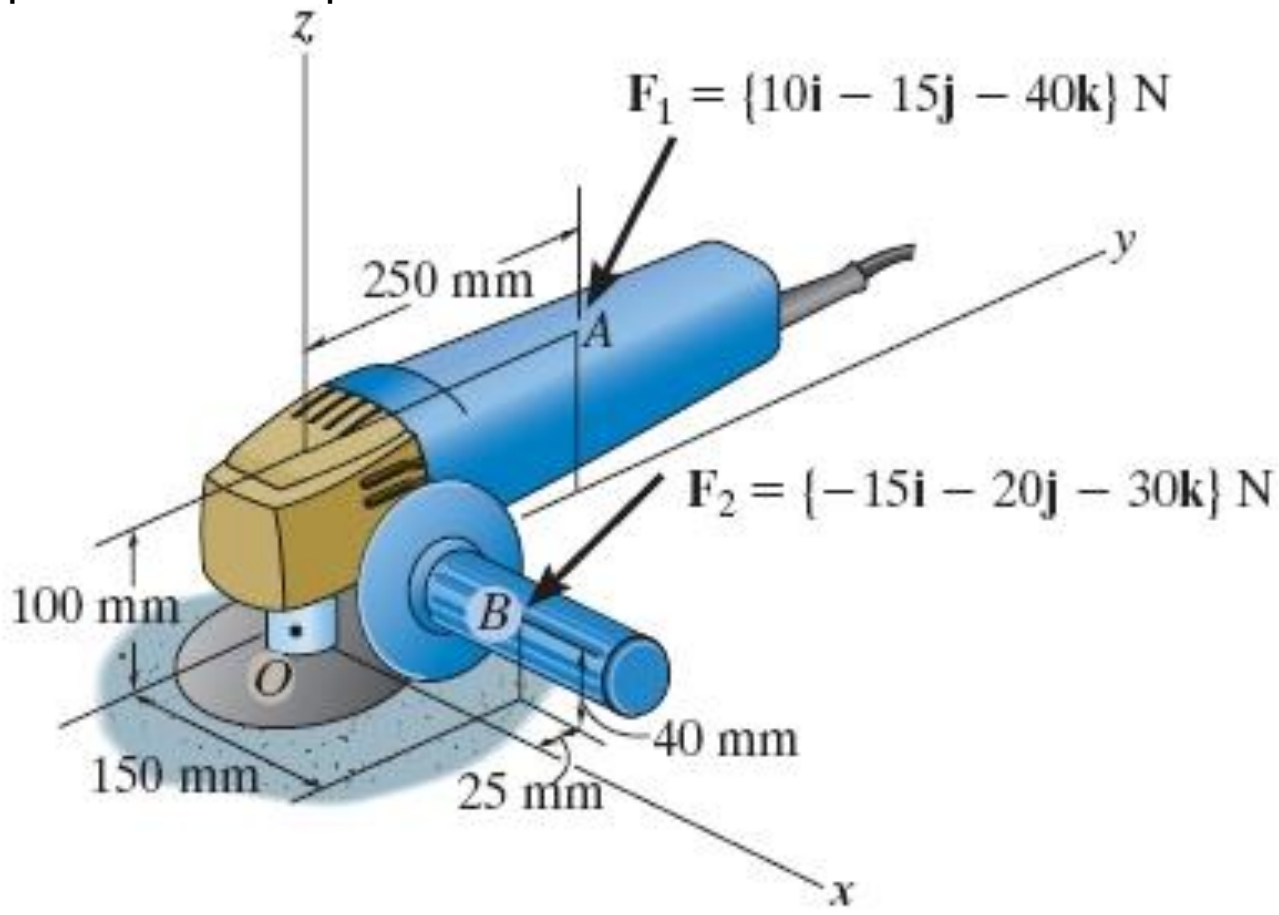
4-101. Determine the magnitudes of couple moments $\mathbf{M}_1$, $\mathbf{M}_2$, and $\mathbf{M}_3$ so that the resultant couple moment is zero.



