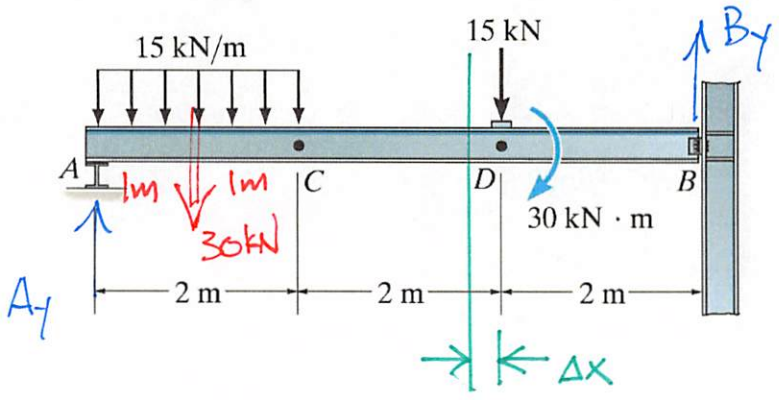
Example 4a-5 - Determine the internal shear force and bending moment at a section to the left of point *D*.



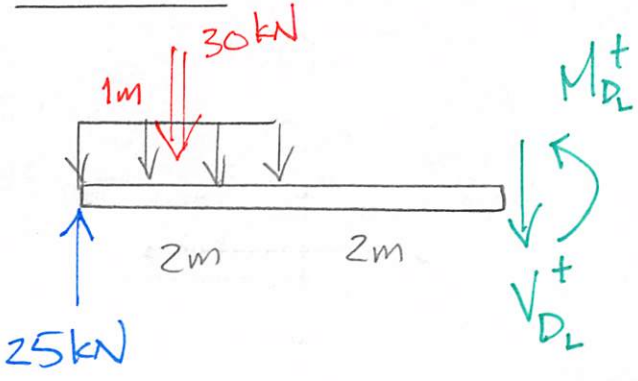
$$\circlearrowleft + \Sigma M_B = 0 = 15kN(2m) + 30kN(5m) - 30kNm - A_y(6m)$$

$$\underline{A_y = 25kN}$$

$$+\uparrow \Sigma F_y = 0 = A_y + B_y - 15kN - 30kN$$

$$\underline{B_y = 20kN}$$

FBD AD

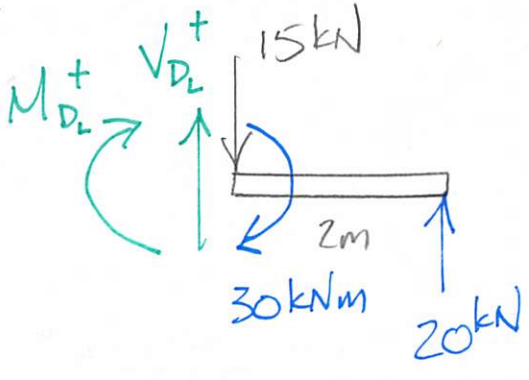


$$\circlearrowleft + \Sigma M_{CUT} = 0 = M_{D_L} + 30kN(3m) - 25kN(4m)$$

$$\underline{M_{D_L} = 10kNm}$$

$$+\uparrow \Sigma F_y = 0 = -V_{D_L} - 30kN + 25kN \qquad \underline{V_{D_L} = -5kN}$$

FBD DB



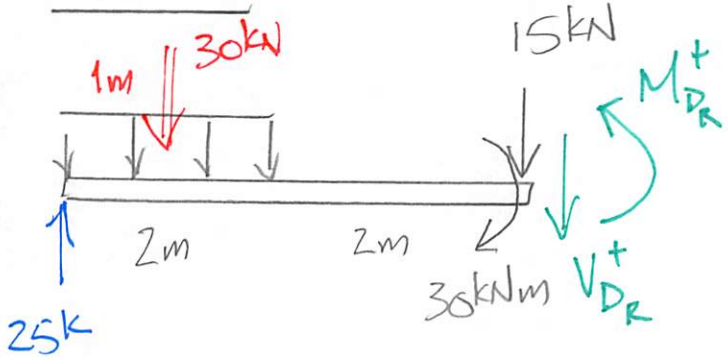
$$\circlearrowleft + \Sigma M_{CUT} = 0 = -M_{D_L} - 30kNm + 20kN(2m)$$

$$\underline{M_{D_L} = 10kNm}$$

$$+\uparrow \Sigma F_y = 0 = V_{D_L} - 15kN + 20kN$$

$$\underline{V_{D_L} = -5kN}$$

FBD AD$^+$



$$\circlearrowleft^+ \Sigma M_{CUT} = 0 = M_{D_R} - 30kNm + 30kN(3m) - 25kN(4m)$$

$$\underline{\underline{M_{D_R} = 40\ kNm}}$$

$$\underline{\Delta M_{L\to R} = 30kNm}$$

$$+\uparrow \Sigma F_y = 0 = -V_{D_R} - 15kN - 30kN + 25^k$$

$$\underline{\underline{V_{D_R} = -20\ kN}}$$

$$\underline{\Delta V_{L\to R} = -15\ kN}$$