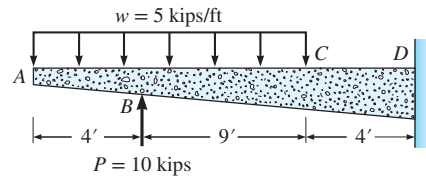
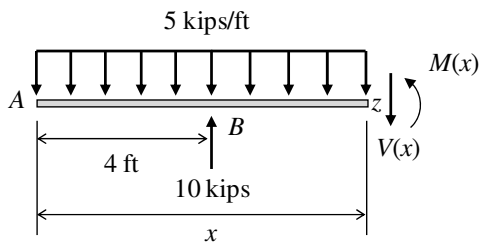


P5.4. Write the equations for shear V and moment M between points B and C . Take the origin at point A . Evaluate V and M at point C using the equations.



P5.4

For $4 \text{ ft} < x < 13 \text{ ft}$



$$\Sigma F_y = 0 = -V(x) + 10 - 5x$$

$$V(x) = -5x + 10 \text{ kips}$$

$$V(13) = V_C = -55 \text{ kips}$$

$$\Sigma M_z = 0 = -M(x) - 5x\left(\frac{x}{2}\right) + 10(x - 4)$$

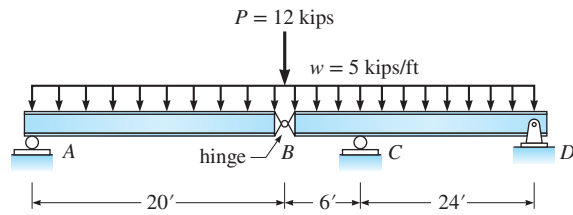
$$M(x) = -\frac{5}{2}x^2 + 10(x - 4) - 40 \text{ kip} \cdot \text{ft}$$

$$M(13) = M_C = -332.5 \text{ kip} \cdot \text{ft}$$

$$\downarrow + \uparrow$$

$$\curvearrowright + \curvearrowleft$$

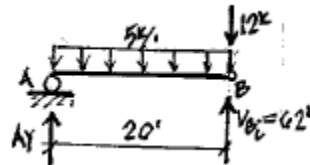
P5.21. For each beam, draw the shear and moment curves label the maximum values of shear and moment, locate points of inflection, and sketch the deflected shape.



P5.21

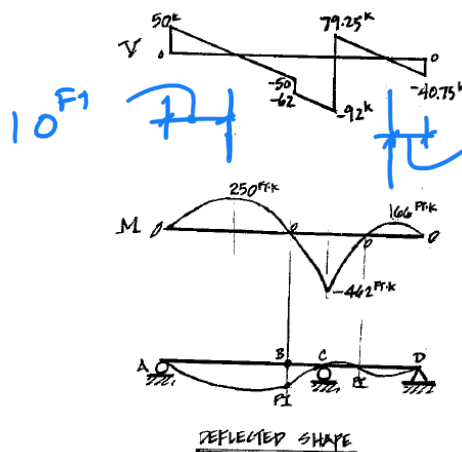
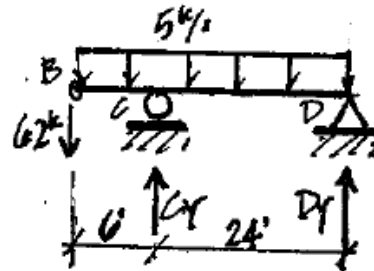
FBD "AB"

$$\begin{aligned} \sum M_A = 0; & \quad \frac{5^{k/ft}(20')^2}{2} + 12^k(20') - V_{B_2}(20') = 0 \\ & \quad \boxed{V_{B_2} = 62^k \uparrow} \\ +\uparrow \sum F_y = 0; & \quad A_y - 5^{k/ft}(20') + 62^k - 12^k = 0 \\ & \quad \boxed{A_y = 50^k \uparrow} \end{aligned}$$



FBD "BCD"

$$\begin{aligned} \sum M_D = 0; & \quad -62^k(30') - \frac{5^{k/ft}(30')^2}{2} + C_y(24') = 0 \\ & \quad \boxed{C_y = 171.25^k \uparrow} \\ +\uparrow \sum F_y = 0; & \quad -62^k - 5^k(30') + C_y + 171.25^k = 0 \\ & \quad \boxed{D_y = 40.75^k \uparrow} \end{aligned}$$



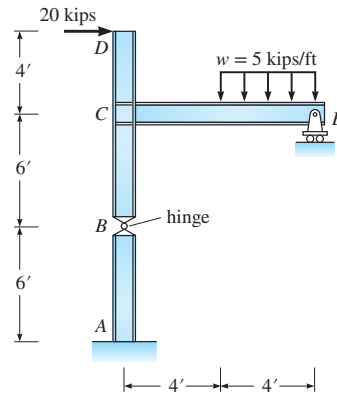
Handwritten calculations and notes:

- 10^{ft} (location of maximum moment in segment AB)
- $M_D - M_{\text{MAX}} = \frac{1}{2}(8.15')(-40.75^k)$
- $M_{\text{MAX}} = 166.06 \text{ k-ft}$

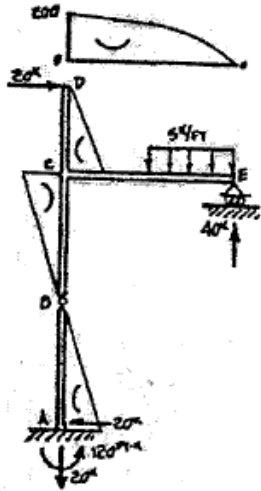
Handwritten calculation for maximum moment in segment AB:

$$M_{\text{MAX}} - M_A = \frac{1}{2}(50^k)(10^{\text{ft}}) = 250 \text{ k-ft}$$

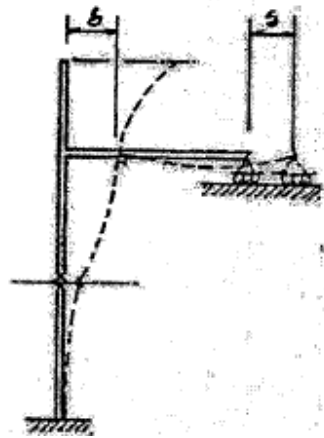
P5.47. For the frame in Figure P5.47, draw the shear and moment curves for all members. Next sketch the deflected shape of the frame. Show all forces acting on a free-body diagram of joint C.



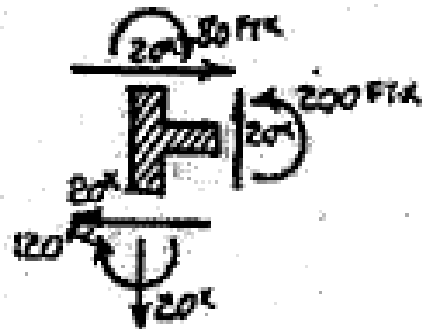
P5.47



M Diagrams



Deflected Shape



Joint C