Physics 253 In-Class Worksheet
22 Nov 2005

1. A 30-kg child at a playground runs at 4 m/s toward a motionless merry-go-round (R = 1.5 m, M=100-kg) and jumps on.

(a) Calculate the initial total angular momentum of the system [Hint: the angular momentum of the child running at the merry-go-round is the same as if the child were running in a circle of radius R = 1.5 m].

(b) What is the final angular momentum of the system?

(c) ) Determine the angular velocity of the child and merry-go-round immediately after the child jumps on.

(d) How much kinetic energy is lost in the “collision”?

(e) We know that (linear) force can be described in terms of momentum as \( F = \frac{\Delta p}{\Delta t} \).

Using the fact that there is a one-to-one relationship between linear and angular quantities, describe how you could determine the average torque exerted on the merry-go-round by the child.