14-2

Rework Problem 14-1 using the properties of the dressed size listed in the appendix, Table A-6(a), for a nominal 4 x 6 timber section.

Solution

14-3

A cantilever beam has a 10 ft span (3-m) and a circular section of 4 in (100-mm) diameter. Determine the maximum flexural stress in the beam due to a 1125 lb (5-kN) concentrated load applied at the free end.

Solution.

14-4

Verify the section moduli tabulated in the appendix, Tables A-1 and A-2, for the following sections:

Sx for W18 x 35

Sy for W250 x 0.71 (SI Designation) AND US Equivalent W10 x 49

Sx and Sy for S12 x 31.8

Solution.

14-6

A simple beam has a 26 ft (8-m) span and a W16 x 50 (W410 x 0.73) section. Determine the maximum flexural stress due to two concentrated loads of 20,230 lb (90 kN) each applied at the third points along the beam.

Solution.

14-7

A standard-weight steel pipe of 2 in (50-mm) nominal diameter is used as a post for a clothesline. The pipe is firmly embedded in a concrete base. Determine the maximum normal stress in the pipe caused by a horizontal force of 90 lb (400 N) applied at the section 6.5 ft (2 m) above the base.

Solution.

14-10

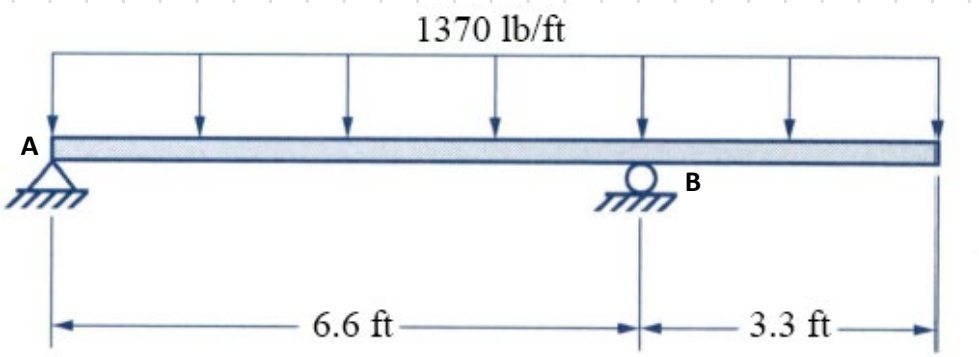
A timber beam has a 16 ft (5-m) simple span and a rectangular section of nominal size 6 x 16 (150 x 410). Determine the maximum flexural stress due to a concentrated load of 3600 lb (16 kN) applied at the midspan and a uniform load of 300 lb/ft (4.5 kN/m) (including the weight of the beam) over the entire length of the beam.

Solution.

14-11

The overhanging beam shown in Fig. P14-11 has a timber section of nominal size 4 x 12 (100 x 300). Determine the maximum flexural stress due to a uniform load of 1370 lb/ft (20 kN/m) over the entire length of the beam.

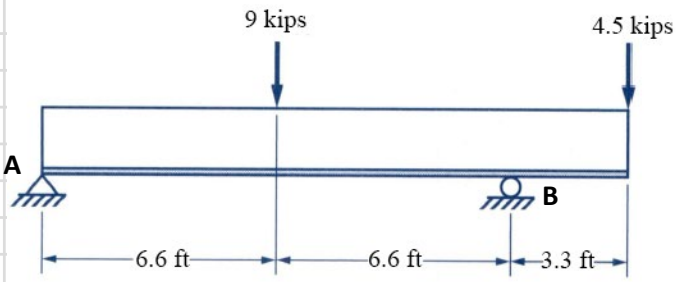
Solution.

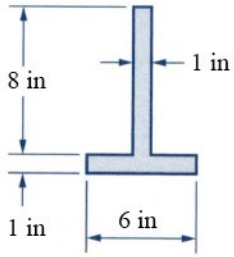


14-12

A beam with an inverted T-section is subjected to the two concentrated loads shown in Fig. P14-12. Determine the maximum tensile and compressive stresses in the beam. Neglect the weight of the beam.

