6-21. The beam is subjected to a uniform dead load of 1.2 kN/m and a single live load of 40 kN. Determine (a) the maximum moment created by these loads at C, and (b) the maximum positive shear at C. Assume A is a pin, and B is a roller.

(a) \( (M_C)_{\text{max}} = 40 \text{ kN} \cdot \text{m} (3 \text{ m}) + 1.2 \text{ kN/m} \left(\frac{1}{2}\right)(12 \text{ m})(3 \text{ m}) = 141.6 \text{ kN} \cdot \text{m} \) \hspace{1cm} \text{Ans}

(b) \( (V_C)_{\text{max}} = 40\left(\frac{1}{2}\right) + 1.2 \text{ kN/m} \left[\frac{1}{2}\left(-\frac{1}{2}\right)(6) + \frac{1}{2}\left(-\frac{1}{2}\right)(6)\right] = 20 \text{ kN} \) \hspace{1cm} \text{Ans}
6-25. Draw the influence line for (a) the force in the cable BC, (b) the vertical reaction at A, and (c) the moment at D.

Prob. 6-25
6–30. A uniform live load of 1.8 k/ft and a single concentrated live force of 12 k are placed on the top beams. If the beams also support a uniform dead load of 350 lb/ft, determine (a) the maximum live shear in panel BC of the girder and (b) the maximum moment in the girder at C.

(a) \( V_{BC} \)

\[
(V_{BC})_{\text{max}} = 12 \text{ k} \cdot (-1 \text{ ft}) + (1.8 \text{ k/ft} + 0.350 \text{ k/ft}) \left[ (-1)(3) + \frac{1}{2}(-1)(6 - 3) \right]
\]
\[
= 21.7 \text{ k} \quad \text{Ans}
\]

(b) \( M_c \)

\[
(M_c)_{\text{max}} = 12 \text{ k} \cdot (-6 \text{ ft}) + (1.8 \text{ k/ft} + 0.350 \text{ k/ft}) \left[ \frac{1}{2}(-6 \text{ ft})(6 \text{ ft}) \right] = -111 \text{ k-ft} \quad \text{Ans}
\]
6–50. The roof truss serves to support a crane rail which is attached to the bottom cord of the truss as shown. Determine the maximum live force (tension or compression) that can be developed in member HC, due to the crane load of 12 k. Specify the position \( x \) of the load. Assume the truss is supported at \( A \) by a pin and at \( E \) by a roller. Also, assume all members are sectioned and pin connected at the gusset plates.

\[
\begin{align*}
F_{HC} \quad & \quad \text{Ans} \\
\begin{array}{c}
12 \\
-1.118 \\
24 \\
48 \\
x (ft)
\end{array} \\
\end{align*}
\]

\[ x = 12 \text{ ft} \quad \text{Ans} \]

\[ (F_{HC})_{\text{max}} = 12(1.118) = 13.4 \text{ k (C)} \quad \text{Ans} \]

6–51. Determine the maximum live force (tension or compression) that can be developed in member BH of the truss due to the crane load of 12 k. Specify the position \( x \) of the load. Assume the truss is supported at \( A \) by a pin and at \( E \) by a roller. Also, assume all members are sectioned and pin connected at the gusset plates.

\[
\begin{align*}
F_{BH} \quad & \quad \text{Ans} \\
\begin{array}{c}
1.0 \\
12 \\
24 \\
48 \\
x (ft)
\end{array} \\
\end{align*}
\]

\[ x = 12 \text{ ft} \quad \text{Ans} \]

\[ (F_{BH})_{\text{max}} = 12(1.0) = 12.0 \text{ k (T)} \quad \text{Ans} \]