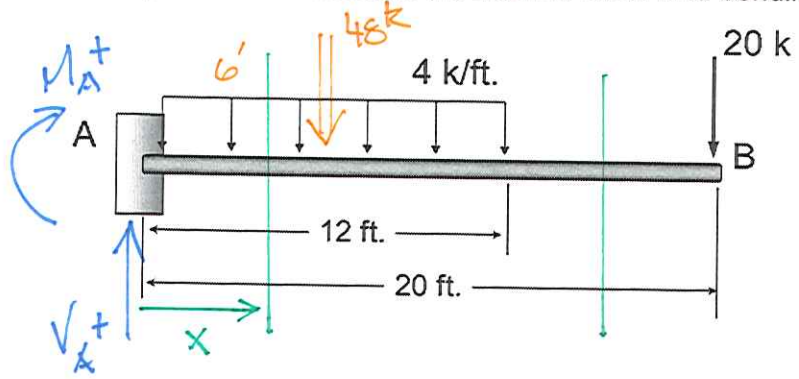
Example 4b-2 - Determine the internal shear and bending moment as a function of *x*.



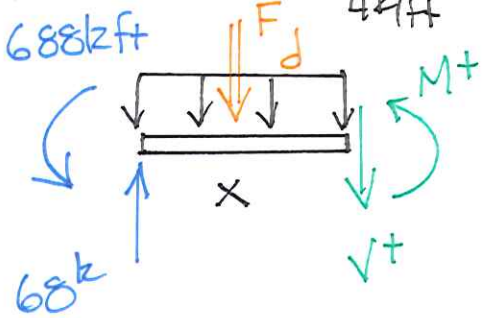
$\circlearrowleft + \sum M_A = 0 = -M_A - 48^k(6') - 20^k(20')$

$M_A = -688\ k\text{-ft}$

$+\uparrow \sum F_y = 0 = V_A - 48^k - 20^k \quad V_A = 68^k$

I

$0 \le x \le 12$



$F = 4x$

$d = \frac{x}{2}$

$\circlearrowleft + \sum M_{cut} = 0 = M + 4x\left(\frac{x}{2}\right) - 68x + 688\ k\text{-ft}$

$M(x)_I = \left[-2x^2 + 68x - 688\right] k\text{-ft} \quad M(x=0) = -688$ ✓

$+\uparrow \sum F_y = 0 = -V - 4x + 68$

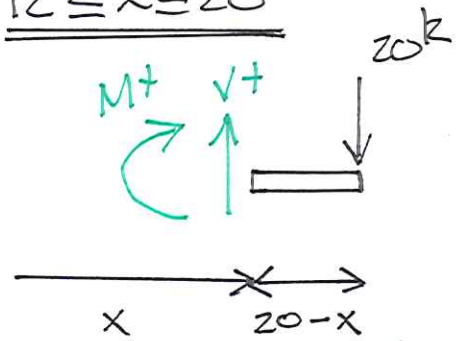
$V(x)_I = \left[-4x + 68\right] k$

$V(x=0) = 68^k$ ✓

$\frac{dM}{dx} = V$ ✓

II

$12 \le x \le 20$



$\circlearrowleft + \sum M_{cut} = 0 = -M - 20(20-x)$

$M(x)_{II} = -20(20-x)\ k\text{-ft}$

$M(x=20) = 0$ ✓

$+\uparrow \sum F_y = 0 = V - 20$

$V(x)_{II} = 20k$

$\frac{dM}{dx} = V$ ✓

$M_I(12) = M_{II}(12)$ ✓ $\quad V_I(12) = V_{II}(12)$ ✓