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.

3. In Fig. 12-24, a uniform sphere of mass m = 0.85 kg and radius r = 4.2 cm is held in place by a massless rope attached to a frictionless wall a distance L = 8.0 cm above the center of the sphere. Find (a) the tension in the rope and (b) the force on the sphere from the wall.

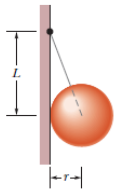

Fig. 12-24
Problem 3.

Answer: (a) 9.4 N (b) 4.4 N.

10. The system in Fig. 12-26 is in equilibrium, with the string in the center exactly horizontal. Block A weighs 40 N, block B weighs 50 N, and angle Φ is 35°. Find (a) tension T_1, (b) tension T_2, (c) tension T_3, and (d) angle θ.

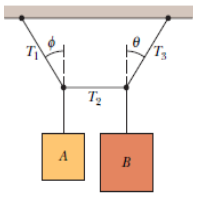

Fig. 12-26 Problem 10.

Answer: (a) 49N (b) 28N (c) 57N (d) 29°

17. In Fig. 12-32, a uniform beam of weight 500 N and length 3.0 m is suspended horizontally. On the left it is hinged to a wall; on the right it is supported by a cable bolted to the wall at distance D above the beam. The least tension that will snap the cable is 1200 N. (a) What value of D corresponds to that tension? (b) To prevent the cable from snapping, should D be increased or decreased from that value?

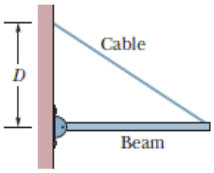

Fig. 12-32 Problem 17.

Answer: (a) 0.64 m (b) increased

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 Φ = 30.0° and θ = 45.0°,find (a) the tension T in the cable and the (b) horizontal and (c) vertical components of the force on thestrut from the hinge.

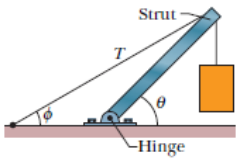

Fig. 12-36 Problem 21.

Answer: (a) $T = 6.63 \times 10^3$ N (b) 5.74×10^3N (c) 5.96×10^3N

28. In Fig. 12-43, suppose the length L of the uniform bar is 3.00 m and its weight is 200 N. Also, let the block's weight W = 300 N and the angle θ = 30.0°. The wire can withstand a maximum tension of 500 N. (a) What is the maximum possible distance x before the wire breaks? With the block placed at this maximum x, what are the (b) horizontal and (c) vertical components of the force on the bar from the hinge at A?

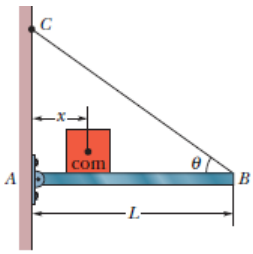

Fig. 12-43
Problems 28 and 34.

Answer: (a) 1.50m (b) 433N (c) 250N

44. Figure 12-53 shows the stress–strain curve for a material. The scale of the stress axis is set by s = 300, in units of 10^6 N/m^2.What are (a) the Young's modulus and (b) the approximate yield strength for this material?

Answer: (a) $7.5 \times 10^{10} \mathrm{N}/m^2$ (b) 2.9×10^8 N/m^2

45. In Fig. 12-54, a lead brick rests horizontally on cylinders A and B. The areas of the top faces of the cylinders are related by $A_A = 2A_B$; the Young's moduli of the cylinders are related by $E_A = 2E_B$. The cylinders had identical lengths before the brick was placed on them. What fraction of the brick's mass is supported (a) by cylinder A and (b) by cylinder B? The horizontal distances between the center of mass of the brick and the centerlines of the cylinders are d_A for cylinder A and d_B for cylinder B. (c) What is the ratio d_A/d_B?

Fig. 12-53 Problem 44.

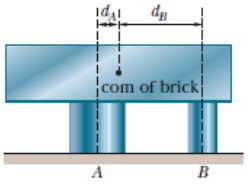

Fig. 12-54 Problem 45.

Answer: (a) 0.80 (b) 0.20, (c) 0.25