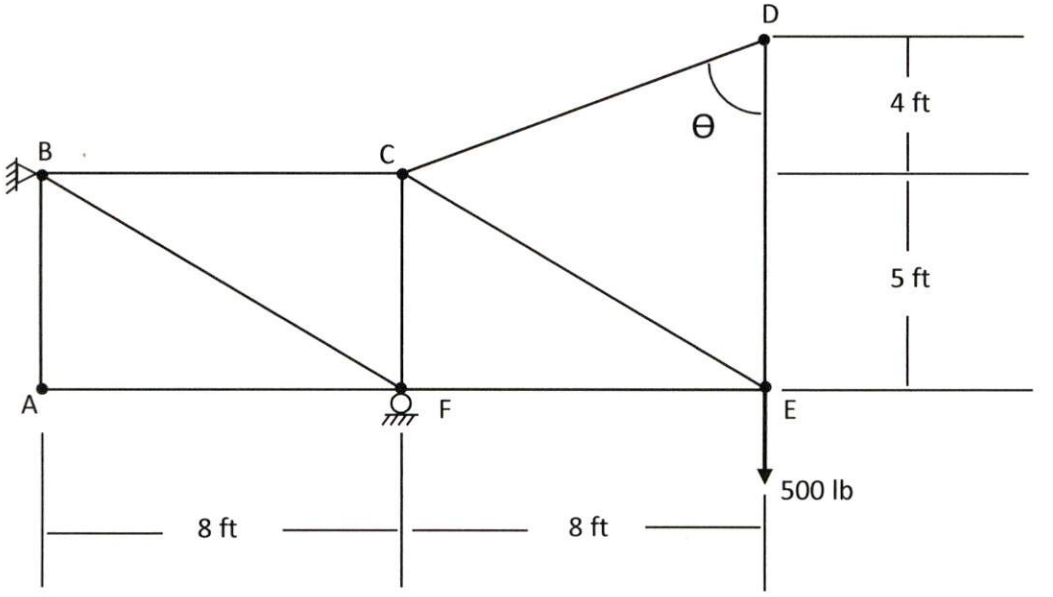
4-5
Zero-Force Members

Zero-Force Members
Under certain loading conditions some truss members carry no loads.
Such members are called Zero-Force Members



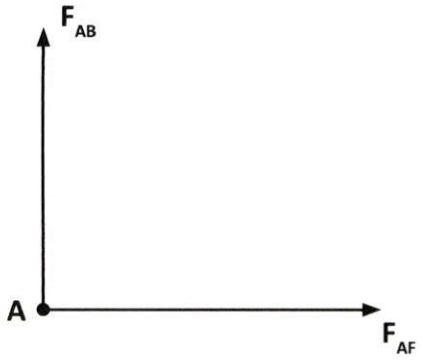
Zero-Force Members:

Used to increase stability of the truss during construction

Provide support if the applied loading is changed

For the above truss which of the members support NO LOADING ?

