Angular Mechanics

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| .578 Kg m2 | 1. What is the moment of inertia of a 5.00 Kg 34.0 cm radius hoop about its normal axis? |
| .032 Kg m2 | 2. What is the moment of inertia of a 8.0 Kg 10. cm radius sphere about its center? |
| 29 Nm | 3. What is the torque when you exert a force of 52 N on a 56 cm breaker bar? |
| 300 N | 4. What force should you exert on a 14 cm long wrench to get a torque of 42 Nm? |
| 5.7 rad/s/s | 5. If you exert a torque of 68 Nm on a flywheel with an I of 12 Kg m2, what is its angular acceleration? |
| 9300 rad/s/s | 6. A drill exerts a torque of 80. Nm on a 1.2 Kg 0.12 m radius grinding disk that is a solid cylinder. What is the angular acceleration of the disk? |
| 3.07 m/s  .0646 J  .162 J  388 Rad/s/s | 7. A 34.2 gram marble rolls from rest down a ramp that loses 67.5 cm of height. What is the final velocity of the marble? What is its rotational kinetic energy at the bottom, and what is its translational kinetic energy at the bottom? Assuming the ramp was linear and 3.56 m long, and the marble had a radius of 0.342 cm, what was the angular acceleration of the marble as it moved down the incline? |
| .29 kg m2  3.5 rad/s  .97 s-2 | 8. A uniform cylinder with a mass of 5.6 kg and a radius of 0.32 m is free to rotate about a horizontal axis. There is a weight of 92 grams tied to a string that is wrapped around the cylinder. The weight accelerates toward the ground. What is the moment of inertia of the cylinder? What is the angular velocity of the cylinder when it has completed one revolution? What was the cylinder's angular acceleration as the weight fell? |
| 1.54 m/s/s  .728 m/s | 9. In figure 8-47 (on page 221) the cylindrical pulley has a mass of 5.21 kg, a radius of 0.450 m, mass 2 is 7.82 kg, and mass 1 is 5.34 kg Mass 1 is resting on the ground, and mass 2 is 17.2 cm above the ground. Calculate the vertical acceleration of the masses, and the speed at which mass 2 hits the ground. |
| 60.48 Kg m2/s | 10. What is the angular momentum of a gyroscope that is a solid cylinder with a radius of 0.24 m, a mass of 15 Kg and a angular velocity of 140 rad/sec |
| 1.73 rev/sec | 11. A ballerina spinning at 1.2 rev/sec with a moment of inertia of 2.6 Kg m2 pulls her arms in so that her new moment of inertia is 1.8 Kg m2. What is her new angular speed? |
| 86.7 rpm | 12. A group of children playing on a merry go round spinning at 52 rpm with a moment of inertia of 200. Kg m2 move to its center so that the new moment of inertia is 120 Kg m2. What is the new angular speed? |
| 2.42 rad/sec | 13. A figure skater spinning at 3.4 rad/sec with a moment of inertia of 3.2 Kg m2 puts his arms out so that his new moment of inertia is 4.5 Kg m2. What is his new angular speed? |