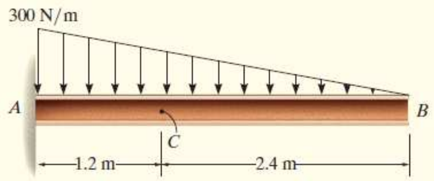
Loading in beams

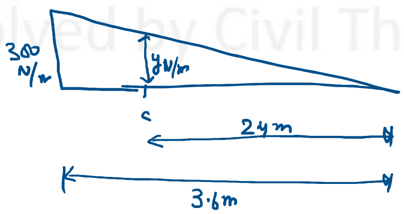
Determine the resultant internal loadings acting on the cross section at *C* of the cantilevered beam shown in Fig. 1–4*a*.



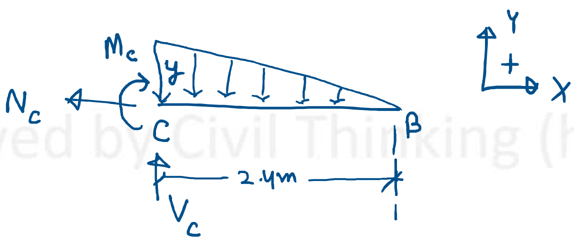
(a)

Fig. 1–4

Courtesy: Mechanics of Materials, Tenth Edition in SI Units, R. C. Hibbeler



$$\frac{300}{3.6} = \frac{y}{2.4} \Rightarrow y = 200 \text{ N/m}$$



$\circlearrowleft + \Sigma M_c = 0$:

$$-\frac{1}{2} \times y \times 2.4\text{m} \times \frac{2.4\text{m}}{3} - M_c = 0$$

Put $y = 200 \text{ N/m}$

$$\Rightarrow M_c = -\frac{1}{2} \times 200 \text{N/m} \times 2.4\text{m} \times \frac{2.4\text{m}}{3} = -192 \text{ N.m}$$

$$\Rightarrow M_c = \circlearrowleft 192 \text{ Nm}$$

$\xrightarrow{+} \Sigma F_x = 0:$

$$-N_c = 0 \Rightarrow \boxed{N_c = 0}$$

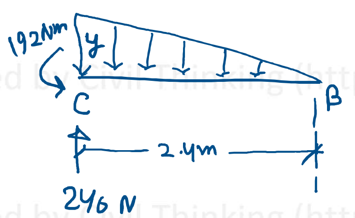
$+\uparrow \Sigma F_y = 0:$

$$V_c - \frac{1}{2}(y \times 2.4m) = 0$$

Put $y = 200\ N/m$

$$\Rightarrow V_c = \frac{200\ N/m \times 2.4m}{2} = 240\ N$$

Results:



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