Phy 113: Physics of Sports
Homework Problems
Set #10: Due Monday, November 26, 2018

Note: Students are encouraged to work together and discuss the problems. However, each student must arrive at her/his own final answers. Show all your work. Simply copied homework will result in zero.

1. (10 points) The current world record for the men's hammer throwing was set by Yuriy Sedykh in 1986. In the hammer throwing competition, a 16-lbs steel ball attached at the end of a 4-feet wire is wound around and thrown. If the steel ball is revolving uniformly in a horizontal circle and the ball makes 2.4 revolutions in a second: (a) What is the moment of Inertia (rotational mass) of the ball about the center of the rotation? (Ignore the size of the ball.) (b) What is the angular momentum of the ball about the center of the rotation?

2. (10 points) A curveball thrown by Jacob deGrom, NY Mets Ace, who should win this year’s Cy Young Award, spins at a rate of 2100 rpm. What is the angular momentum of the curveball? A baseball is 0.14 kg in mass and 9.25 inches in circumference.

3. (10 points) As shown during a lecture, Yuna Kim, a 2010 Winter Olympics gold medalist in figure skating, starts her spin at an initial angular velocity of 1.6 spins (rotations) per second while keeping her arms and legs stretched out. Moments later she pulls her arms and legs inward tightly making herself spin rapidly at a rate of 6.2 spins per second. If we assume, there is no friction and her final moment of inertia (rotational inertia) is 2.2 kg m^2, what is her initial moment of inertia?

4. (10 points) Nastia Luikin can reduce her rotational inertia by a factor of about 2.6 when changing from a straight position to a tuck position. If it takes her 0.6 s to make one full rotation (or revolution) in a straight position, what is her angular speed when in a tuck position? Provide your answer in rev/s as well as in rad/s.