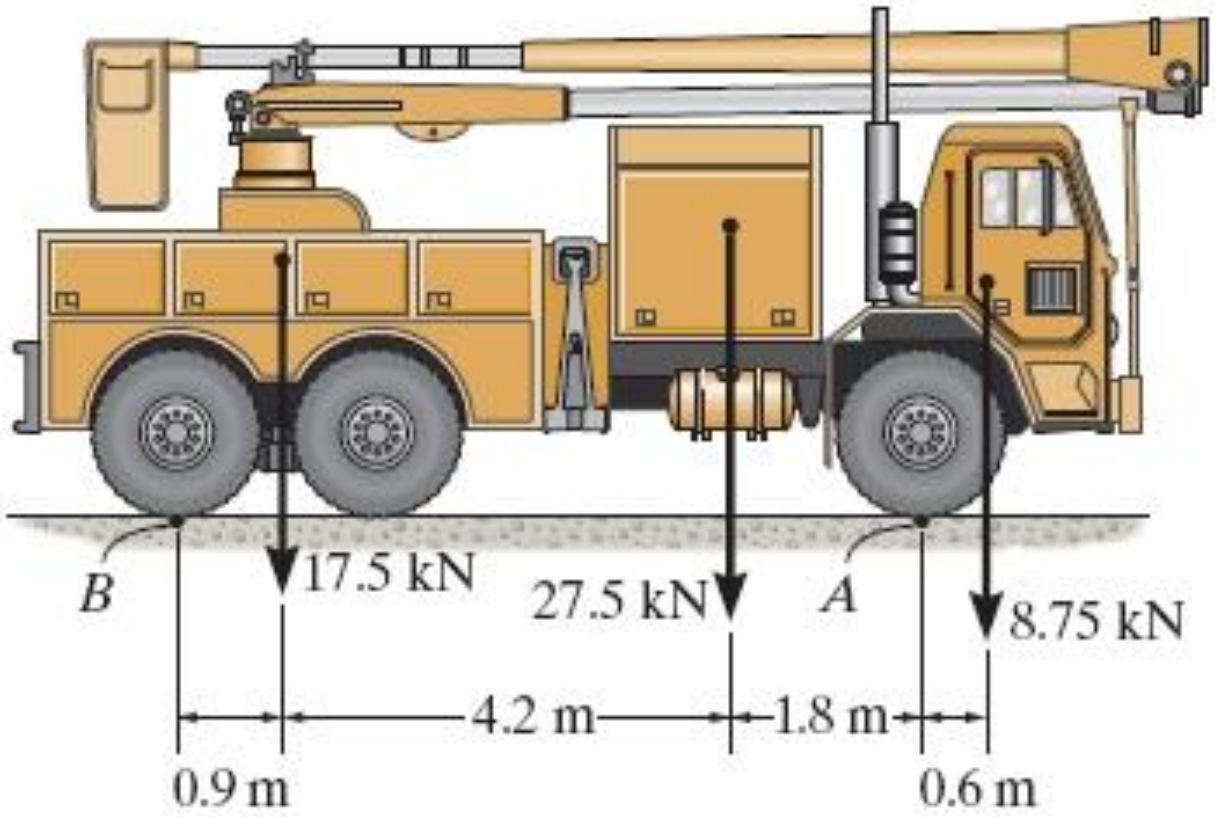
4-109. Replace the force system acting on the post by a resultant force and couple moment at point A.



