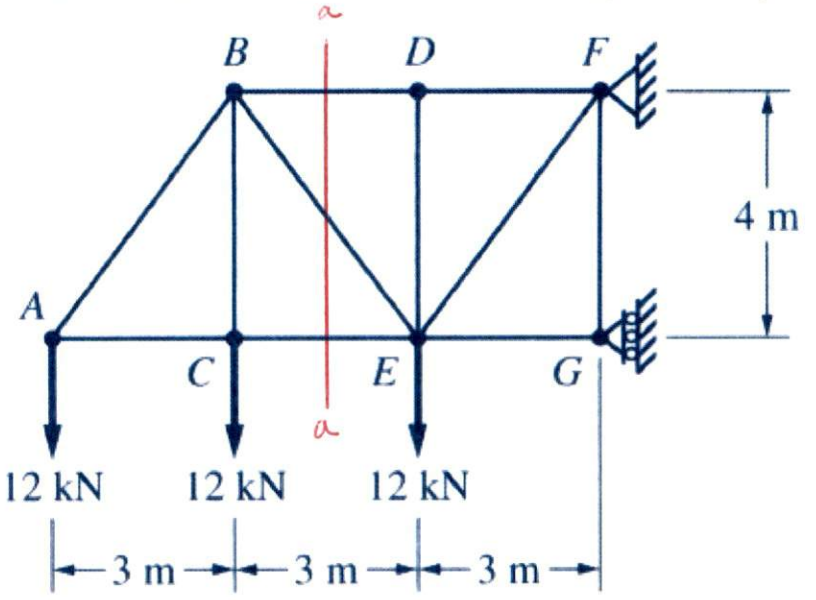
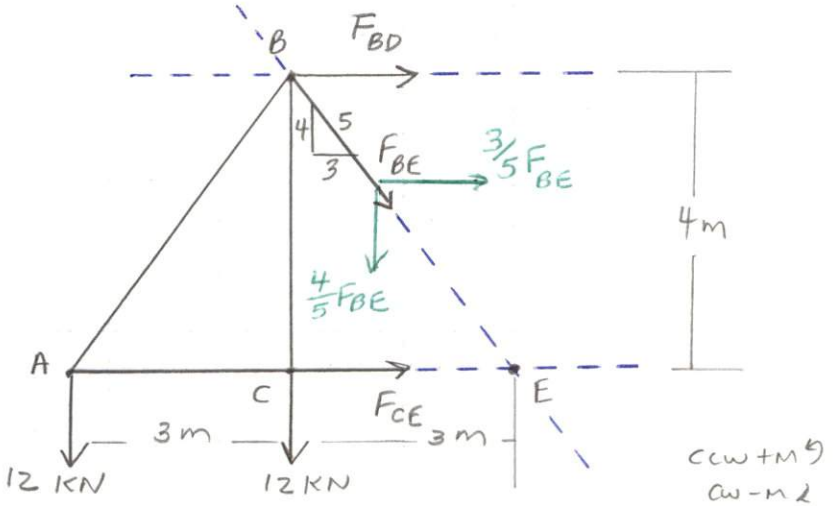
4-16 Determine the forces in members BD, BE, and CE of the truss and loading shown in Fig. P4-16 by the method of sections.

Solution.



If we use the left portion of section a-a we do not need to solve for the reactions at the supports F and G.



FBD- Left Portion of section a-a

If the truss is in equilibrium any portion of the truss is in equilibrium.

For the Method of Sections the only points where to take a Moment is where two Lines of action intersect for the unknown member forces i.e. at B and E

$[\Sigma M_E = 0]$ $12\,kN(6m) + 12\,kN(3m) - F_{BD}(4m) = 0$

$$F_{BD} = \frac{108\,kN\cdot m}{4m} = 27\,kN\,(T)$$

$[\Sigma M_B = 0]$ $12\,kN(3m) + F_{CE}(4m) = 0$

$$F_{CE} = \frac{-36\,kN\cdot m}{4m} = -9\,kN\,(T) \text{ and}$$

$$F_{CE} = 9\,kN\,(C)$$

$[\Sigma F_x = 0]$ $F_{CE} + \frac{3}{5}F_{BE} + F_{BD} = 0$

$$F_{BE} = \frac{5}{3}\left(-F_{CE} - F_{BD}\right) = \frac{5}{3}\left(-(-9kN) - 27kN\right) = -30\,kN\,(T)$$

and $F_{BE} = 30\,kN\,(C)$