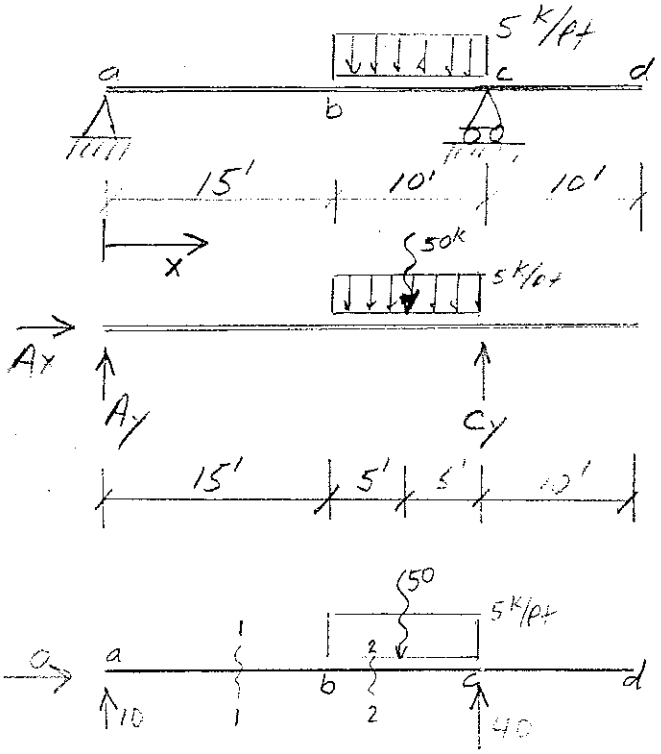
3.3 Shear and Moment Functions



- V(x)
- M(x)

$\rightarrow \Sigma F_x = 0 \quad A_x = 0$

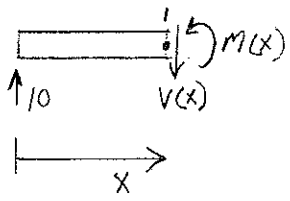
$\circlearrowleft \Sigma M_a = 0 \quad 25C_y - 20(50) = 0$

$C_y = 40$

$\uparrow \Sigma F_y = 0 \quad A_y + C_y - 50 = 0$

$A_y = 10$

Reactions



- Show V(x) & M(x) acting in positive direction
- V(x) & M(x) are unknown functions of x ie, at location. V & M depend on location.

Section a-b $(x \le 15)$

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

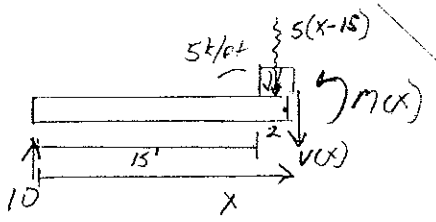
$\circlearrowleft \Sigma M_1 = 0 \quad M(x) - x(10) = 0 \quad M(x) = 10x$

- Equations are good for certain part of beam.
- location between a & b

$0 \le x \le 15'$

- $x > 15$ need new FBD

Section b-c



$+\uparrow \Sigma F_y = 0 \quad 10 - V(x) - 5(x-10) = 0 \quad V(x) = 10 - 5(x-15) = 85 - 5x$

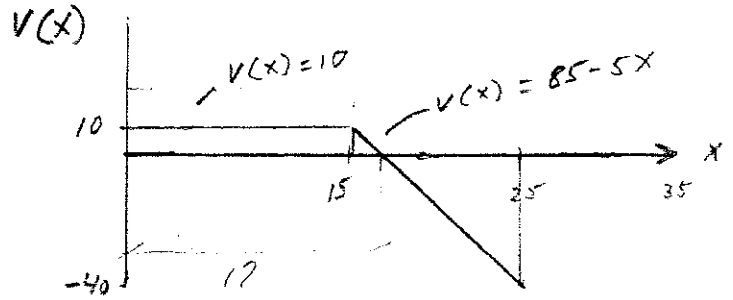
$\circlearrowleft \Sigma M_2 = 0 \quad M(x) - x(10) + \frac{(x-15)}{2}(5(x-15)) = 0 \quad M(x) = 10x - \frac{5}{2}(x-15)^2$

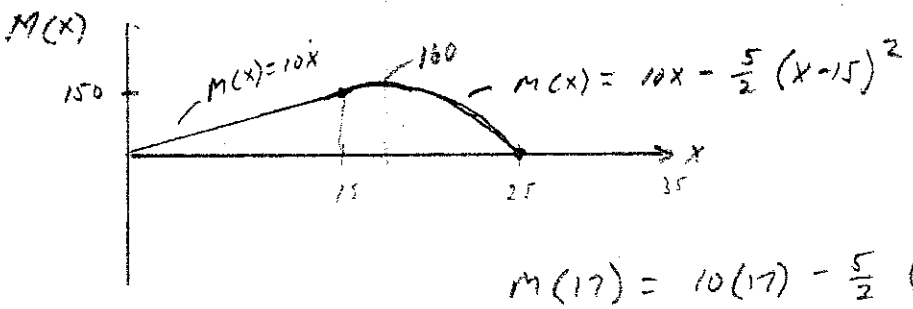
$15' \le x \le 25'$

- Good for location between b & c
- $x > 25$ need new FBD

Section c-d $25 \le x \le 35$

Plot Functions → Shear & Moment Diagrams





For now think of diagram as plot of function with axes. Later drop axes.

$$M(17) = 10(17) - \frac{5}{2}(17-15)^2 = 160$$