Joint A

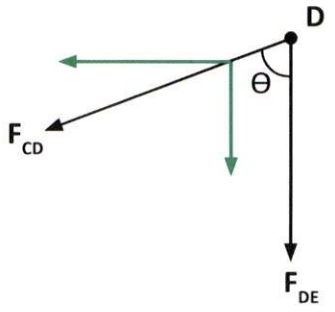


Equilibrium Equations

$\sum Fx = 0 \qquad F_{AF} = 0$

$\sum Fy = 0 \qquad F_{AB} = 0$

Joint D



Equilibrium Equations

$\sum Fx = 0 \qquad -\sin\Theta\, F_{CD} = 0$

since $\sin\Theta \neq 0$ $(0 < \Theta < 90)$

Therefore, $F_{CD} = 0$

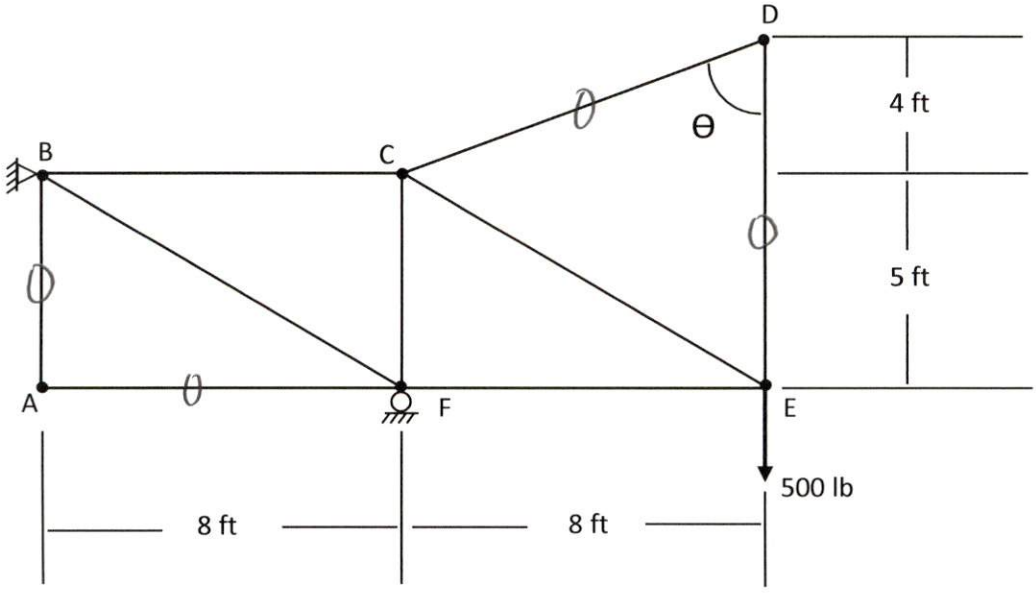
$\sum Fy = 0 \qquad -F_{DE} - \cos\Theta\, F_{CD} = 0$ ($F_{CD} = 0$)

