Angular Momentum and Conservation of Angular Motion

1. A bicycle wheel with a diameter of 0.80 m and a mass of 2.1 kg spinning with a velocity of 4.5 m/s. What is the angular momentum of the wheel if it is treated like a hoop? [3.78 $\frac{kgm^2}{s}$]
2. A 350-g baseball is shot out of a small cannon with a velocity of 9.0 m/s. The baseball flies horizontally at a constant height of 3.0 m. What is its linear and angular momentums if its radius is 7.4 cm? [linear = 3.2 kgm/s; angular = 9.6 $\frac{kgm^2}{s}$]
3. What is the angular momentum of the moon in orbit around the earth? Moon = 7.4 x 10^{22} kg, orbital distance = 3.8 x 10^{8} m, 27 days for 1 revolution. [2.878 x 10^{34} $\frac{kgm^2}{s}$]
4. An axel passes through a solid disc that spins clockwise at 650 rpm. The disc is 1.50 kg and 5.0 cm in diameter. What is the angular momentum of the disc? [0.0319 → 3.2 x 10^{-2} $\frac{kgm^2}{s}$]
5. How much torque is needed to change the speed of spinning rate of a 3.50 kg sphere with a radius of 7.50 m from 900. rpm to 200. rpm in 3.0 s? [-1924 → -1.92 x 10^{3} Nm]
6. A solid disc with a radius of 5.00 m and a mass of 20.0 kg is initially at rests and lies on the plane of the paper. A smaller disc with a radius of 2.50 m and a mass of 10.0 kg is spinning at 3500. rpm. The smaller disc is carefully pressed against the larger disc (flat side to flat side) so that they spin together without slipping. What is the angular velocity of the large disc? [40.7 $\frac{\theta}{s}$]
7. A playground merry-go-round can be treated like it is in the shape of a solid disc. The merry-go-round is 2.50 m in diameter, weighs 8000. N and is spinning at 360 $\frac{\theta}{s}$. Mr. Vinny decides to jump on and lands straight vertically onto the merry-go-round. If Mr. Vinny lands 1.00 m from the center of the merry-go-round and he has a mass of 85 kg, what is the new speed of the merry-go-round? You may treat Mr. Vinny as a blob of clay. [317.7→320 $\frac{\theta}{s}$]
8. An ice skater is going into a spin. To simplify the system, the skater's body (legs, torso, head) has a moment of inertia of 1.719 kgm^2. Each hand-arm can be modeled as a point mass of 5.0 kg. At the beginning of the spin, the skater is spinning at 0.50 m/s with their arms extended so that the center of mass of the hand-arm is 0.60 m from the axis of rotation. For the finale, the skater pulls their arm inward so that the hand-arm is 0.20 m from the axis of rotation. What is the angular velocity of the skater during the finale? [2.08→2.1 $\frac{\theta}{s}$]