Solution.





Section

14-14

Determine the allowable moment about the horizontal neutral axis that a timber beam with a nominal size 2 x 4 (50 X 100) can resist without exceeding the allowable stress of 1450 psi (10 MPa).

Solution.

14-15

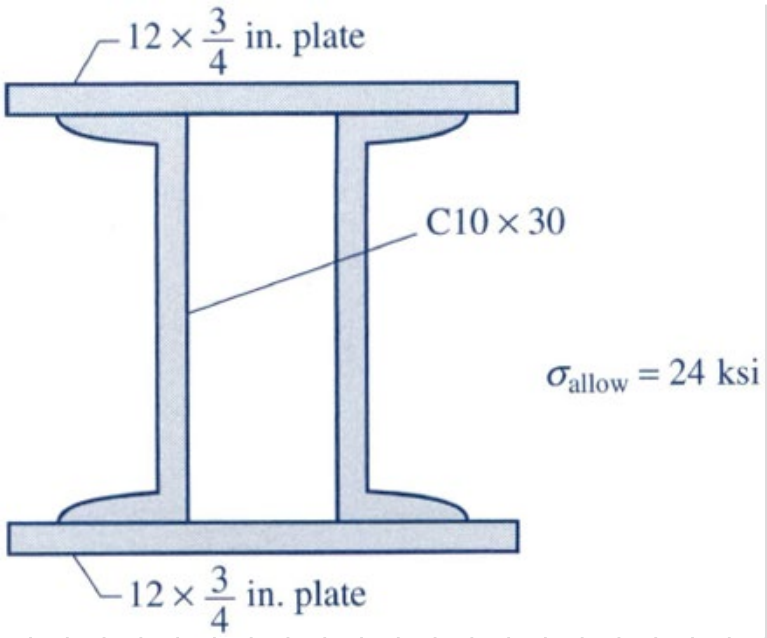
Determine the allowable moment about the horizontal neutral axis that a W16 x 50 section can resist without exceeding the allowable stress of 24 ksi.

Solution.

14-16

Determine the allowable moment about the horizontal neutral axis that the beam with the built-up section shown in Fig. P14-16 can resist without exceeding the allowable stress of 24 ksi.

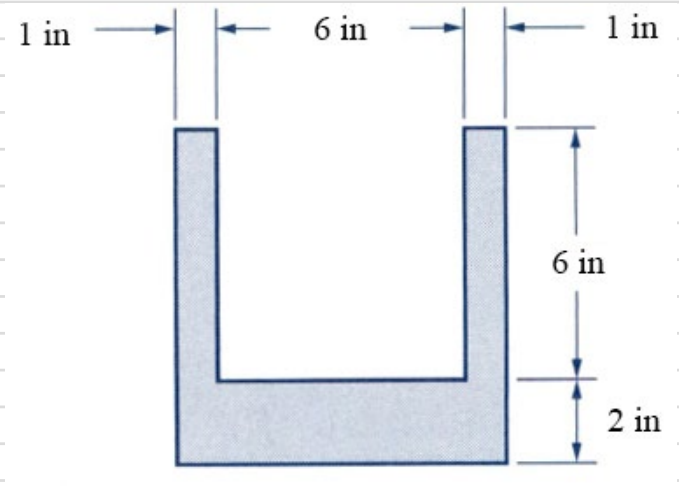
Solution.



14-17

A cast-iron machine part has a channel section, as shown in Fig. P14-17. Determine the allowable positive moment about the horizontal neutral axis that the section can resist without exceeding the allowable stress of 3050 psi (21 MPa) in tension and 12,180 psi (84 MPa) in compression.

Solution.