$F_{DE} = 0$

General Rule

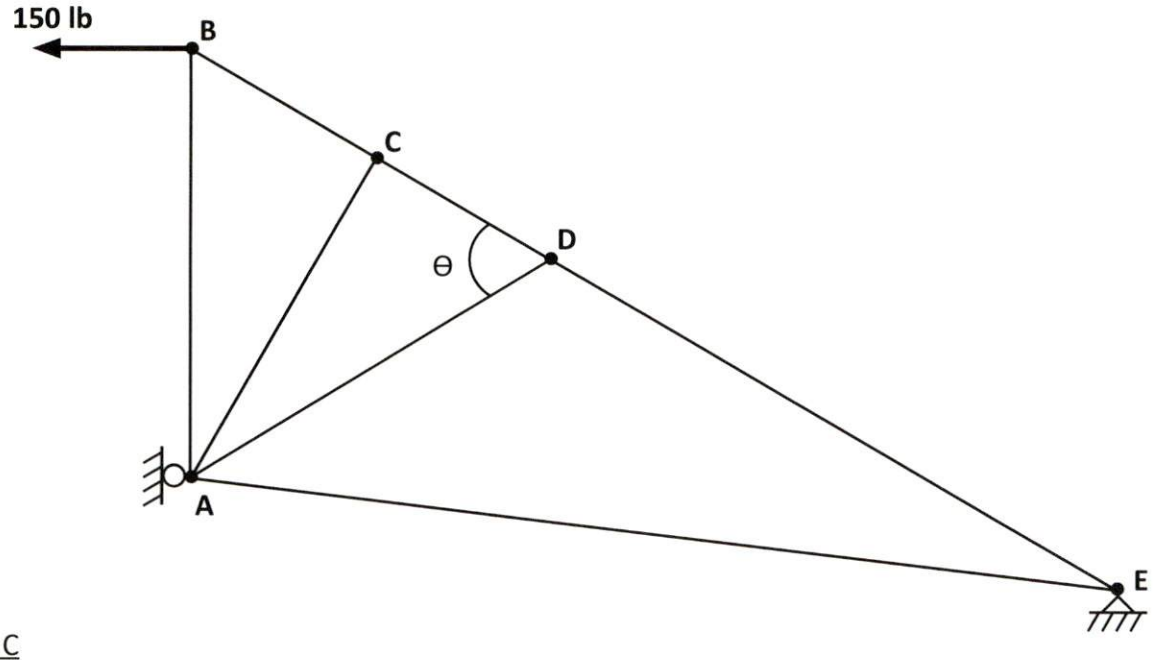
Rule #1

If only two members form a truss joint and no external load or support reaction is applied to the joint, the members must be zero-force members.

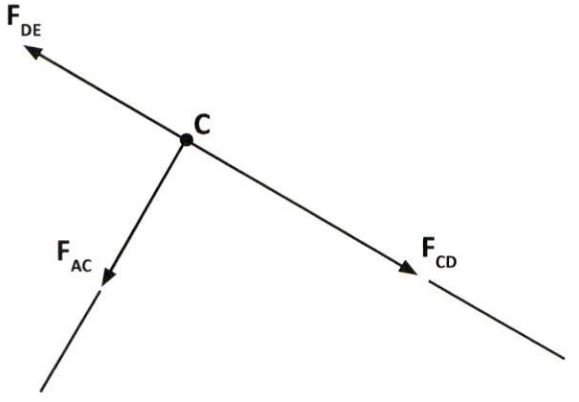


Rule #2

If three members form a truss joint for which two of the members are collinear, the third member is a zero-force member provided no external force (load) or support reaction is applied to the joint.



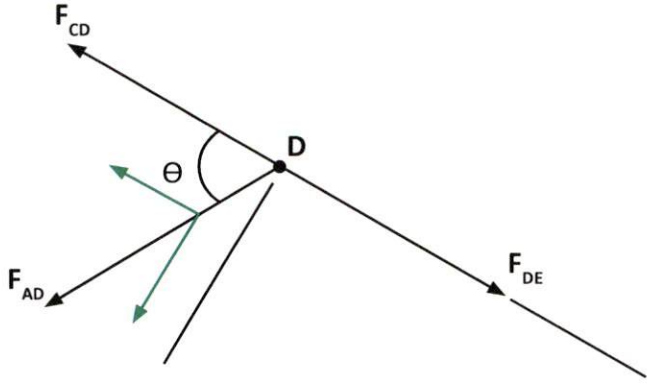
Joint C



Equilibrium Equations

$\sum Fx = 0$ $F_{AC} = 0$

Joint D



Equilibrium Equations

$\sum Fx = 0$ $-\sin\Theta F_{AD} = 0$

since $\sin\Theta \neq 0$ $(0 < \Theta < 90)$

Therefore, $F_{AD} = 0$

Using Rule #1 and Rule #2 identify on each of the truss diagrams shown the zero-force members.

