Homework Set 12 C

PH 112 – 10

P1. A diving board 3.00 m long is supported at a point 1.00 m from the end, and a diver weighing 500 N stands at the free end, as shown below. The diving board is of uniform cross section and weighs 280 N. Find (A) the force at the support point and (B) the force at the left-hand end.



P2. The horizontal beam in the figure below weighs 150 N, and its center of gravity is at its center. Find (A) the tension in the cable, and (B) the horizontal and vertical components of the force exerted on the beam at the wall.



P3. A 15,000-N crane pivots around a friction-free axle at its base and is supported by a cable making a 25° angle with the crane, as shown in the figure below. The crane is 16 m long and is not uniform, its center of gravity being 7.0 m from the axle as measured along the crane. The cable is attached 3.0 m from the upper end of the crane. When the crane is raised to 55° above the horizontal holding an 11,000-N pallet of bricks by a 2.2-m very light cord, find (A) the tension in the cable and (B) the horizontal and vertical components of the force that the axle exerts on the crane. Start with a free-body diagram of the crane.



P4. Sir Lancelot rides slowly out of the castle at Camelot and onto the 12.0-m-long drawbridge that passes over the moat (as shown in the figure below). Unbeknownst to him, his enemies have partially severed the vertical cable holding up the front end of the bridge so that it will break under a tension of 5.80 × 103 N. The bridge has mass 200 kg and its center of gravity is at its center. Lancelot, his lance, his armor, and his horse together have a combined mass of 600 kg. Will the cable break before Lancelot reaches the end of the drawbridge? If so, how far from the castle end of the bridge will the center of gravity of the horse plus rider be when the cable breaks?

