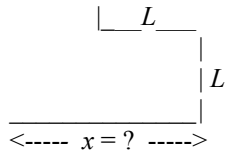


1. A solid, uniform cylinder with mass 7.50 kg and diameter 16.0 cm is spinning at 200 rpm on a thin, frictionless axle that passes along the cylinder axis. You design a simple friction brake to stop the cylinder by pressing the brake against the outer rim with a normal force. The coefficient of kinetic friction between the brake and rim is 0.25. What must the applied normal force be to bring the cylinder to rest after it has turned through 9.0 revolutions?

2. A star collapses from a radius of 8.0×10^5 km to a radius of 15 km, becoming a neutron star. The original star rotated once in 28 days. Assume the star is always a uniform, solid, rigid sphere. What is the angular speed of the neutron star?

3. A 75-kg mountain climber with a height of 1.80 m and a center of gravity 1.0 m from his feet rappels down a vertical cliff. His body is raised 33 degrees above the horizontal. He holds the rope 1.20 m from his feet, and it makes a 30 degree angle with the cliff face. Find (a) the tension his rope must support; (b) the horizontal and vertical components of the force that the cliff face exerts on the climber's feet.

4. A thin uniform metal rod is bent into three perpendicular segments, two of which have length L . You want to determine what the length of the third segment should be so that the unit will hang with two segments horizontal when it is supported by a hook. Find x in terms of L .



5. The International Space Station makes 15.75 revolutions per day in its orbit around the Earth. Assuming a circular orbit, how high is the satellite above the surface of the Earth?

6. What is the mass of a black hole with diameter $1.1 \cdot 10^{-15}$ m?