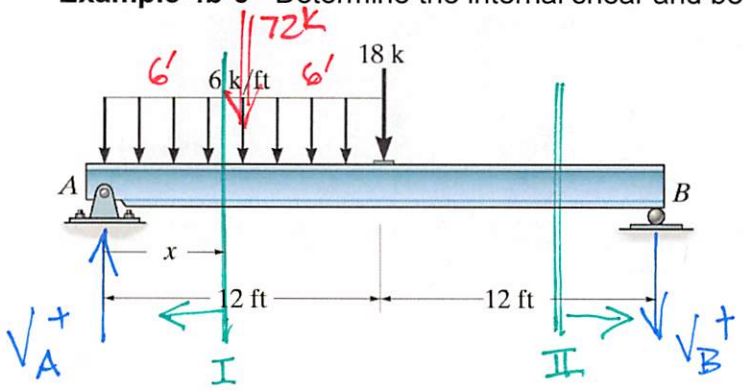
Example 4b-6 - Determine the internal shear and bending moment as a function of ***x***.

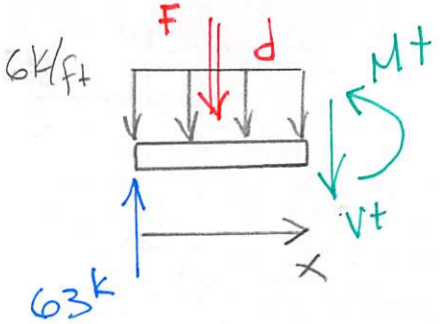


$\circlearrowleft^+ \sum M_B = 0 = 18^k(12') + 72^k(18') - V_A(24')$ $\quad V_A = 63^k$

$+\uparrow \sum F_y = 0 = V_A - V_B - 18^k - 72^k$ $\quad V_B = -27^k$

F d

(I) $0 \le x \le 12'$



$\circlearrowleft^+ \sum M_{CUT} = 0 = M_I + 6x\left(\frac{x}{2}\right) - 63^k(x)$

$M_I(x) = \left[-3x^2 + 63x\right]$ kft

$M(x=0) = 0$ ✓

$+\uparrow \sum F_y = 0 = -V - 6x + 63^k$

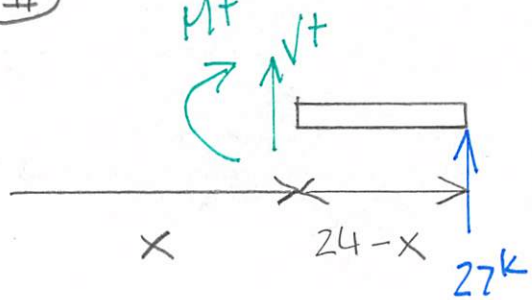
$V_I(x) = \left[-6x + 63\right]^k$

$V(x=0) = 63^k$ ✓

$\frac{dM}{dx} = V$ ✓✓

$F = 6x \quad d = \frac{1}{2}x$

(II) $12 \le x \le 24$



$\circlearrowleft^+ \sum M_{CUT} = 0 = -M + 27(24-x)$

$M_{II}(x) = \left[27(24-x)\right]$ kft

$M(x=24) = 0$ ✓

$M_I(x=12) = M_{II}(x=12)$ ✓

$+\uparrow \sum F_y = 0 = V + 27^k$

$V(x) = \left[-27\right]^k$

$V(x=24) = -27^k$ ✓

$\Delta V = V_{II}(12) - V_I(12) = -18^k$ ✓