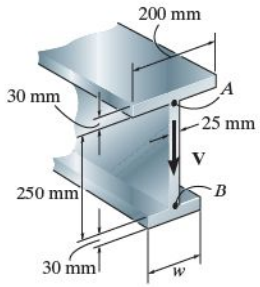
PROBLEMS

7–1. If the beam is subjected to a shear of $V = 15$ kN, determine the web's shear stress at A and B. Indicate the shear-stress components on a volume element located at these points. Set $w = 125$ mm. Show that the neutral axis is located at $\bar{y} = 0.1747$ m from the bottom and $I_{NA} = 0.2182(10^{-3})$ m^4.

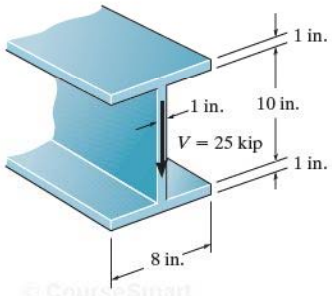
7–2. If the wide-flange beam is subjected to a shear of $V = 30$ kN, determine the maximum shear stress in the beam. Set $w = 200$ mm.

7–3. If the wide-flange beam is subjected to a shear of $V = 30$ kN, determine the shear force resisted by the web of the beam. Set $w = 200$ mm.



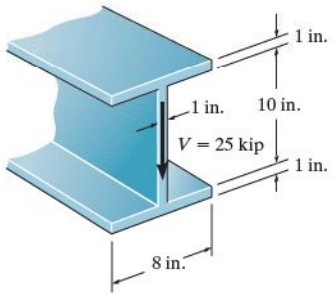
Probs. 7–1/2/3

***7–4.** If the wide-flange beam is subjected to a shear of $V = 25$ kip, determine the maximum shear stress in the beam.



Prob. 7–4

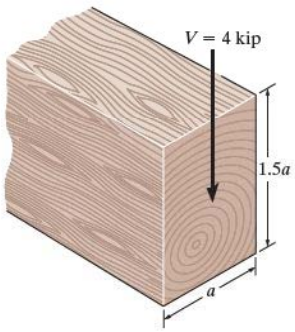
7–5. If the wide-flange beam is subjected to a shear of $V = 25$ kip, determine the shear force resisted by the web of the beam.



Prob. 7–5

7–6. The beam has a rectangular cross section and is made of wood having an allowable shear stress of $\tau_{allow} = 1.6$ ksi. If it is subjected to a shear of $V = 4$ kip, determine the smallest dimension a of its bottom and $1.5a$ of its sides.

7–7. The beam has a rectangular cross section and is made of wood. If it is subjected to a shear of $V = 4$ kip, and $a = 10$ in., determine the maximum shear stress and plot the shear–stress variation over the cross section. Sketch the result in three dimensions.

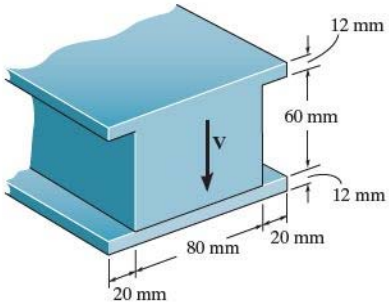


Probs. 7–6/7

***7–8.** Determine the maximum shear stress in the strut if it is subjected to a shear force of $V = 20$ kN.

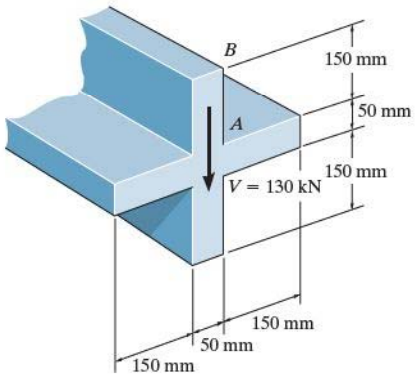
7–9. Determine the maximum shear force V that the strut can support if the allowable shear stress for the material is $\tau_{allow} = 40$ MPa.

7–10. Plot the intensity of the shear stress distributed over the cross section of the strut if it is subjected to a shear force of $V = 15$ kN.



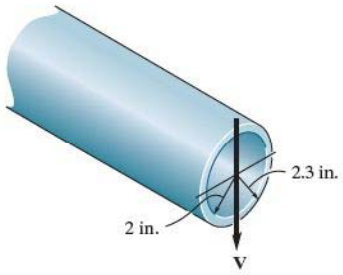
Probs. 7–8/9/10

***7–12.** The strut is subjected to a vertical shear of $V = 130$ kN. Plot the intensity of the shear-stress distribution acting over the cross-sectional area, and compute the resultant shear force developed in the vertical segment AB.



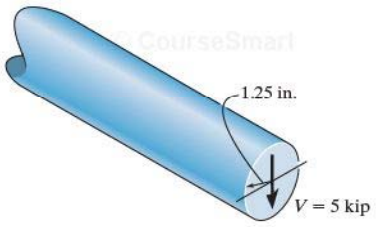
Prob. 7–12

7–11. If the pipe is subjected to a shear of $V = 15$ kip, determine the maximum shear stress in the pipe.



Prob. 7–11

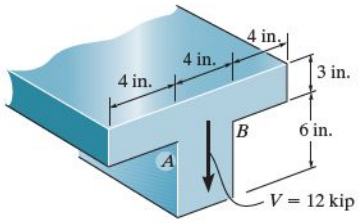
7–13. The steel rod has a radius of 1.25 in. If it is subjected to a shear of $V = 5$ kip, determine the maximum shear stress.



