

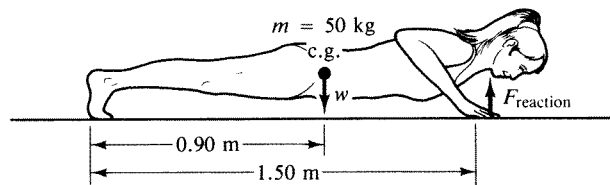
Phy 113: Physics of Sports

Homework Problems

Set #9: Due Wednesday, November 19, 2008

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.

- (15 points) At an Olympic figure skating competition Sarah Hughes finishes her routine by doing a rapid spin. (a) If she spins at an angular velocity of 40 rad/s, how many revolutions per second does she spin? (b) How many rpm's is it? (b) If she spins for 5 seconds, how many radians did she rotate in total? Assume there is no friction.
- (10 points) Now let's consider more realistic situation, in which there is friction between the ice and her skates. So, she slows down and stops spinning after 12 s. (a) What is the angular acceleration? (b) In this case, how many revolutions did she make in the 12 s?
- (10 points) What force must the woman in the figure below exert on the floor with her hands in order to do a pushup?



- (10 points) Jose Reyes swings a bat, accelerating it from rest to 5.0 rev/s (revolutions per second) in a time of 0.15 s. Approximate the bat as a 2.2-kg uniform rod of length 0.95 m, and compute the torque Jose applies to one end of it.

- (10 points) Laveranues Coles, a NY Jets wide receiver, was tackled by two Patriots players simultaneously when he received a ball from Chad Pennington. If one player hit him at the knee at a 90 degree angle with a 300 N force, and the other player hit him at the shoulder at a 45 degree angle with a 200 N force as shown below. What is the total torque about his center of mass (CoM) applied

to Laveranues Coles by these players?