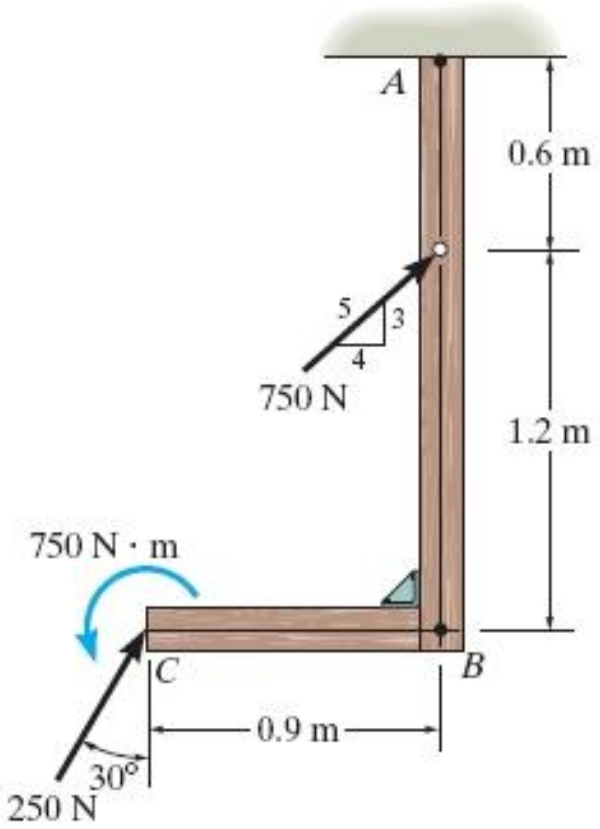
4-112. Replace the two forces acting on the grinder by a resultant force and couple moment at point O.



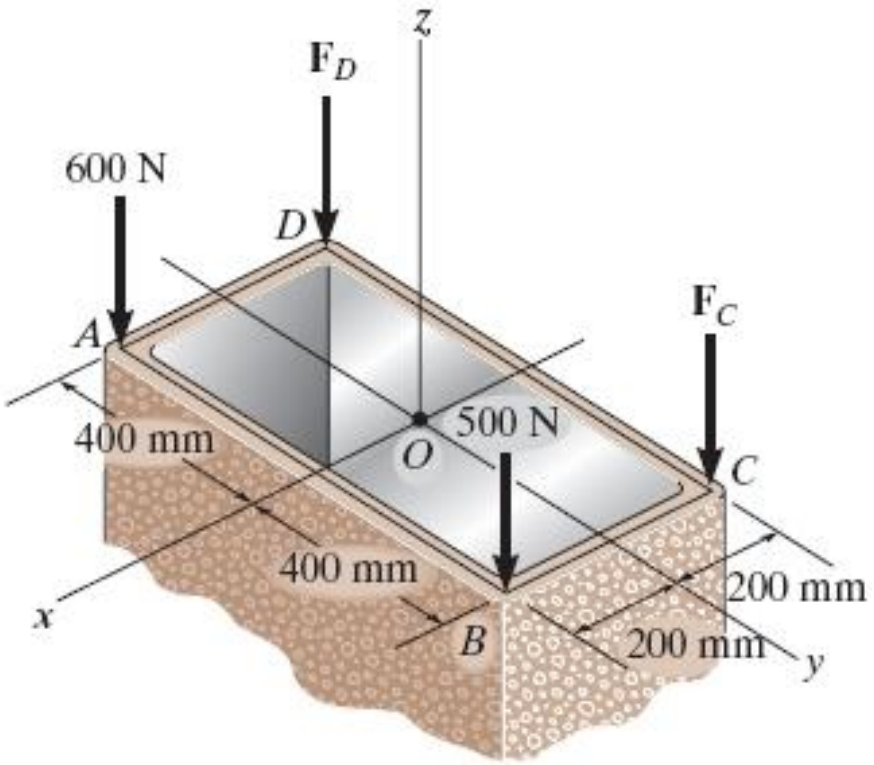
4-119. The weights of various components of the truck are shown. Replace the system of forces by an equivalent resultant force and specify its location measured from point A.



