1) If the torque required to loosen a nut that is holding a flat tire in place on a car has a magnitude of 40.0 Nm, what minimum force must be exerted by the mechanic at the end of a 30.0-cm lug wrench to accomplish the task?
2) Calculate the net torque (magnitude and direction) on the beam in this Figure about (a) an axis through O perpendicular to the page and (b) an axis through C perpendicular to the page.
3) A cook holds a 2.00-kg carton of milk at arm's length as in this figure. What force $F_B$ must be exerted by the biceps muscle? (Ignore the weight of the forearm.)
4) Four objects are held in position at the corners of a rectangle by light rods as shown in this figure. Find the moment of inertia of the system about (a) the x-axis, (b) the y-axis, and (c) an axis through 0 and perpendicular to the page.
5) A 10.0-kg cylinder rolls without slipping on a rough surface. At an instant when its center of gravity has a speed of 10.0 m/s, determine (a) the translational kinetic energy of its center of gravity, (b) the rotational kinetic energy about its center of gravity, and (c) its total kinetic energy.
6) A horizontal 800-N merry-go-round of radius 1.50 m is started from rest by a constant horizontal force of 50.0 N applied tangentially to the merry-go-round. Find the kinetic energy of the merry-go-round after 3.00 s. (Assume it is a solid cylinder.)
43. The system of small objects shown in this figure is rotating at an angular speed of 2.0 rev/s. The objects are connected by light, flexible spokes that can be lengthened or shortened. What is the new angular speed if the spokes are shortened to 0.50 m? (An effect similar to that illustrated in this problem occurred in the early stages of the formation of our galaxy. As the massive cloud of dust and gas that was the source of the stars and planets contracted, an initially small angular speed increased with time.)