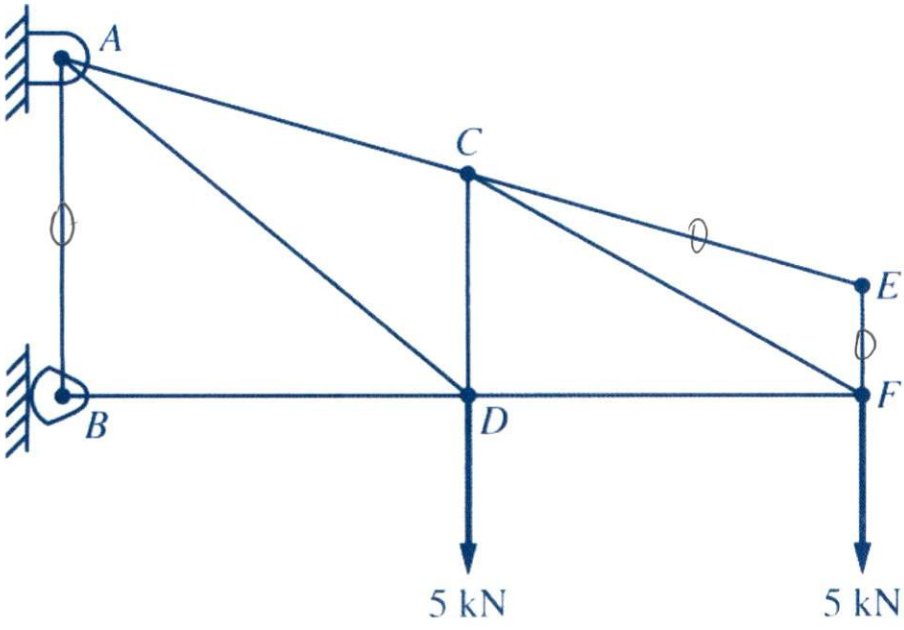


FIGURE P4–11

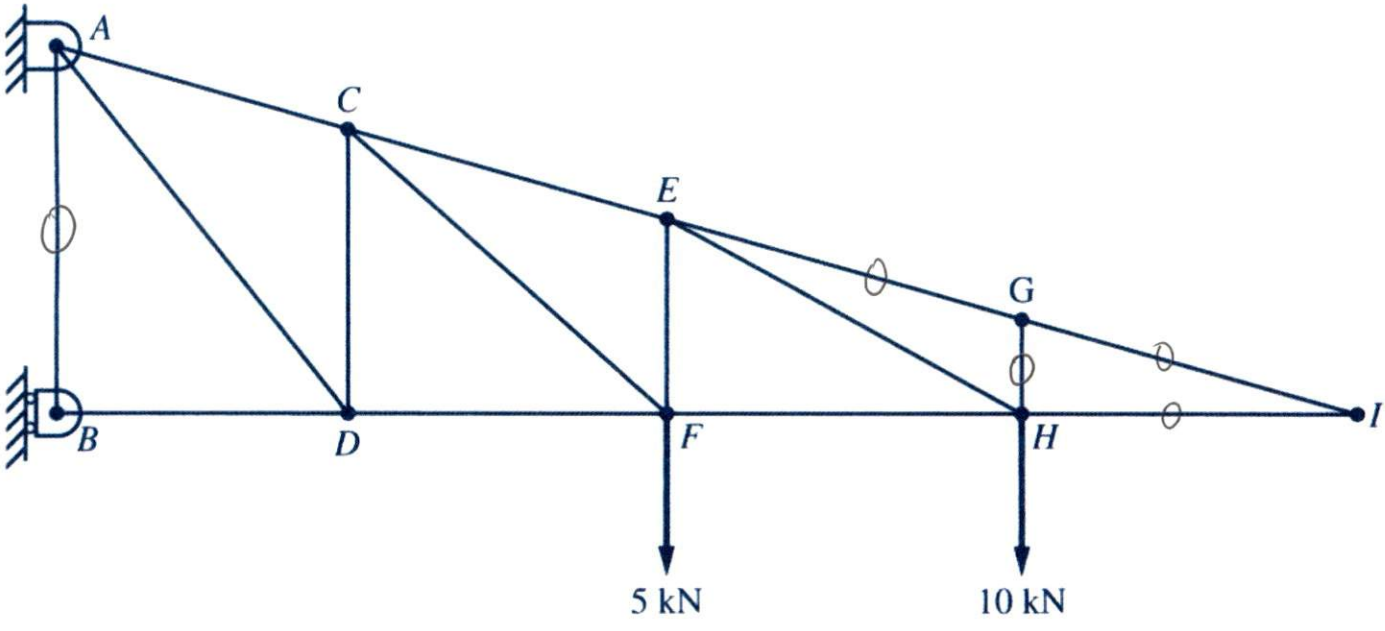