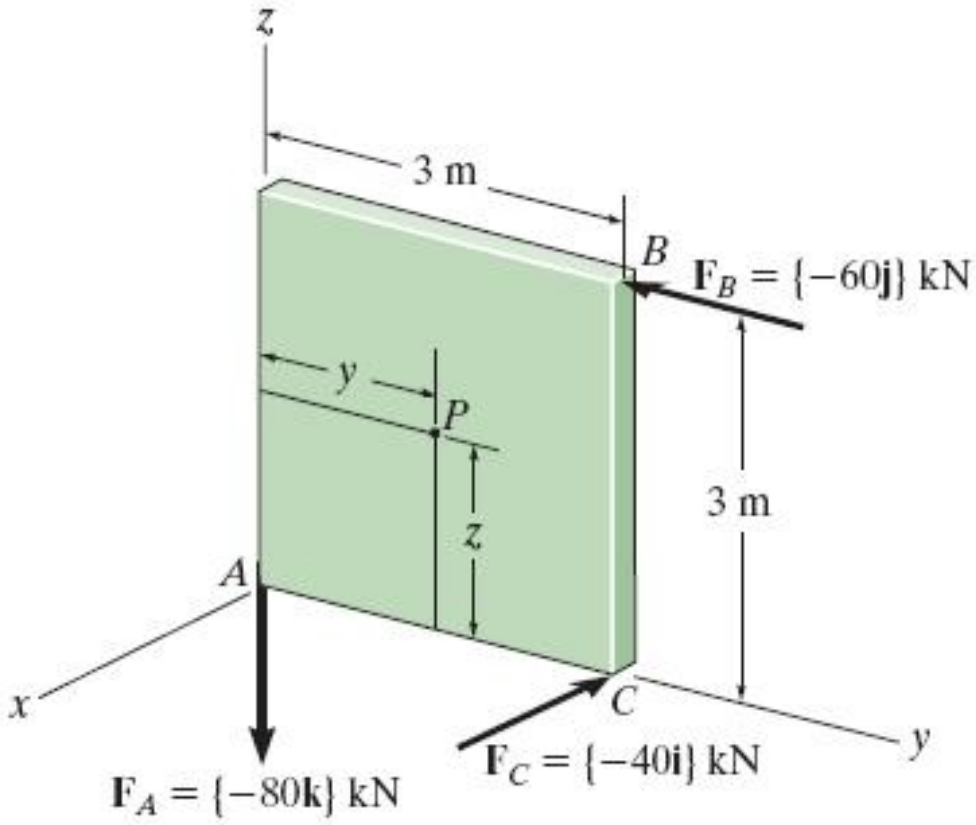
4-123. Replace the force and couple system acting on the frame by an equivalent resultant force and specify where the resultant's line of action intersects member BC measured from B.



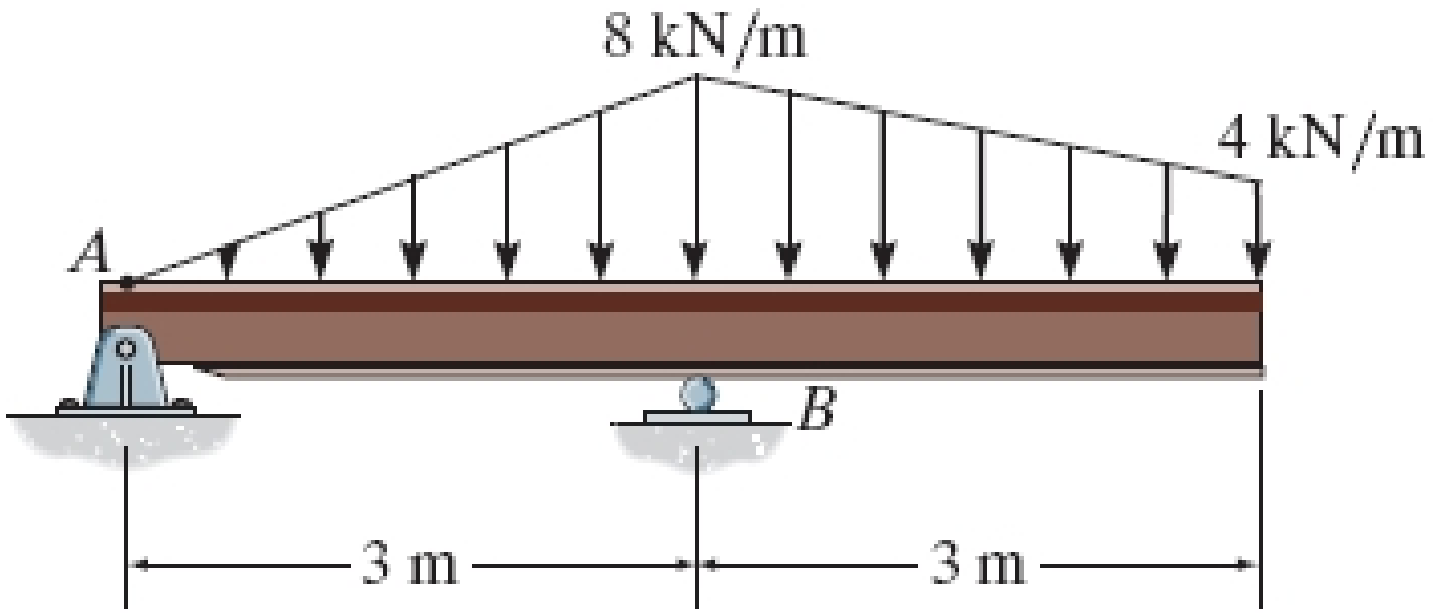
4-131. The tube supports the four parallel forces. Determine the magnitudes of forces $\mathbf{F}_C$ and $\mathbf{F}_D$ acting at C and D so that the equivalent resultant force of the force system acts through the midpoint, O, of the tube.



