Chapter 10 - Problems

Note: All SI Unit Problems changed to US Customary Units

10-2

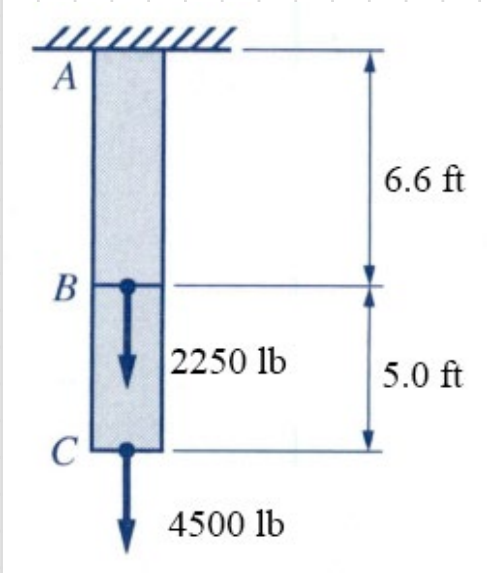
An aluminum rod of 0.8 in. (20-mm) diameter is elongated 9/64 in. (3.5 mm) along its longitudinal direction by a load of 5.6 kips (25 kN). If the modulus of elasticity of aluminum is E = 10,153 ksi (70 GPa), determine the original length of the bar.

10-4

A metal wire is 33 ft (10 m) long and 0.08 in (2 mm) in diameter. It is elongated 0.25 in (6.06 mm) by a tensile force of 90 lb (400 N). Determine the modulus of elasticity of the material and indicate a possible material for the wire.

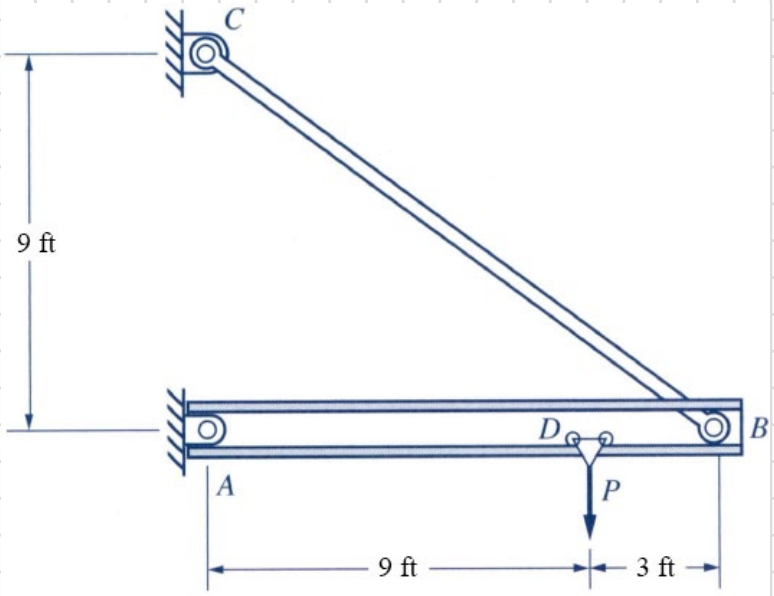
10-8

An aluminum bar 1.2 in. (30 mm) in diameter is suspended as shown in Fig. P10-8. Determine the total displacement of the lower end C after the loads are applied. The modulus of elasticity of aluminum is E = 10,153 ksi (70 GPa).



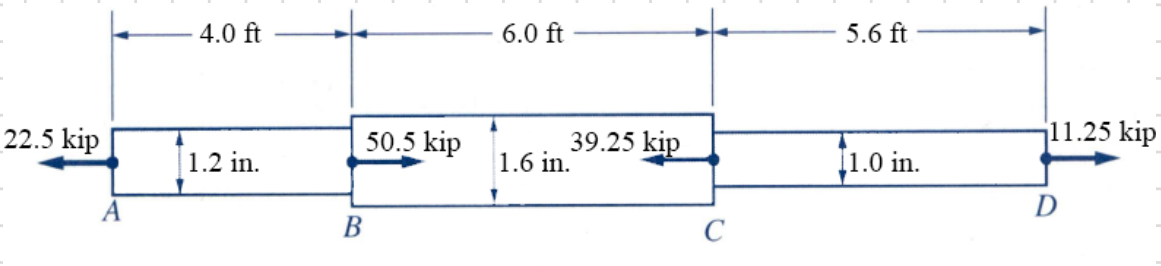
10-10

See Fig. P10-10. Determine the total elongation of the steel eye bar BC of 0.4 in. (10-mm) diameter due to the load P = 1800 lb (8 kN). The modulus of elasticity of steel is E= 30,460 ksi (210 GPa).



10-11

Determine the total deformation between points A and D of a stepped steel bar subjected to the axial forces shown in Fig. P10-11. The modulus of elasticity of steel is E= 30,460 ksi (210 GPa).



10-14

A steel rod used in a control mechanism must transmit a tensile force of 2250 lb (10 kN) without exceeding an allowable stress of 21,756 psi (150 MPa) or stretching more than 0.04 in. (1 mm) per 3.3 ft (1 meter) of length. The modulus of elasticity is E= 30,460 ksi (210 GPa). Find the proper diameter of the bar.