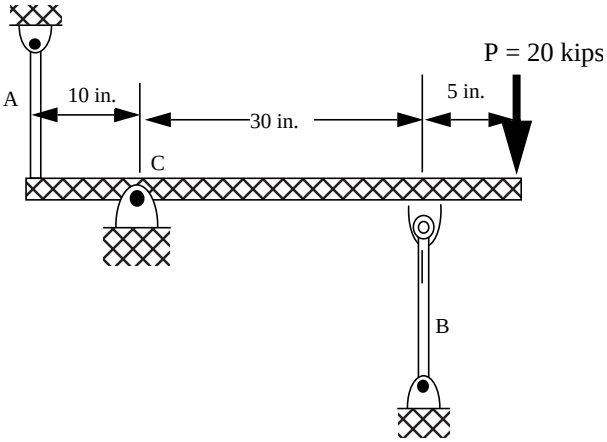
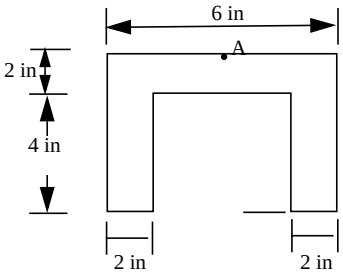
1 A rigid plate is pivoted at point C. After the load P is applied the temperature of bar B is observed to decrease by 50^{o}F. Determine the axial stress in bar A and the deformation of bar B. The area of cross-section of both bars is 2 in^{2}.

	Modulus of Elasticity	Coefficient of Thermal Expansion	Length
Bar A	10,000 ksi	16 $(10^{-6})/^{o}$F	10 inches
Bar B	30,000 ksi	10 $(10^{-6})/^{o}$F	18 inches



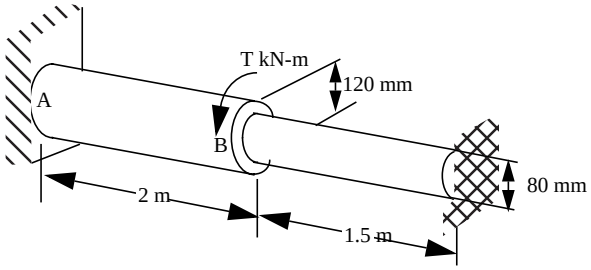
2 A beam of elastic-perfectly plastic material has a yield stress of 50 ksi and a cross-section shown. Determine the location of the neutral axis when point A is at yield stress.



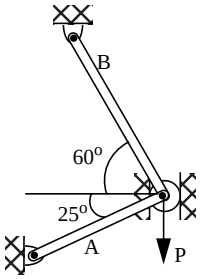
(3a, b) A stepped shaft is subjected to a torque T as shown. The shaft material has a shear yield stress of 120 MPa and Shear Modulus of Rigidity of 80 GPa. The plastic zone in AB is 40 mm deep. Determine:

(b) the depth of plastic zone in BC.

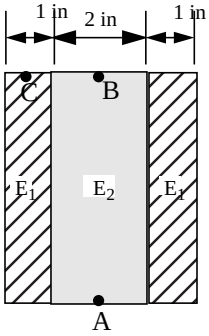
(c) the maximum torsional shear *strain* in AB.



(c) A force F is applied to the roller that slides inside a slot. Both bars have an area of cross-section of A = 100 mm^2, Modulus of Elasticity E = 200 GPa, and a yield stress of 250 MPa. Bar AP and BP have lengths of L_{AP}= 200 mm and L_{BP}= 250 mm respectively. Determine the collapse load



In parts (d) and (e) below use the composite cross-section shown in which E_1=30,000 ksi and E_2= 10,000 ksi. Point a is at the bottom of the cross-section and points B and C are at the top of the cross-section.



(d) The AXIAL normal stress at A is 12 ksi (T). What are the axial stresses at points B and C?
(e) The BENDING normal stress at A is 12 ksi (T). What are the bending normal stresses at B and C?

ANSWERS

1. σ_A = 5 ksi (C) δ_B = 0.015 in
2. a=2.7 in
3a $(depth)_{BC}$ =25 mm
3b γ_{max} = 4500 μ
3c $P_{collapse}$ = 32,216N
3d σ_B = 12 ksi (T) σ_C =36 kxi (T)
3e σ_B =12 ksi (C) σ_C = 36 ksi(C)