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**AP Physics 1: Angular Acceleration and Torque**

1. A merry go round is accelerated uniformly from rest and attains an angular speed of 0.4 rad/s in the first 10 seconds. If the net torque applied is 2000 Nm, what is the moment of inertia of the merry go round?
2. A string is wrapped around a pulley of radius 0.10 m and moment of inertia 0.15 kg·m2. The string is pulled with a force of 12 N. What is the magnitude of the resulting angular acceleration of the pulley?
3. A string is wrapped around a pulley of radius 0.05 m and moment of inertia 0.2 kg·m2. If the string is pulled with a force F, the resulting angular acceleration of the pulley is 2 rad/s2. Determine the magnitude of the force F.
4. How much torque is required to accelerate a DVD from rest to its operating speed of 4 rad/s, in 2 s, if the DVD is 50 grams and has a diameter of 20 cm? Assume the DVD is a disk (*I= ½ mr2*).
5. A spool of wire has a radius of 0.4 m and 4 kg mass. If you pull the wire with a 20 N force, what angular acceleration will this cause on the spool? Assume the spool is a solid cylinder (*I=½mr2*).
6. A golfer applies 50 Nm of torque to his golf club. Assuming the club is a 1 m long rod with mass=0.5 kg attached to a 0.5 kg head (treat as a point mass), what is the moment of inertia of the golf club? What angular acceleration will this create?
7. What is the magnitude of the net torque on the system about the axis in terms of F and R? What is the angular acceleration of the system? The moment of inertia for a disk is *I=½ mr2*, the larger disk has a mass of *M*, and the smaller disk has a mass of *m*.



1. A one-piece cylinder is shaped as in the figure below, with a core section protruding from the larger drum. The cylinder is free to rotate around the central axis shown right. A rope wrapped around the drum, of radius 1 m, exerts a force F1 to the right on the cylinder. A rope wrapped around the core, of radius 0.5 m, exerts a force F2 downward on the cylinder. If F1=5N and F2=6N, what is the net torque around the axis of rotation? What is the magnitude of the angular acceleration of the system? The moment of inertia for a disk is *I=½ mr2*, the larger disk has a mass of 5 kg, and the smaller disk has a mass of 3 kg.
2. A uniform horizontal rod of mass 1.2 kg and length 0.83 m is free to pivot about one end as shown. If a 5.1 N force at an angle of 120° to the horizontal acts on the rod as shown, what is the magnitude of the resulting net torque about the pivot point? What is the magnitude of the angular acceleration if the moment of inertia for a rod pivoted at one end is ?