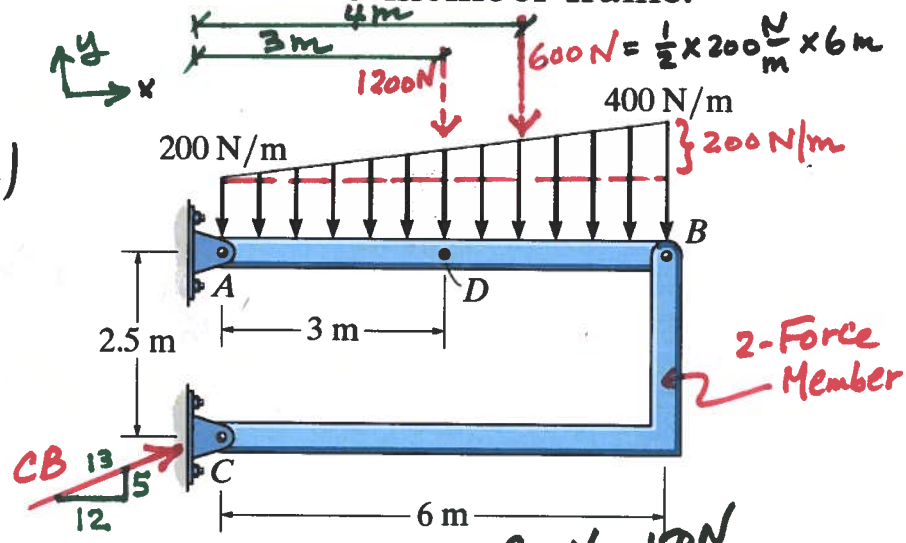
Problem 2 – Internal Forces II

Determine the normal force, shear force, and moment at a section passing through point *D* of the two-member frame.



$\circlearrowleft \Sigma M_A = 0 = CB\left(\frac{12}{13}\right)(2.5)m - (1200N)(3m) - (600N)(4m)$

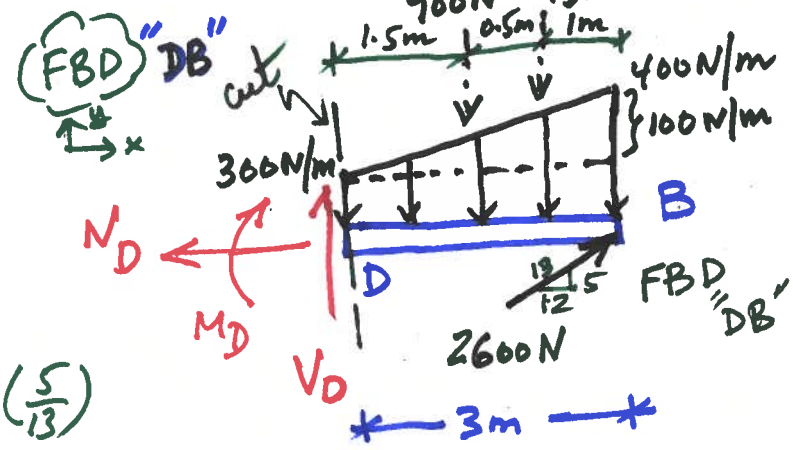
$CB = 2600\,N$ (5 : 12)

FBD DB:

$\rightarrow \Sigma F_x = 0 = -N_D + 2600\left(\frac{12}{13}\right)$

$N_D = 2400\,N \leftarrow$ on DB

$N_D = 2.40\,kN \leftarrow$ on DB



$\uparrow \Sigma F_y = 0 = V_D - 900 - 150 + 2600\left(\frac{5}{13}\right)$

$V_D = 50.0\,N \uparrow$ on DB

$\circlearrowleft \Sigma M_A = 0 = -M_D - 900(1.5) - 150(2) + 2600\left(\frac{5}{13}\right)(3)$