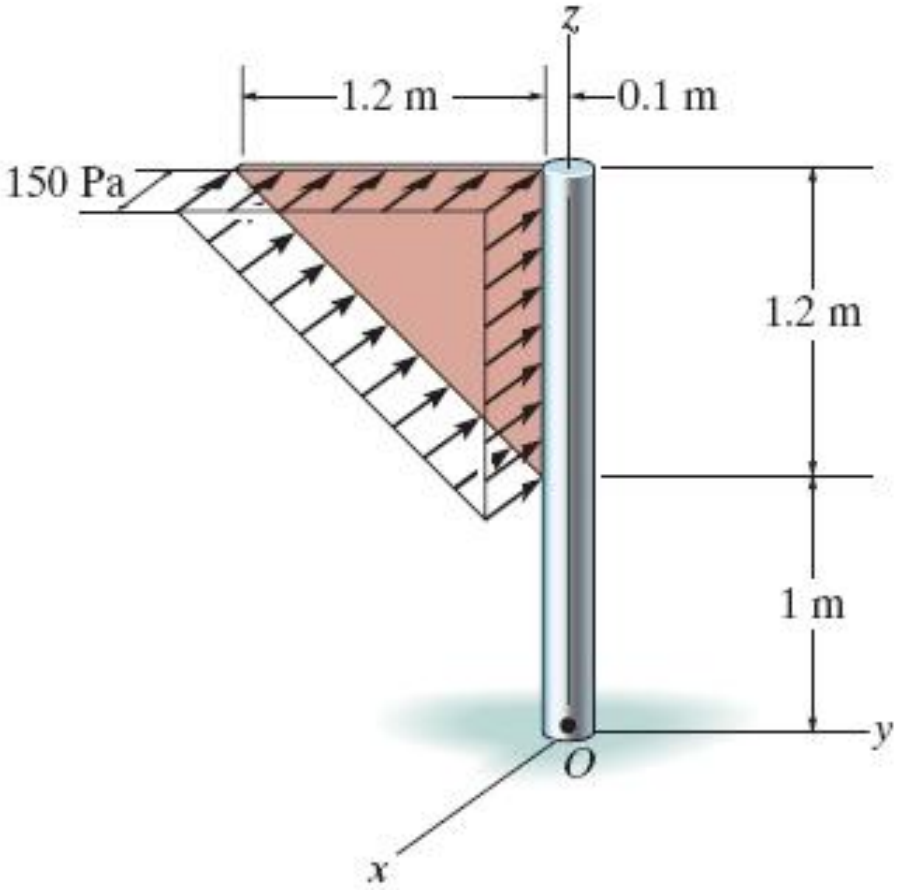
4-140. Replace the three forces acting on the plate by a wrench. Specify the magnitude of the force and couple moment for the wrench and the point, P (y, z) where its line of action intersects the plate.



4-143. Replace the distributed loading with an equivalent resultant force and specify its location on the beam measured from A.



4-149. The wind pressure acting on a triangular sign is uniform. Replace this loading by an equivalent resultant force and couple moment at point O.



4-154. Replace the distributed loading with an equivalent resultant force, and specify its location on the beam measured from point A.