4–145. Replace the loading by an equivalent resultant force and couple moment acting at point $O$.

\[ \sum F_y = (2.25 + 11.25 + 1.875) = 15.405 \text{ kN} \]

\[ \sum M_o = -2.25(0.5) - 11.25(1.125) - 1.875(2.5) = -18.47 \text{ kNm} \]
4-151. Replace the loading by a single resultant force, and specify the location of the force measured from point O.

\[ F_1 = \left( \frac{7.5}{2} \right) (6) = 22.5 \text{ kN} \]
\[ F_2 = \left( \frac{1.5}{2} \right) (6) = 13.5 \text{ kN} \]

\[ \Sigma M_o = -500 + (-112.5) + (-127.5) + (-15) \]
\[ = -914 \text{ kNm} \]

\[ \Sigma F_y = -22.5 - 13.5 - 15 \]
\[ = -51 \text{ kN} \]

\[ M_{R.o} = \Sigma M_0 \]
\[ (51) \cdot d = 914 \]
\[ d = 17.92 \text{ m} \]
4-155. Replace the distributed loading by an equivalent resultant force and specify where its line of action intersects a vertical line along member BC, measured from C.

\[ F_1 = 3 \times (3) = 9 \text{kN} \]
\[ F_2 = (4) \times (2) = 8 \text{kN} \]

\[ \Sigma F_x = -8 \text{kN} \]
\[ \Sigma F_y = -9 \text{kN} \]
\[ \Sigma M_C = 2(8) + 1.5(9) = 29.5 \text{ kNm} \]

\[ M_{RC} = \Sigma M_C \]
\[ (8)d = 29.5 \]
\[ d = 3.6875 \text{ m} \]