Prob. 7–13

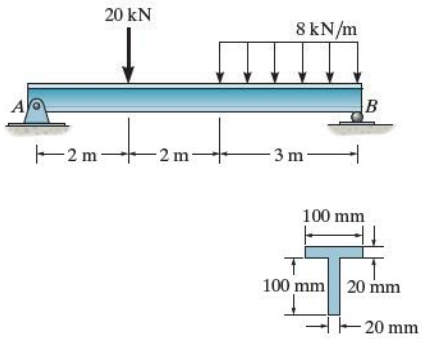
7–14. If the T-beam is subjected to a vertical shear of $V = 12$ kip, determine the maximum shear stress in the beam. Also, compute the shear-stress jump at the flange–web junction AB. Sketch the variation of the shear-stress intensity over the entire cross section.

7–15. If the T-beam is subjected to a vertical shear of $V = 12$ kip, determine the vertical shear force resisted by the flange.



Probs. 7–14/15

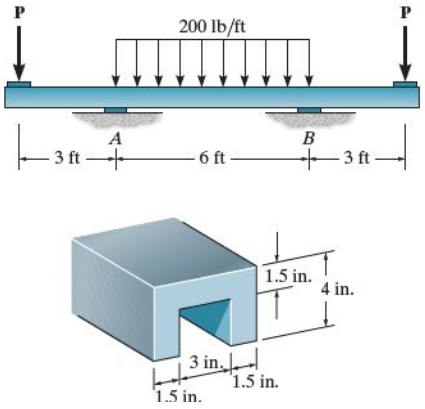
***7–16.** The T-beam is subjected to the loading shown. Determine the maximum transverse shear stress in the beam at the critical section.



Prob. 7–16

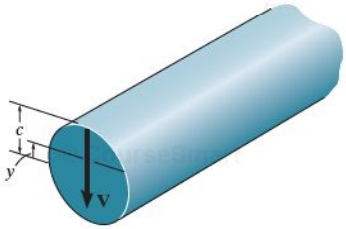
7–17. Determine the largest end forces P that the member can support if the allowable shear stress is $\tau_{allow} = 10$ ksi. The supports at A and B only exert vertical reactions on the beam.

7–18. If the force $P = 800$ lb, determine the maximum shear stress in the beam at the critical section. The supports at A and B only exert vertical reactions on the beam.



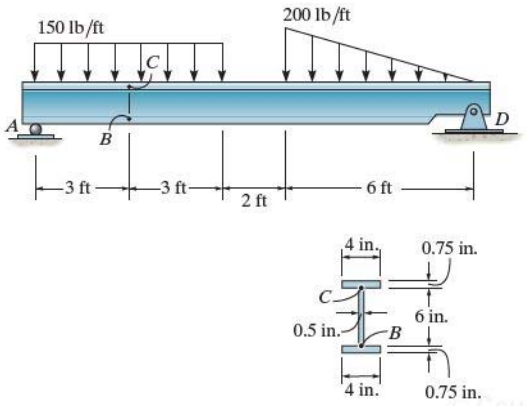
Probs. 7–17/18

7–19. Plot the shear-stress distribution over the cross section of a rod that has a radius c. By what factor is the maximum shear stress greater than the average shear stress acting over the cross section?



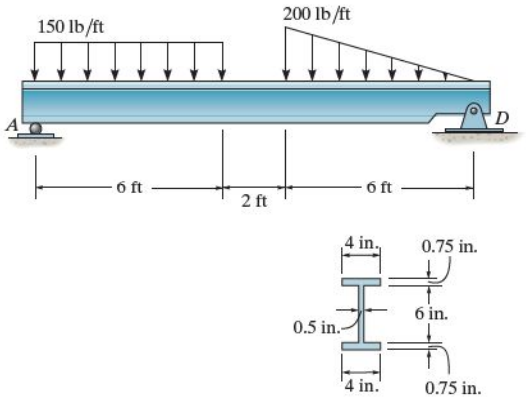
Prob. 7–19

7–27. Determine the shear stress at points B and C located on the web of the fiberglass beam.



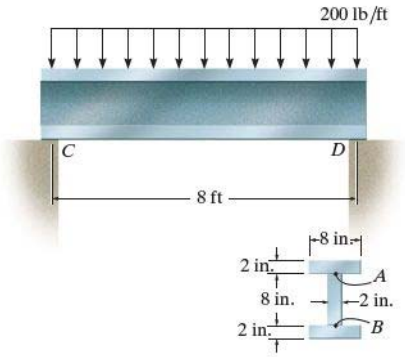
Prob. 7–27

***7–28.** Determine the maximum shear stress acting in the fiberglass beam at the critical section.



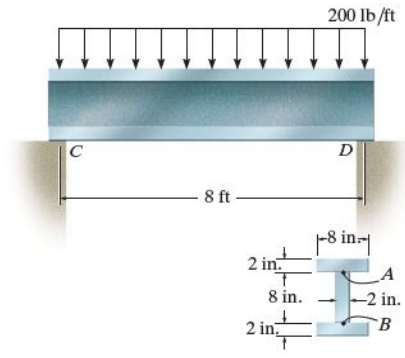
Prob. 7–28

7–29. The beam is made from three plastic pieces glued together at the seams A and B. If it is subjected to the loading shown, determine the shear stress developed in the glued joints at the critical section. The supports at C and D exert only vertical reactions on the beam.



Prob. 7–29

7–30. The beam is made from three plastic pieces glued together at the seams A and B. If it is subjected to the loading shown, determine the vertical shear force resisted by the top flange of the beam at the critical section. The supports at C and D exert only vertical reactions on the beam.



Prob. 7–30