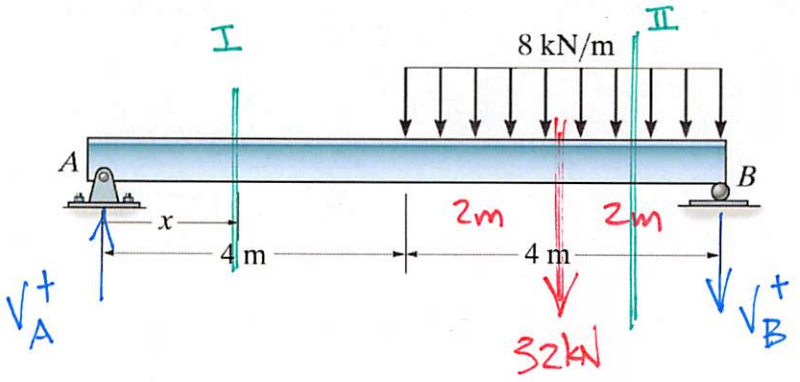
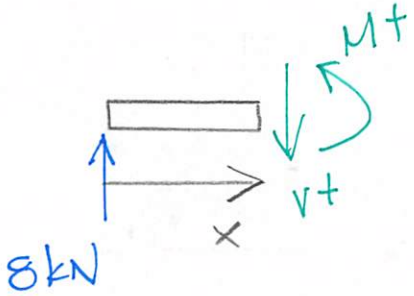
Example 4b-5 - Determine the internal shear and bending moment as a function of ***x***.



$\circlearrowleft^+ \sum M_B = 0 = 32\,kN(2m) - V_A(8m)$ $\quad V_A = 8\,kN$

$+\uparrow \sum F_y = 0 = V_A - V_B - 32kN$ $\quad V_B = -24\,kN$

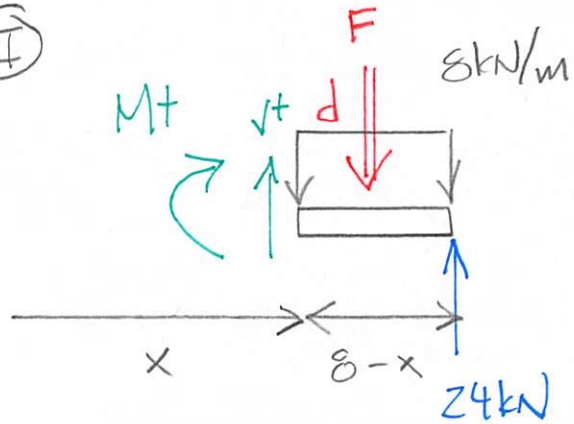
(I) $0 \le x \le 4m$



$\circlearrowleft^+ \sum M_{CUT} = 0 = M - 8kN\,x$ $\quad M_I = [8x]\,kN\,m$ $\quad M(x=0) = 0$ ✓

$+\uparrow \sum F_y = 0 = -V + 8kN$ $\quad V_I = 8\,kN$ $\quad V_A(x=0) = 8kN$ ✓

(II)



$F = 8(8-x)$ $\quad d = \frac{1}{2}(8-x)$

$\circlearrowleft^+ \sum M_{CUT} = 0 = -M - \underbrace{8(8-x)}_{F}\underbrace{\tfrac{1}{2}(8-x)}_{d} + 24(8-x)$

$M_{II} = \left[-4(8-x)^2 + 24(8-x)\right] kN\,m$

$M_I(x=4) = M_{II}(x=4)$ ✓ $\quad M(x=8) = 0$ ✓

$+\uparrow \sum F_y = 0 = V - 8(8-x) + 24kN$ $\quad V_B(x=8) = -24kN$ ✓

$V_{II} = \left[8(8-x) - 24\right] kN$ $\quad V_I(x=4) = V_{II}(x=4)$ ✓