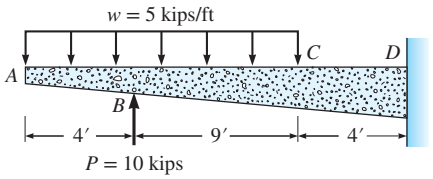
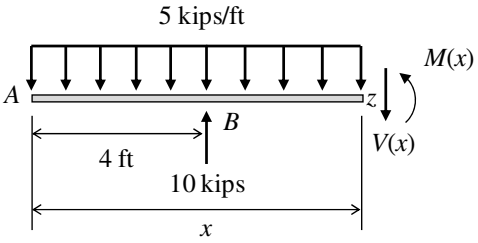
P5.4. Write the equations for shear V and moment M between points B and C. Take the origin at point A. Evaluate V and M at point C using the equations.



P5.4

For 4 ft < x < 13 ft



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

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

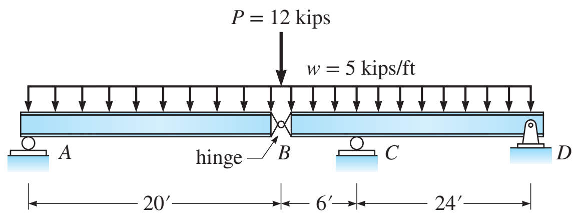
$$\boxed{V(13) = V_C = -55 \text{ kips}}$$

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

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

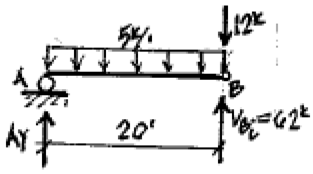
$$\boxed{M(13) = M_C = -332.5 \text{ kip}\cdot\text{ft}}$$

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*"



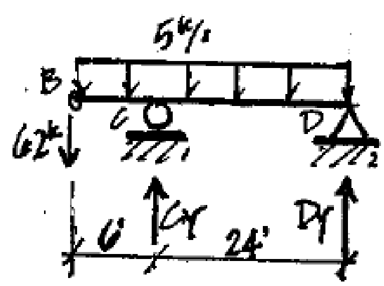
$$\Sigma M_A = 0; \quad \frac{5^{k/1}(20')^2}{2} + 12^k(20') - V_{B_2}(20') = 0$$

$$\boxed{V_{B_2} = 62^k \uparrow}$$

$$+\uparrow \Sigma F_y = 0; \quad A_y - F^{k/1}(20') + 62^k - 12^k = 0$$

$$\boxed{A_y = 50^k \uparrow}$$

FBD "*BCD*"

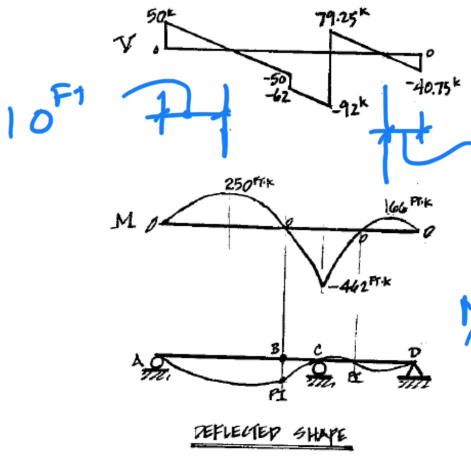


$$\Sigma M_D = 0; \quad -62^k(30') - \frac{5^{k/1}(30')^2}{2} + C_y(24') = 0$$

$$\boxed{C_y = 171.25^k \uparrow}$$

$$+\uparrow \Sigma F_y = 0; \quad -62^k - 5^k(30') + C_y + 171.25^k = 0$$

$$\boxed{D_y = 40.75^k \uparrow}$$

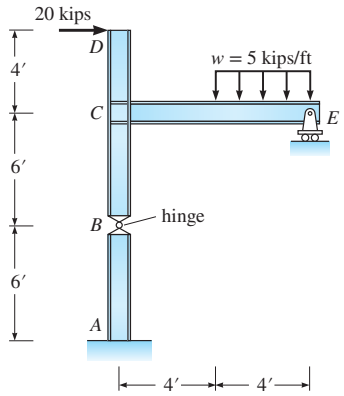


$M_D^0 - M_{MAX} = \frac{1}{2}(8.15')(-40.75^k)$

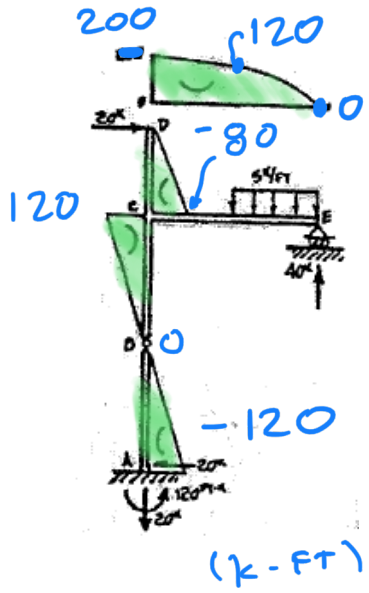
$M_{MAX} = 166.06^{k\text{-}FT}$

$M_{MAX} - M_A^0 = \frac{1}{2}(50^k)(10^{FT}) = 250^{k\text{-}FT}$

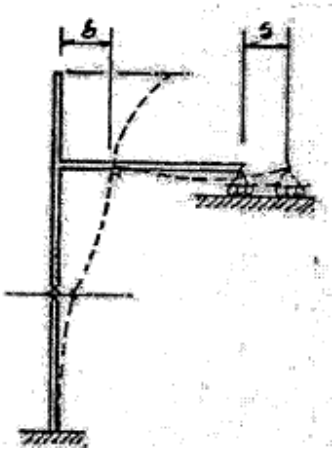
P5.47. For the frame in Figure P5.47, draw the shear and moment curves for all members. Next sketch the deflected shape of the frame. Show all forces acting on a free-body diagram of joint *C*.



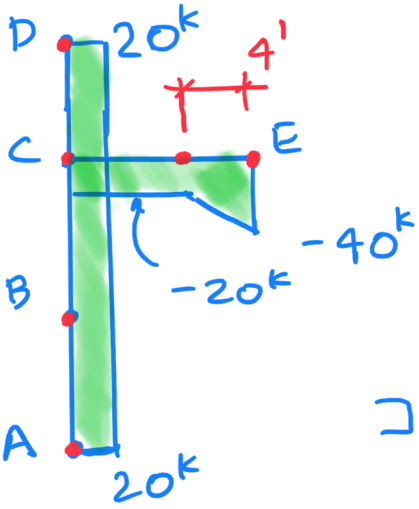
P5.47

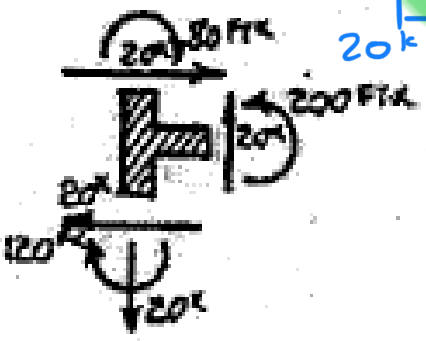


M Diagrams

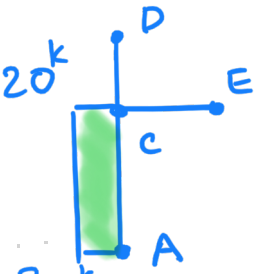


Deflected Share





Joint *C*



F DIAG
TENSION
POSITIVE