**IB Physics**

**FA review: Kinematics, Dynamics and Energy**

Name

**Show your work, and circle your answers and use sig figs to receive full credit.**

1. What is the angular velocity of a 56.0 mm (diameter) skateboard wheel if the skateboard is going 8.50 m/s? Give and answer in rad/s and RPM (304 rad/s, 2.90x103 RPM (2898.9))

2. A wheel speeds up from rest to 16.0 rad/s in 12.0 seconds. What angle in radians does it go through? How many rotations? (96.0 rad, 15.3 rotations)

3. A drill spinning at 1210 RPM slows through 56.2 rotations to rest. What was the angular deceleration in rad/s/s? What was the linear deceleration of a point 3.40 cm from the center of rotation? (-22.7 rad/s/s, -0.773 m/s/s)

4. A torque of 3.50 mN acts on a motor and it accelerates at 130. rad/s/s. What is the moment of inertia of the motor? (0.0269 kgm2)

5. A tangential force of 26.0 N acts at the edge of a 218 kg 2.15 m radius (cylindrical) merry go round. What is the resulting angular acceleration? (0.111 rad/s/s)

6. A potter's wheel that is a 72.0 cm diameter cylinder with a mass of 32.0 kg is spinning at 62.0 RPM and comes to a halt because of a tangential frictional force of 1.80 N acting at the edge. through how many rotations does it turn slowing down? (10.7 rot)

7. A 2.14 kg thin walled hollow sphere (yup yup) with a radius of 0.230 m is rolling at 7.20 m/s. What is its translational and rotational kinetic energy? What is its total kinetic energy?

(55.5 J, 37.0 J, 92.4 J)

8. A 13.0 g, 0.0137 m radius solid with a moment of inertia of 7/9mr2 rolls down an incline that is 5.70 m long, and loses 0.870 m of elevation.

a. Set up the appropriate dynamics or conservation of energy equation, substitute for ω or α, and for I, and solve for v or a. Show your steps below. Give an exact answer.  

b. Solve for the final velocity of the marble at the bottom of the incline. (3.10 m/s)

c. Calculate the acceleration of the marble as it rolls down the incline. (0.842 m/s/s)