$M_D = 1350\,N.m$

$M_D = 1.350\,kN.m \circlearrowleft$ on DB

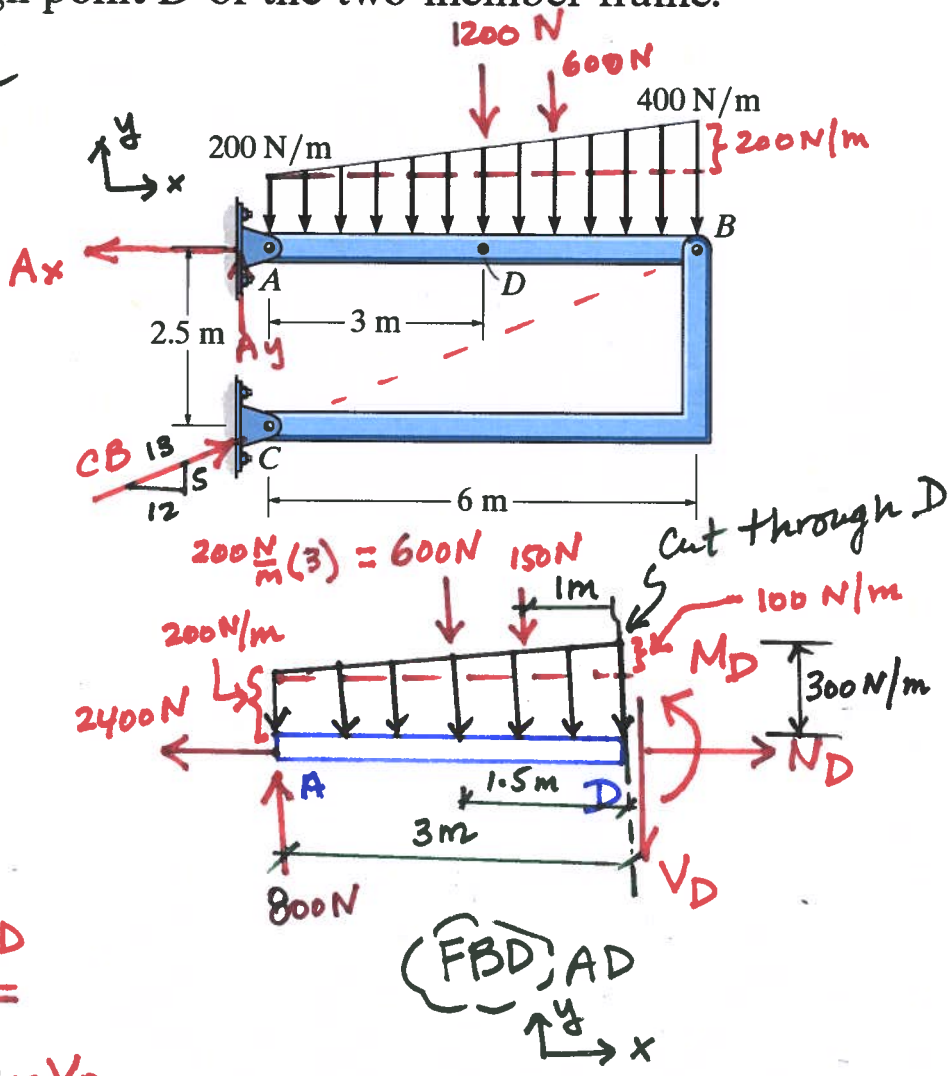
⇒ You may also find A_x and A_y and study the FBD of "AD" to get the same answers. Try it!

↳ see next Page

ALTERNATIVE SOLUTION

Problem 2 – Internal Forces II

Determine the normal force, shear force, and moment at a section passing through point *D* of the two-member frame.



$\circlearrowleft \Sigma M_A = 0 = CB\left(\frac{12}{13}\right)(2.5)\,m - 1200(3) - 600(4)$

$CB = 2600\ N$ (5, 12)

$\rightarrow \Sigma F_x = 0 = -A_x + 2600\left(\frac{12}{13}\right)$

$A_x = 2400\ N \leftarrow$

$\uparrow \Sigma F_y = 0 = A_y - 1200 - 600 + 2600\left(\frac{5}{13}\right)$

$A_y = 800\ N \uparrow$

FBD AD

$\rightarrow \Sigma F_x = 0 = -2400 + N_D$

$N_D = 2400\ N \rightarrow$ on AD

$\uparrow \Sigma F_y = 0 = 800 - 600 - 150 - V_D$

$V_D = 50.0\ N \downarrow$ on AD

$\circlearrowleft \Sigma M_D = 0 = 800(3) - 600(1.5) - 150(1) - M_D$

$M_D = 1350\ N.m = 1.350\ KN.m \circlearrowleft$ on AD

Same answers.