FIGURE P4–12

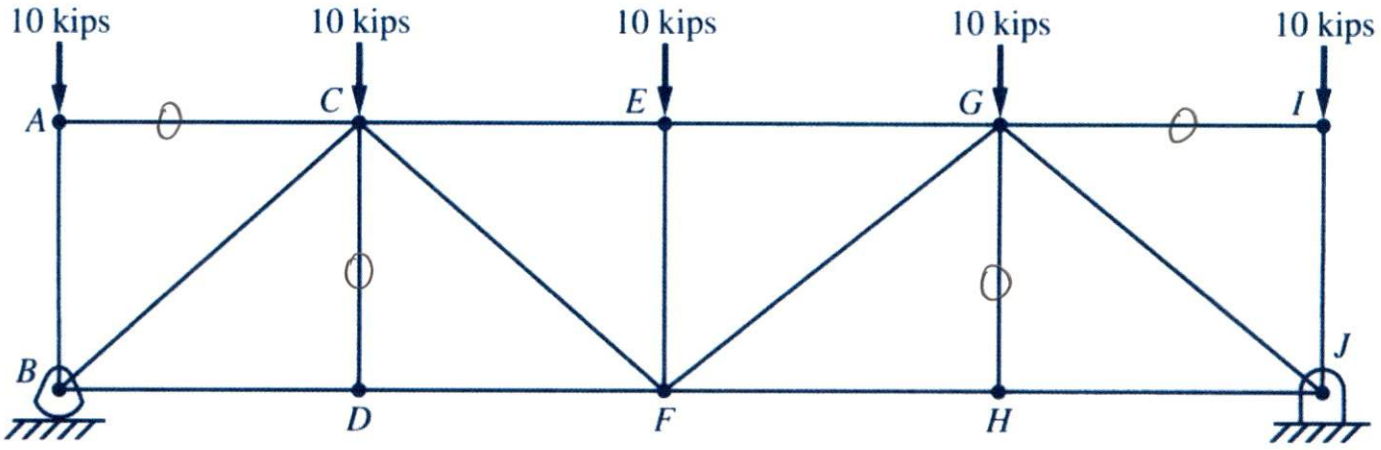


FIGURE P4–13

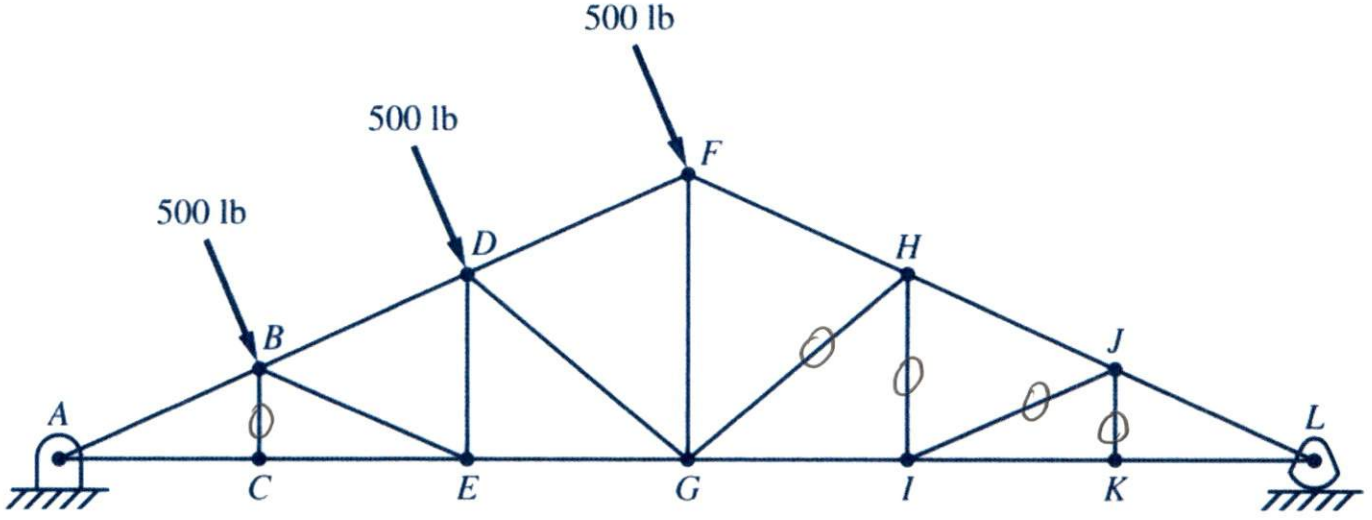


