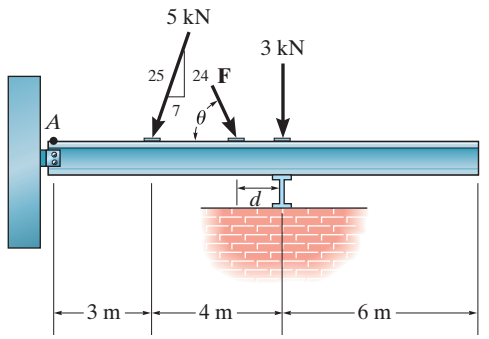
# PROBLEMS

**4–126.** Determine the magnitude and direction $\theta$ of force **F** and its placement $d$ on the beam so that the loading system is equivalent to a resultant force of 12 kN acting vertically downward at point $A$ and a clockwise couple moment of 50 kN · m.

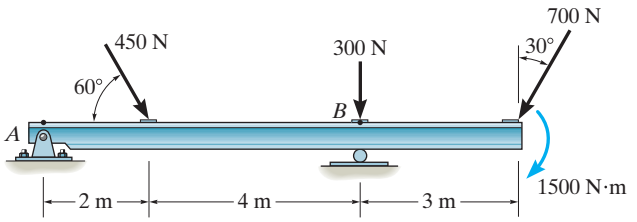
**4–127.** Determine the magnitude and direction $\theta$ of force **F** and its placement $d$ on the beam so that the loading system is equivalent to a resultant force of 10 kN acting vertically downward at point $A$ and a clockwise couple moment of 45 kN · m.




**Probs. 4–126/127**

***4–128.** Replace the loading acting on the beam by a single resultant force. Specify where the force acts, measured from end $A$.

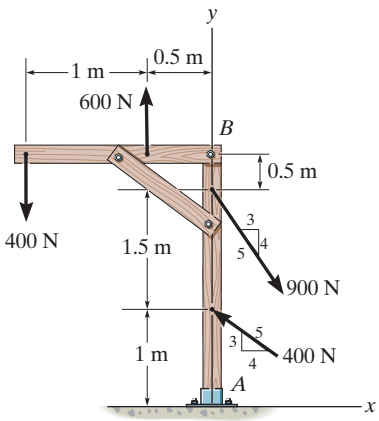
**4–129.** Replace the loading acting on the beam by a single resultant force. Specify where the force acts, measured from $B$.




**Probs. 4–128/129**

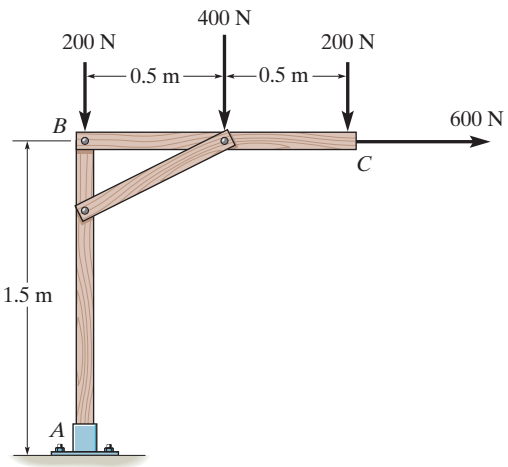
**4–130.** Replace the loading on the frame by a single resultant force. Specify where its line of action intersects a vertical line along member $AB$, measured from $A$.

**4–131.** Replace the loading on the frame by a single resultant force. Specify where its line of action intersects a horizontal line along member $CB$, measured from end $C$.




**Probs. 4–130/131**

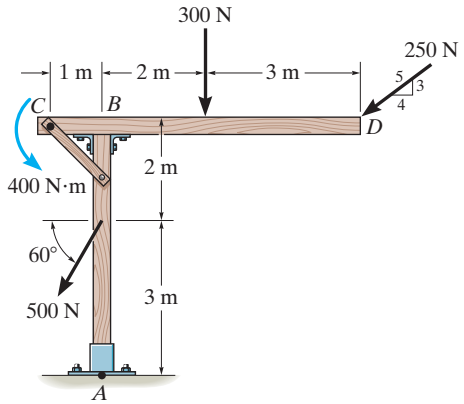
***4–132.** Replace the loading on the frame by a single resultant force. Specify where its line of action intersects a vertical line along member $AB$, measured from $A$.




