



مدرس خصوصى



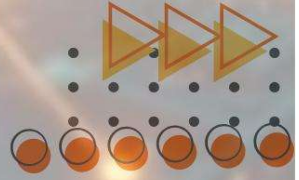
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للتواصل



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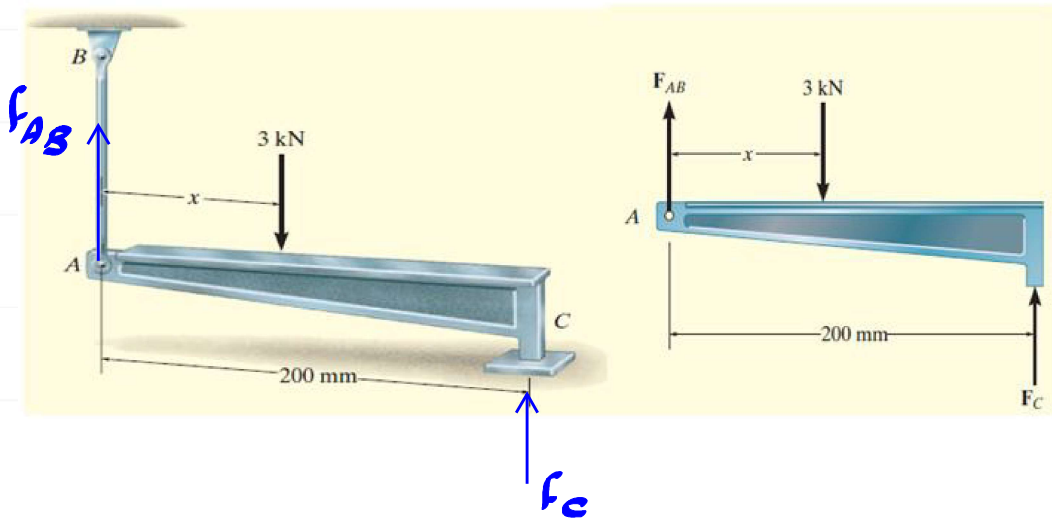


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Example No 5

Member AC shown in Fig. below is subjected to a vertical force of 3 kN. Determine the position x of this force so that the average compressive stress at the smooth support C is equal to the average tensile stress in the tie rod AB . The rod has a cross-sectional area of 400 mm^2 and the contact area at C is 650 mm^2



$$\sigma_{AB} = \sigma_C$$

$$\frac{f_{AB}}{400} = \frac{f_C}{650}$$

$$\sum f_x = 0, \sum f_y = 0, \sum M = 0$$

$$\sum f_y = f_{AB} - 3 + f_C = 0 \Rightarrow f_{AB} = 3 - f_C$$

$$\sum M_A = -(3 \text{ kN})(x) + f_C(200 \text{ mm}) = 0$$

$$\frac{3 - f_C}{400} = \frac{f_C}{650} \Rightarrow f_C = 1.857 \text{ kN}$$

$$f_{AB} = 3 - 1.857 = 1.142 \text{ kN}$$

$$x = \frac{-1.857 \times 200 \text{ mm}}{(-3 \text{ kN})} = 123.8 \text{ mm}$$