FIGURE P4–14

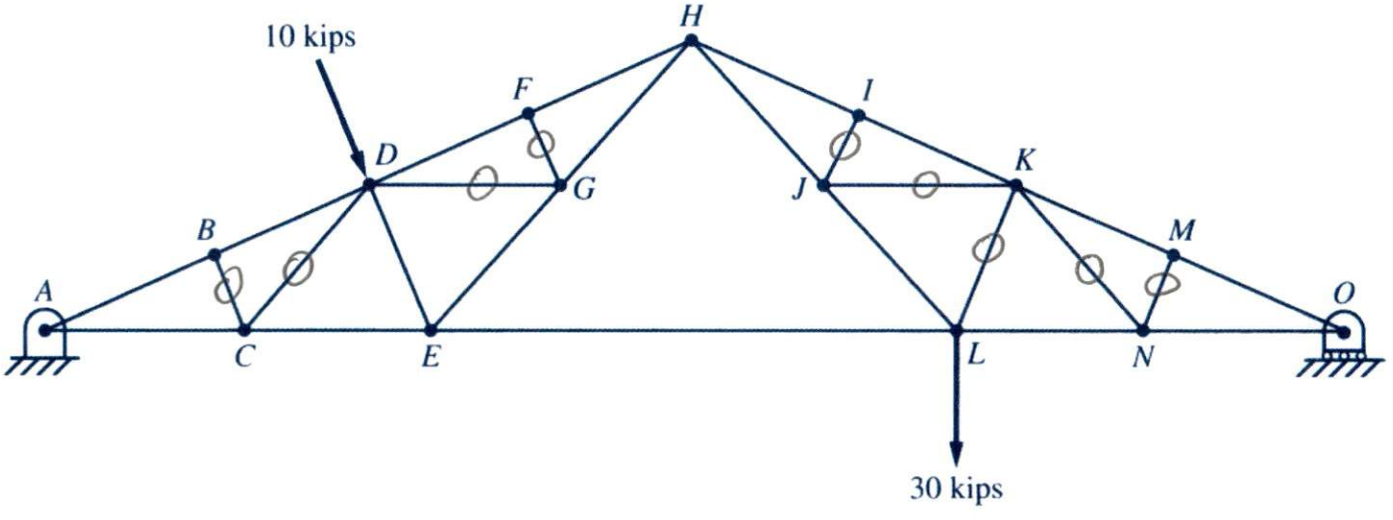


FIGURE P4–15

