

Suggested problems Chapter 12

The quiz questions will be same or very similar to the following text-book problems.

Refer to the course website for the latest version of this document.

You are encouraged to seek the help of your instructor during his office hours.

15. Forces \vec{F}_1 , \vec{F}_2 and \vec{F}_3 act on the structure of Fig. 12-31, shown in an overhead view. We wish to put the structure in equilibrium by applying a fourth force, at a point such as P. The fourth force has vector components \vec{F}_h and \vec{F}_v . We are given that $a = 2.0$ m, $b = 3.0$ m, $c = 1.0$ m, $F_1 = 20$ N, $F_2 = 10$ N and $F_3 = 5.0$ N. Find (a) F_h (b) F_v and (c) d .

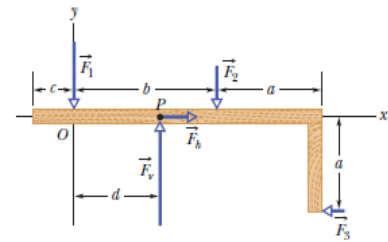


Fig. 12-31 Problem 15.

Answer: (a) 5.0 N; (b) 30 N; (c) 1.3 m

21. The system in Fig. 12-36 is in equilibrium. A concrete block of mass 225 kg hangs from the end of the uniform strut of mass 45.0 kg. For angles $\phi = 30.0^\circ$ and $\theta = 45.0^\circ$, find (a) the tension T in the cable and the (b) horizontal and (c) vertical components of the force on the strut from the hinge.

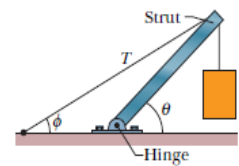


Fig. 12-36 Problem 21.

Answer: (a) 6.63 kN (b) 5.74 kN (c) 5.96 kN

23. In Fig. 12-38, one end of a uniform beam of weight 222 N is hinged to a wall; the other end is supported by a wire that makes angles $\theta = 30.0^\circ$ with both wall and beam. Find (a) the tension in the wire and the (b) horizontal and (c) vertical components of the force of the hinge on the beam.

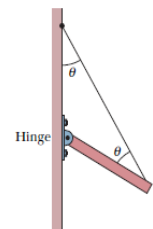


Fig. 12-38 Problem 23.

Answer: (a) 192 N (b) 96.1 N (c) 55.5 N

43. A horizontal aluminum rod 4.8 cm in diameter projects 5.3 cm from a wall. A 1200 kg object is suspended from the end of the rod. The shear modulus of aluminum is $3.0 \times 10^{10} \text{ N/m}^2$. Neglecting the rod's mass, find (a) the shear stress on the rod and (b) the vertical deflection of the end of the rod?

Answer: (a) $6.5 \times 10^6 \text{ N/m}^2$ (b) $1.1 \times 10^{-5} \text{ m}$