**Prob. 4–132**

**4–133.** Replace the loading on the frame by a single resultant force. Specify where its line of action intersects member $AB$, measured from $A$.

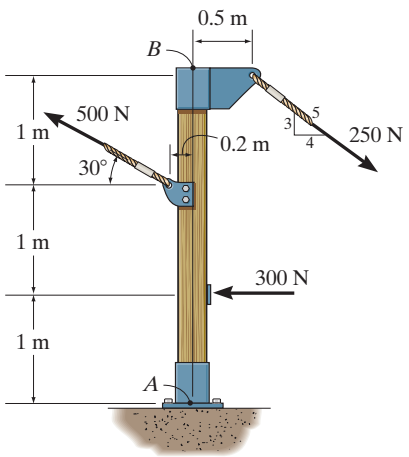
**4–134.** Replace the loading on the frame by a single resultant force. Specify where its line of action intersects member $CD$, measured from end $C$.




**Probs. 4–133/134**

**4–135.** Replace the force system acting on the post by a resultant force, and specify where its line of action intersects the post $AB$ measured from point $A$.

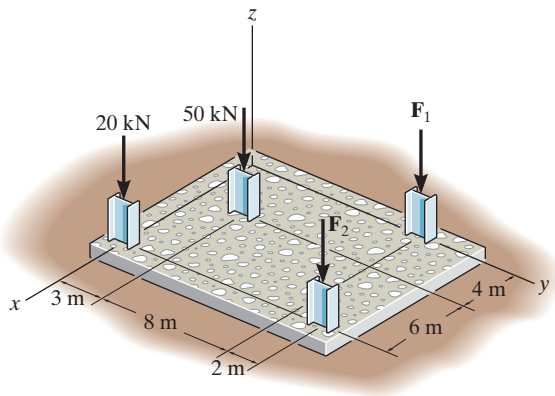
***4–136.** Replace the force system acting on the post by a resultant force, and specify where its line of action intersects the post $AB$ measured from point $B$.




**Probs. 4–135/136**

**4–137.** The building slab is subjected to four parallel column loadings. Determine the equivalent resultant force and specify its location $(x, y)$ on the slab. Take $F_1 = 30$ kN, $F_2 = 40$ kN.

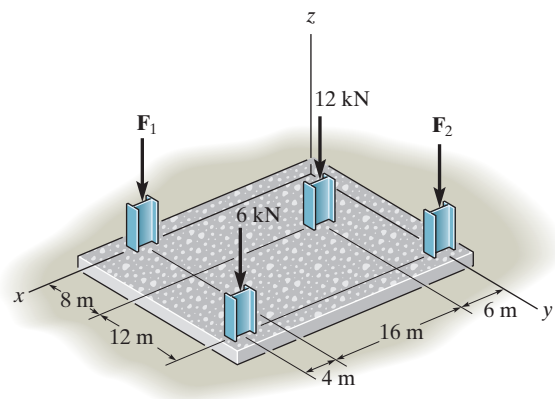
**4–138.** The building slab is subjected to four parallel column loadings. Determine the equivalent resultant force and specify its location $(x, y)$ on the slab. Take $F_1 = 20$ kN, $F_2 = 50$ kN.




**Probs. 4–137/138**

**4–139.** The building slab is subjected to four parallel column loadings. Determine the equivalent resultant force and specify its location $(x, y)$ on the slab. Take $F_1 = 8$ kN and $F_2 = 9$ kN.