14-18

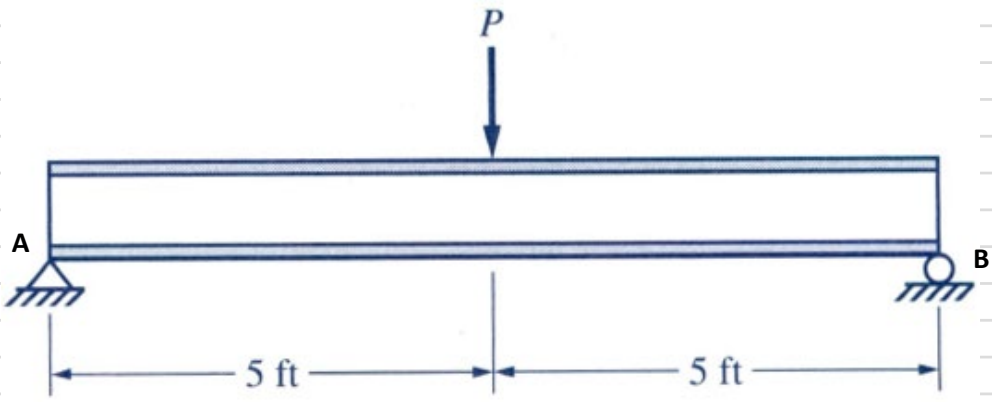
Refer again to Fig. P14-17. Determine the maximum negative moment that the section can resist without exceeding the allowable stresses in tension and compression given in Problem 14-17.

Solution.

14-19

Determine the allowable load P that can be applied to the midspan of the simply supported beam shown in Fig. P14-19. The beam has a structural steel W14 x 82 section and an allowable flexural stress of 33 ksi. Neglect the weight of the beam.

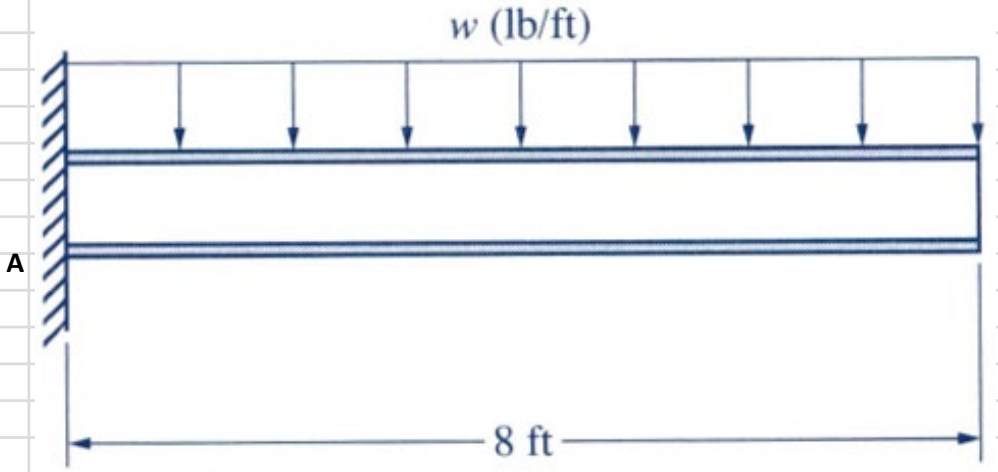
Solution.



14-20

See Fig. P14-20. Determine the allowable uniform load w in lb/ft that the structural steel S15 x 50 cantilever beam can carry without exceeding an allowable flexural stress of 24 ksi.

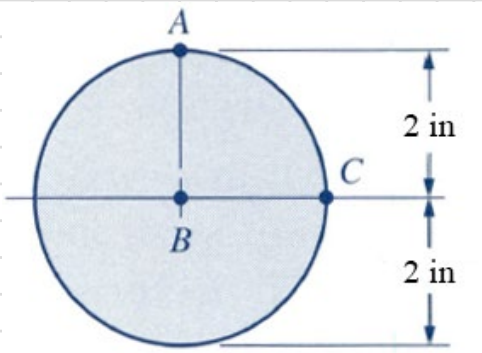
Solution.



14-22

The beam of circular section in Fig. P14-22 is subjected to a maximum shear force of 3375 lb (15 kN). Determine the shear stresses at points A, B, and C.

