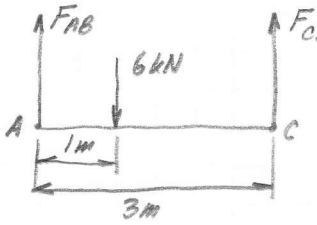
K. Dennehy Ch. 1, Pgs. 40-45: 1-46, 1-51, 1-61 HW

(1-46)



$\sum M_A = 0, \quad -(6\,kN)(1\,m) + F_{CD}(3\,m) = 0, \quad F_{CD} = 2\,kN$

$\sum F_y = 0, \quad F_{AB} - 6\,kN + 2\,kN = 0, \quad F_{AB} = 4\,kN$

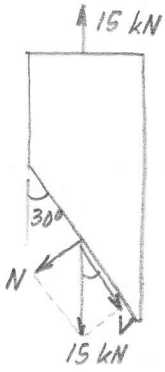
$$\sigma_{AB} = \frac{N_{AB}}{A_{AB}} = \frac{4\,kN}{(12\,mm^2)\left(\frac{1\,m}{1{,}000\,mm}\right)^2} = 333{,}333.3\,kPa$$

or $\boxed{333\,MPa}$

$$\sigma_{CD} = \frac{N_{CD}}{A_{CD}} = \frac{2\,kN}{(8\,mm^2)\left(\frac{1\,m}{1{,}000\,mm}\right)^2} = 250{,}000\,kPa$$

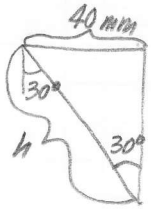
or $\boxed{250\,MPa}$

(1-51)



$N = 15\,kN \sin 30° = 7.5\,kN$

$V = 15\,kN \cos 30° = 12.99\,kN$



$h \sin 30° = 40\,mm$

$h = 80\,mm$

$A = (80\,mm)(20\,mm) = 1{,}600\,mm^2$

$$\sigma = \frac{N}{A} = \frac{7.5\,kN}{(1{,}600\,mm^2)\left(\frac{1\,m}{1000\,mm}\right)^2}$$

$= 4{,}687.5\,kPa$

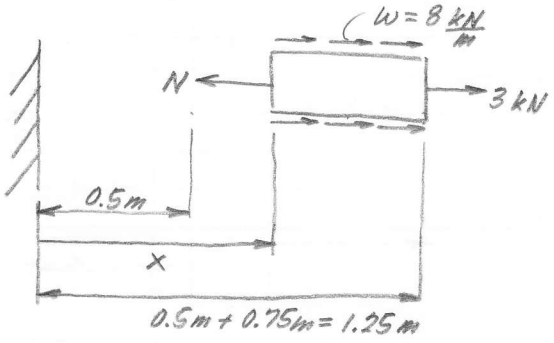
or $\boxed{4.69\,MPa}$

$$\tau = \frac{V}{A} = \frac{12.99\,kN}{(1{,}600\,mm^2)\left(\frac{1\,m}{1000\,mm}\right)^2}$$

$= 8{,}118.75\,kPa$

or $\boxed{8.12\,MPa}$

(1-61)



$\sum F_x = 0, \quad -N + 8\,\frac{kN}{m}(1.25\,m - x) + 3\,kN = 0$

$N = -8x\left(\frac{kN}{m}\right) + 13\,kN$

$$\sigma = \frac{N}{A} = \frac{-8x\left(\frac{kN}{m}\right) + 13\,kN}{400 \times 10^{-6}\,m^2}$$

$= -20{,}000\,x\left(\frac{kPa}{m}\right) + 32{,}500\,kPa$

or $\boxed{-20.0\,x + 32.5\ (MPa, x\ in\ m)}$