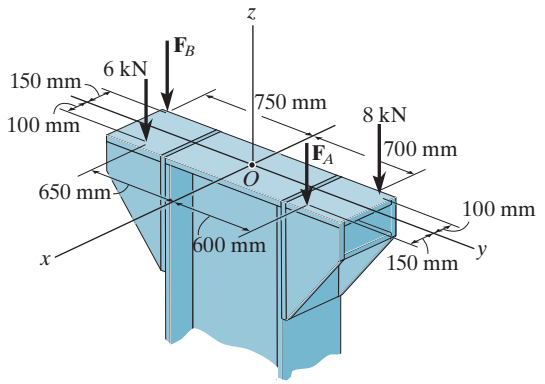
***4–140.** The building slab is subjected to four parallel column loadings. Determine $\mathbf{F}_1$ and $\mathbf{F}_2$ if the resultant force acts through point (12 m, 10 m).




**Probs. 4–139/140**

**4–141.** If $F_A = 7$ kN and $F_B = 5$ kN, represent the force system by a resultant force, and specify its location on the $x$–$y$ plane.

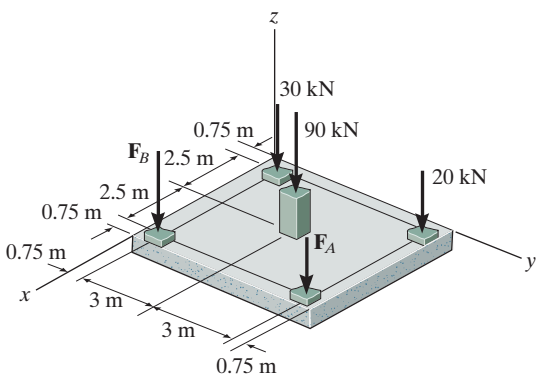
**4–142.** Determine the magnitudes of $\mathbf{F}_A$ and $\mathbf{F}_B$ so that the resultant force passes through point $O$.




**Probs. 4–141/142**

**4–143.** If $F_A = 40$ kN and $F_B = 35$ kN, determine the magnitude of the resultant force and specify the location of its point of application $(x, y)$ on the slab.

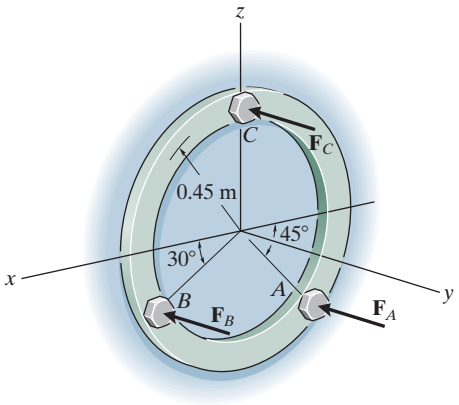
***4–144.** If the resultant force is required to act at the center of the slab, determine the magnitude of the column loadings $\mathbf{F}_A$ and $\mathbf{F}_B$ and the magnitude of the resultant force.




**Probs. 4–143/144**

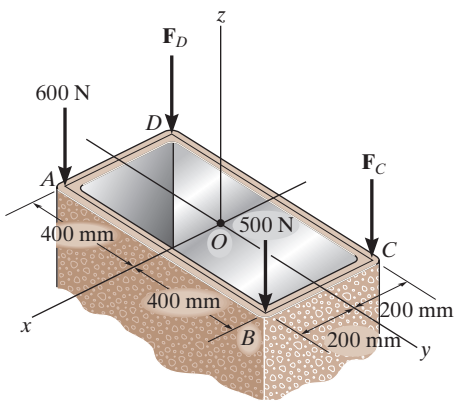
**4–145.** Three parallel bolting forces act on the circular plate. Determine the resultant force, and specify its location $(x, z)$ on the plate. $F_A = 900$ N, $F_B = 450$ N, and $F_C = 1.80$ kN.

**4–146.** The three parallel bolting forces act on the circular plate. If the force at $A$ has a magnitude of $F_A = 900$ N, determine the magnitudes of $\mathbf{F}_B$ and $\mathbf{F}_C$ so that the resultant force $\mathbf{F}_R$ of the system has a line of action that coincides with the $y$ axis. *Hint:* This requires $\Sigma M_x = 0$ and $\Sigma M_z = 0$.



