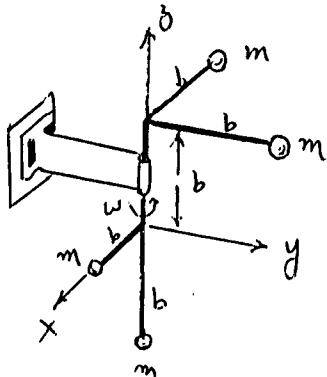
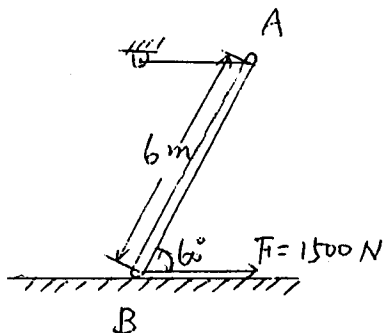


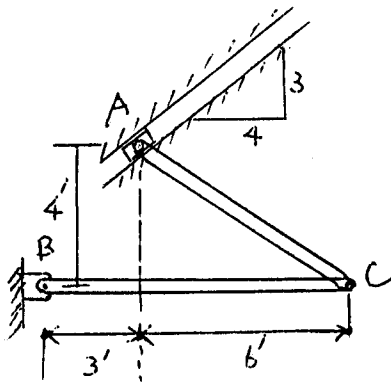
1. Each of the metal sphere has a mass m and diameter which is small compared with the dimension b . Compute the values of the principal moments of inertia and determine the direction cosines for each of the principal axes of inertia. (20%)



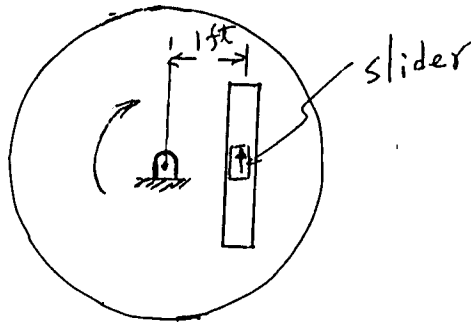
2. The 100 kg uniform rod AB rests on a frictionless floor, while end A is attached to a horizontal cable AC and end B is subjected to a external force 1500 N. Knowing that at the instant shown the external force cause the rod start from rest, determine the tension force of a cable and angular acceleration of a rod. (20%)



3. Rods BC and AC are pinned as shown in the figure. Block A moves in the fixed slot. In the position shown, rod BC is turning clockwise at an angular velocity of 3 radians per sec. clockwise and had an acceleration of 2 radians per sec.² counter clockwise. Determine the velocity and acceleration of A. (20%)



4. In the mechanism shown below, the slider is moving upward along the slot in the wheel at a rate of 10 ft./sec. relative to the wheel and is accelerating 10 ft./sec.² relative to the wheel. The wheel is turning clockwise at an angular velocity of 10 rad./sec. which is increasing at the rate of 10 rad./sec.². Determine the magnitude and direction of the "absolute" velocity and acceleration of the center of the slider. (20%)



5. A mass m_1 hangs from a spring k (N/m) and is in static equilibrium position. A second mass m_2 drops through a height h and sticks to m_1 without rebound. Determine the subsequent motion. (20%)

