1. A uniform beam of length 9 m is hinged to a wall and a wire is attached 2.0 m from the unattached end, holding it in place, as shown in the figure. If the beam weighs 15 kN, what is the (a) tension in the rope and (b) the reaction force of the wall on the beam?

2. A 4-kg-disk lies in static equilibrium on an incline that makes an angle (θ) of 40º up from the horizontal. A rope, parallel to the incline, connects the disk to an immovable wall. Through experiment it is found that the static friction between the disk and the incline is at a maximum. What is (a) the tension in the rope and (b) the coefficient of static friction between the disk and the incline?

3. A 3000-kg crane is supporting a 10,000-kg crate. The crane pivots about point A and is at rest pressed against a support at B. Find the forces acting on the crane at points A and B.

4. Sir Lance a Lost new draw bridge was designed poorly and stops at an angle of 20º below the horizontal. Sir Lost and his steed stop when their combined center of mass is 1.0 m from the end of the bridge. The bridge is 8.0 m long and has a mass of 2000 kg; the lift cable is attached to the bridge 5.0 m from the castle end and to a point 12 m above the bridge. Sir Lost’s mass combined with his armor and steed is 1000 kg. (a) Determine the tension in the cable. (b) Find the horizontal and vertical force components acting on the bridge at the castle end.

5. A uniform solid disk with a mass of 24.3 kg and a radius of 0.314 m is free to rotate about a frictionless axle. Forces of 90 and 125 N are applied to the disk in the same horizontal direction but one is applied to the top and the other is applied to the bottom. (a) What is the net torque produced by the two forces? (b) What is the angular acceleration of the disk?

6. A 4-kg block lies on a horizontal table whose coefficient of friction is 0.3. A horizontal rope is redirected by a uniform solid disk (pulley) of mass 2 kg to a mass of 12-kg hanging off the table. The radius of the solid disk is 10 cm and the rope doesn’t slip on the disk. (a) What is the linear acceleration of the 4-kg block? (b) What is the angular acceleration of the disk? (c) What is the tension in the rope? (d) How far does the top block travel in 2 s? (e) How many revolutions does the disk of the pulley make in 2 s? (f) How far does a point on the edge of the disk of the pulley travel in 2 s?

7. A light string is wrapped around a 0.20-kg hollow 0.080-m-radius hoop. The hoop is released from rest and the free end of the string is pulled upwards such that the center of the mass of the ring does not move. (a) What is the angular acceleration of the hoop? (b) What is the linear acceleration of a point on the rim of the hoop after a half a meter of string has been unwound? (c) How much time does it take to unwind a half a meter of string?