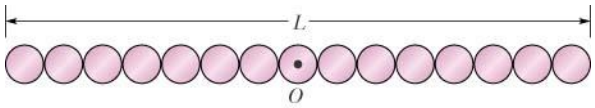
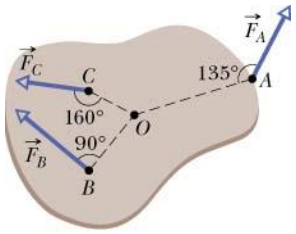
# HOMEWORK - CHAPTER 10

**••14** A disk, with a radius of 0.25 m, is to be rotated like a merry-go-round through 800 rad, starting from rest, gaining angular speed at the constant rate $\alpha_1$ through the first 400 rad and then losing angular speed at the constant rate $-\alpha_1$ until it is again at rest. The magnitude of the centripetal acceleration of any portion of the disk is not to exceed 400 m/s$^2$. (a) What is the least time required for this rotation? (b) What is the corresponding value of $\alpha_1$?




**••40** The figure to the right shows an arrangement of 15 identical disks that have been glued together in a rod-like shape of length $L$ = 1.0000 m and mass $M$ = 100.0 g. The arrangement can rotate about a perpendicular axis through its central disk at point $O$. (a) What is the rotational inertia of the arrangement about that axis? (b) If we approximate the arrangement as being a uniform rod of mass $M$ and length $L$, what percent error would we make in using the formula in Table 10-2*e* (page 253 in your textbook) to calculate the rotational inertia?

**•48** The body shown to the right is pivoted at *O*. Three forces act on it: $F_A = 10\ N$ at point *A*, 8.0 m from *O*; $F_B = 16\ N$ at point *B*, 4.0 m from *O*; $F_C = 19\ N$ at point *C*, 3.0 m from *O*. What is the net torque about *O*?



**••52** In a judo foot-sweep move, you sweep your opponent's left foot out from under him while pulling on his gi (uniform) towards that side. As a result, your opponent rotates around his left foot and onto the mat. The figure to the right shows a simplified diagram of your opponent as you face him, with his left foot swept out. The rotational axis is through point *O*. The gravitational force $\vec{F}_g$ on him effectively acts at his center of mass, which is a horizontal distance of $d$ = 28 cm from point *O*. His mass is 70 kg, and his rotational inertia about point *O* is 65 kg · m$^2$. What is the magnitude of his angular acceleration about point *O* if your pull $\vec{F}_a$ on his gi is (a) negligible and (b) horizontal with a magnitude of 300 N and applied at a height $h$ = 1.4 m?