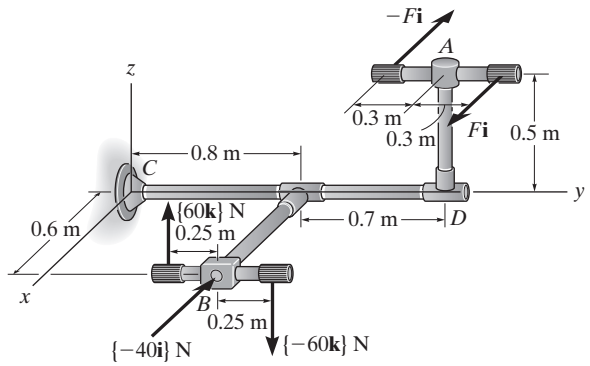

**Probs. 4–145/146**

**4–147.** 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.



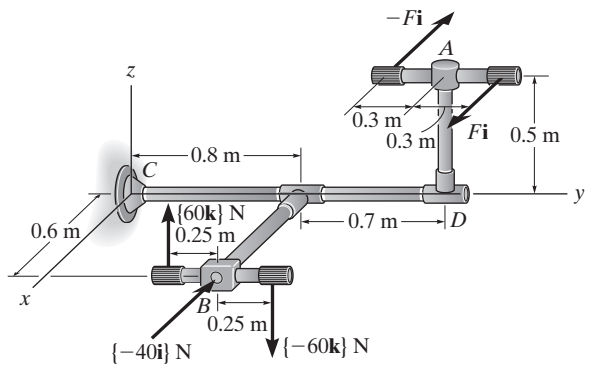

**Prob. 4–147**

*4–148. The pipe assembly is subjected to the action of a wrench at $B$ and a couple at $A$. Determine the magnitude $F$ of the couple forces so that the system can be simplified to a wrench acting at point $C$.



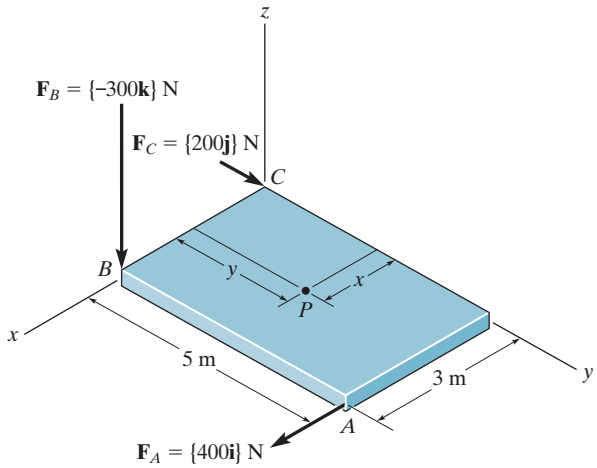

Prob. 4–148

4–149. The pipe assembly is subjected to the action of a wrench at $B$ and a couple at $A$. Simplify this system to a resultant wrench and specify the location of the wrench along the axis of pipe $CD$, measured from point $C$. Set $F = 40$ N.



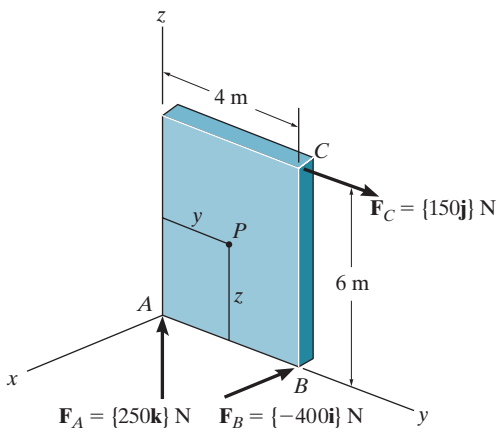

Prob. 4–149

4–150. 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 $P(x, y)$ where the wrench intersects the plate.




Prob. 4–150

4–151. 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.




Prob. 4–151

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