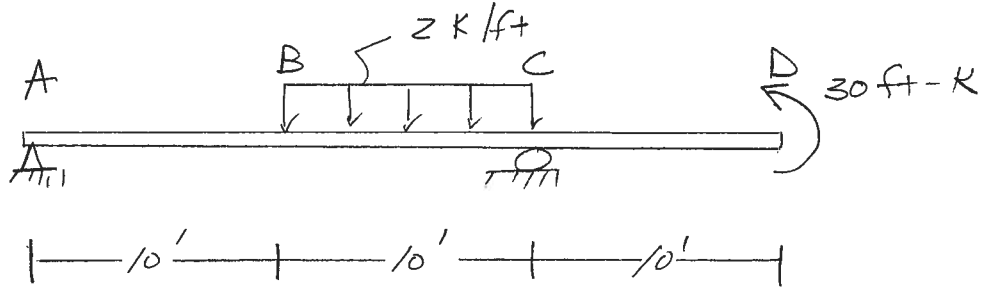
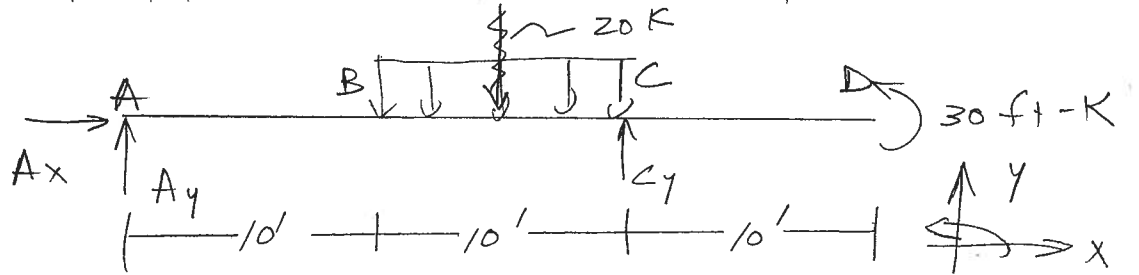


Write the shear and moment equations for the beam loaded as shown and draw shear and bending moment equations



First draw a F.B.D of the beam and calculate the external reactions.



$$\pm \rightarrow \sum F_x = 0$$

$$A_x = 0$$

$$\curvearrowright \sum M_A = 0$$

$$-20(15) + C_y(20) + 30 = 0$$

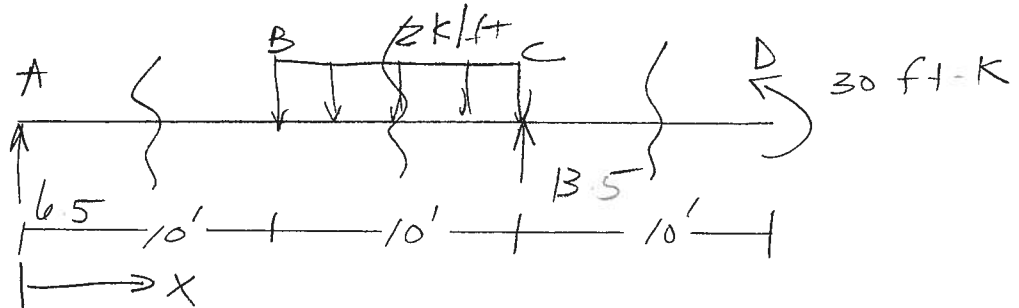
$$C_y = \frac{270}{20}$$

$$C_y = \underline{13.5 \text{ k}} \uparrow \text{ as shown}$$

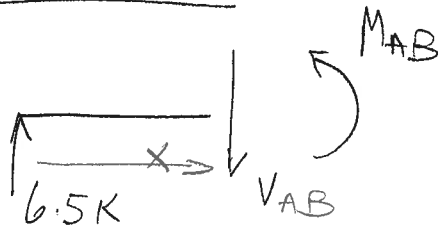
$$+\uparrow \sum F_y = 0$$

$$A_y - 20 + 13.5 = 0$$

$$\underline{A_y = 6.5 \text{ K}} \quad \uparrow \quad \text{as shown}$$



Section AB



$$+\uparrow \sum F_y = 0 \quad \left(\begin{array}{l} \leftarrow \\ + \end{array} \right) \sum M_{cut} = 0$$

