

## PROBLEM SET FOR ANGULAR MOTION

### Moment of Inertia

1. If bat A has a mass of 4.5 kg and a radius of 0.6m and bat B has a mass of 4.2 kg and a radius of 0.5m, which bat would be harder to swing, therefore creating more resistance to angular motion?
2. There were 2 bats that have equal mass, however, the first bat is 3 times the radius compared to the second bat. How much harder would it be to swing the first bat in comparison the second bat?

### Angular Momentum

1. What torque would be required to swing a golf club at an angular acceleration of  $25^\circ/\text{s}^2$ , if the club has a radius of 80 cm and mass of 2.1 kg?
2. If a 65kg diver's torque during a dive is 1842N and the angular acceleration is  $35^\circ/\text{s}^2$ , what is the radius of the diver?
3. a) A skater is spinning about his longitudinal axis. If his mass is 80kg, his radius 0.35m and his angular velocity is  $80^\circ/\text{s}$ , what is his angular momentum?  
b) If he wanted to decrease his angular velocity what should he do?  
c) If he increased his radius by 2 times, what would be his angular velocity? Is he spinning faster or slower than part a)?
4. a) A skydiver is spinning about her medial axis as she falls ( arms and legs extended ) from the sky. If her mass is 65kg and the radius of her body is approximately 0.8m, with an angular velocity of  $90^\circ/\text{s}$ , what will be her angular momentum?  
  
b) If the skydiver tucks in her arms and legs, ( decreasing her radius by  $\frac{1}{2}$  ) what will her new angular velocity be? ( Hint: remember she is freefalling, therefore her angular momentum is ????)
5. A kid in a pool is doing somersaults at a rate of  $360^\circ/\text{sec}$ . He then starts doing them with his legs outstretched therefore, increasing his radius by 3 times. What is his resulting angular velocity?