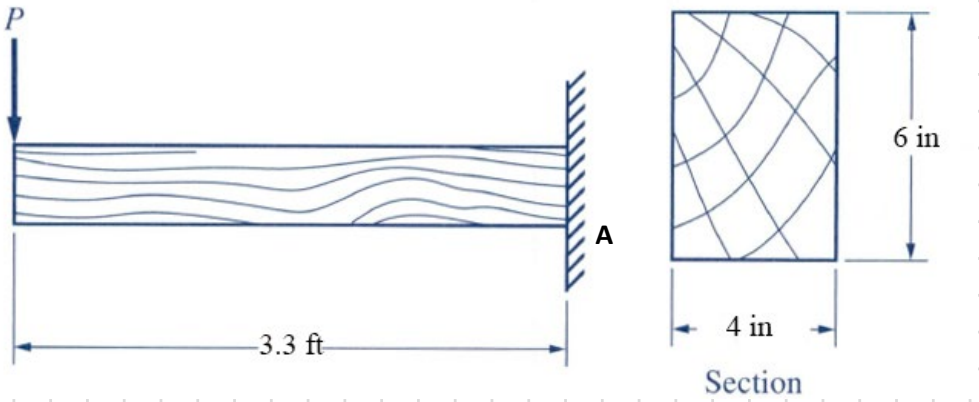
Solution.



14-24

A cantilever timber beam having the full-size rectangular section shown in Fig. P14-24 is subjected to the concentrated load P at its free end. Determine the maximum allowable load P if the allowable flexural stress is 1450 psi (10 MPa) and the allowable shear stress in the beam is 116 psi (800 kPa).

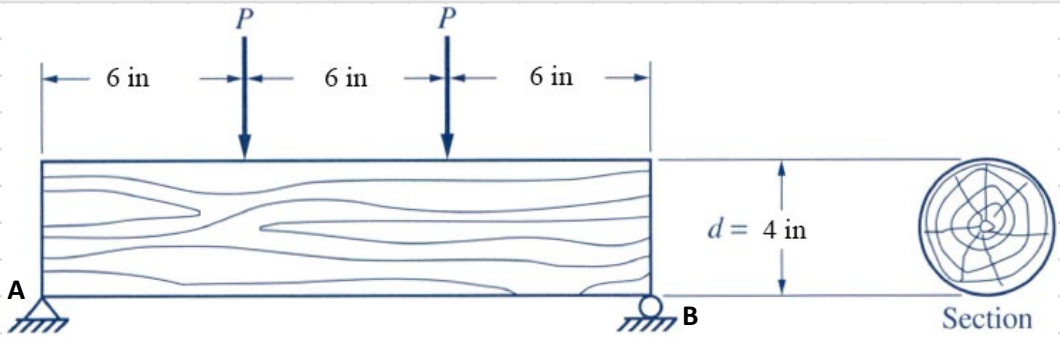
Solution.



14-26

Determine the maximum load P in kN that can be applied to the circular log shown in Fig. P14-26. The beam has an allowable flexural stress of 1305 psi (9 MPa) and an allowable shear stress parallel to the grain of 123 psi (850 kPa).

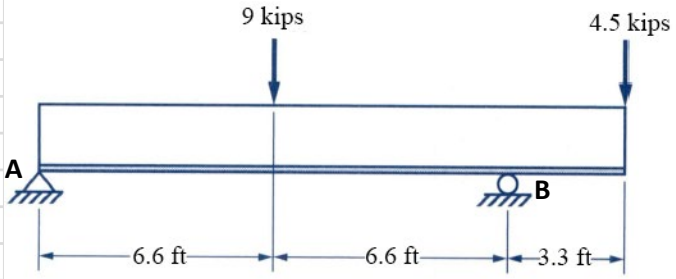
Solution.

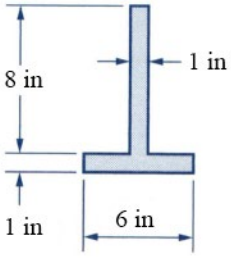


14-27

Determine the maximum shear stress in the beam shown in Fig. P14-12.

Solution.





Section