$$-V_{AB} + 6.5 = 0$$

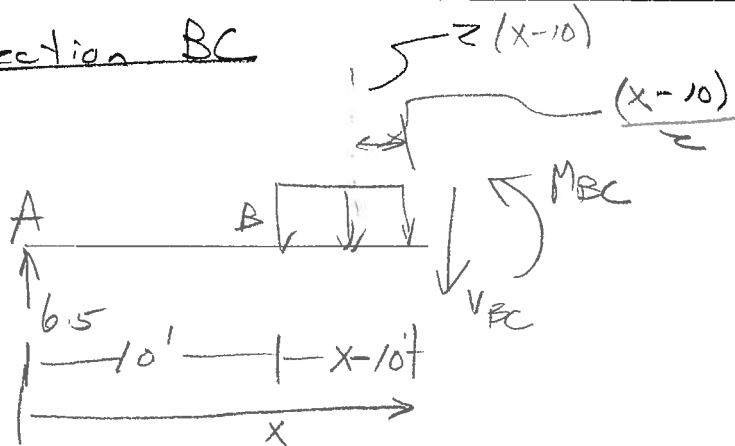
$$M_{AB} - 6.5x = 0$$

$$\underline{V_{AB} = 6.5}$$

$$\underline{M_{AB} = 6.5x}$$

$$0 < x < 10$$

Section BC



$$+\uparrow \sum F_y = 0$$

$$6.5 - 2(x-10) - V_{BC} = 0$$

$$V_{BC} = 6.5 - 2x + 20$$

$$\underline{V_{BC} = 26.5 - 2x}$$

$$\curvearrowright \sum M_{cut} = 0$$

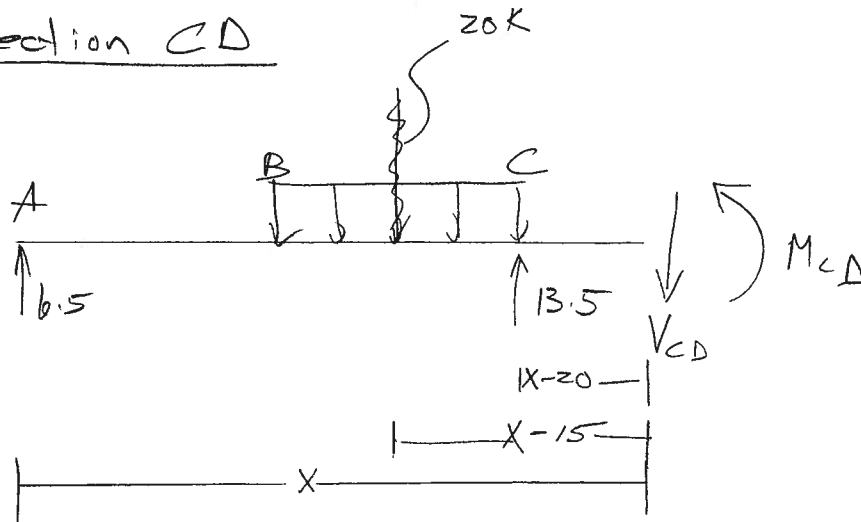
$$M_{BC} + 2(x-10) \frac{(x-10)}{2} - 6.5x = 0$$

$$M_{BC} = 6.5x - x^2 + 20x - 100$$

$$\underline{M_{BC} = -x^2 + 26.5x - 100}$$

$$10 < x < 20$$

Section CD



$$+\uparrow \sum F_y = 0$$

$$-V_{CD} - 20 + 13.5 + 6.5 = 0$$

$$\underline{V_{CD} = 0}$$

$$\curvearrowright \sum M_{cut} = 0$$

$$M_{CD} + 20(X-15) - 13.5(X-20) - 6.5X = 0$$

$$M_{CD} = -20X + 300 + 13.5X - 270 + 6.5X$$

$$\underline{M_{CD} = 30}$$

$$20 < X < 30$$