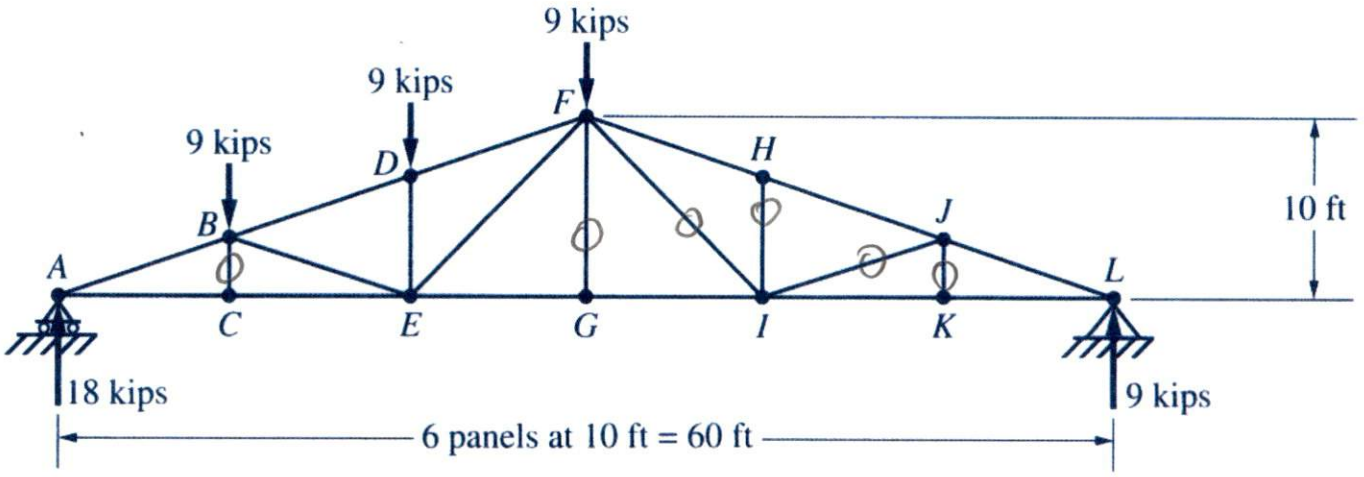


FIGURE P4–17

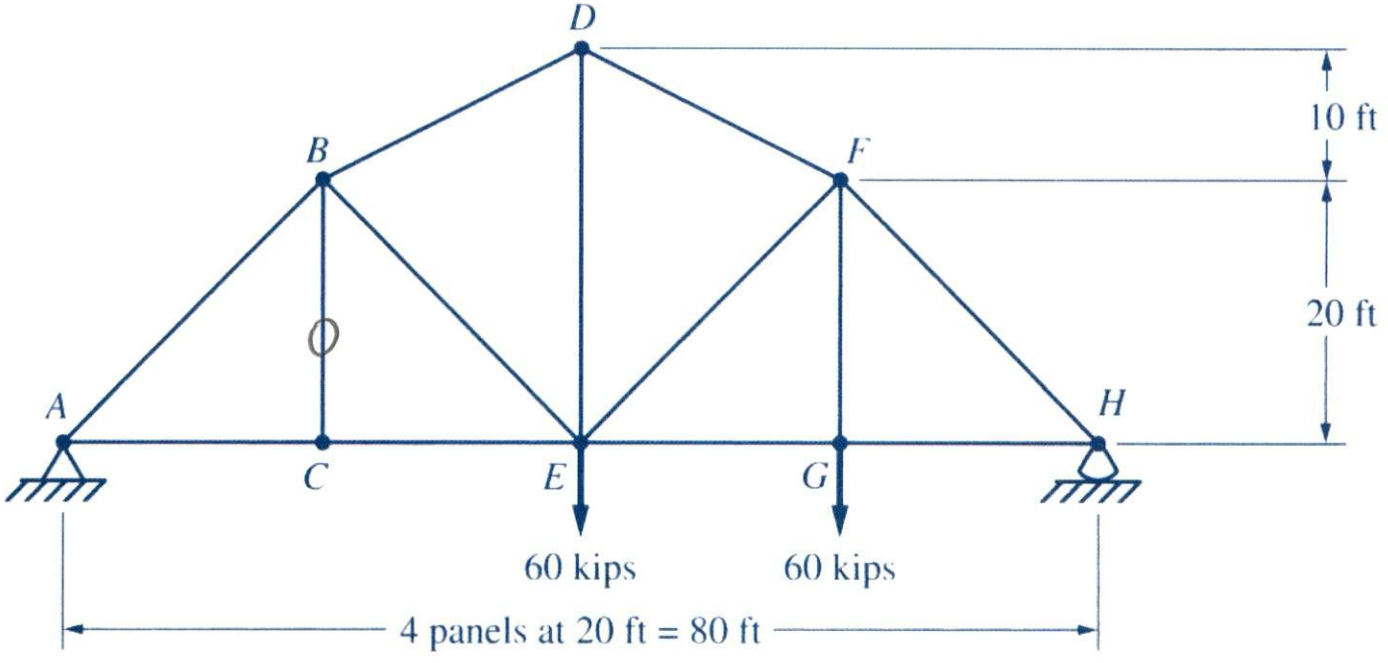


FIGURE P4–25