IB Physics
FA8.1 - Rotational Kinematics

Name_____

Favorite Author_____

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

1. A bicycle going 13.5 m/s has 68.0 cm diameter wheels. What is the angular velocity of the wheels in rad/s? in RPM?

2. What is the tangential velocity of a 4.50 cm radius hard drive spinning at 5200. RPM?

3. What time will it take a wheel to speed up from 12.0 rad/s to 47.0 rad/s with an acceleration of 1.40 rad/s/s?

4. A hard drive takes 4.80 s to speed up from rest to 7200. RPM. How many revolutions does it go through in doing this?

5. A car with 0.450 m radius wheels speeds up to 28.0 m/s over a distance of 112 m with an acceleration of 2.60 m/s/s. What is the initial angular velocity of the wheels?

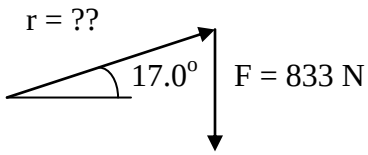
Name_____

Favorite Film Maker_____

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

I (about centers): cylinder = $^1/_2mr^2$, ring/point = mr^2, sphere = $^2/_5mr^2$, rod = $^1/_{12}mL^2$ (= $^1/_3mL^2$ about end)

1. A mechanic needs to exert 385 mN of torque. He weighs 833 N and he stands on the handle of his wrench that is making a 17.0^o angle above the horizontal. How far from the center must he stand? (Be careful what you use for the angle)



2. What is the acceleration of a flywheel with a moment of inertia of 0.145 kg m^2 if a torque of 2.80 mN acts on it?

3. A 0.680 m diameter flywheel has a moment of inertia of 0.243 kg m^2. What is the angular acceleration of the flywheel if you exert 4.50 N tangentially at the edge to speed it up?

4. A 0.210 m radius grinding disk is spinning at 1350 RPM. If it goes through 85.0 rotations being brought to rest by a 1.20 N frictional force applied tangentially at its edge, what is the moment of inertia of the disk?

5. A 4.30 m diameter (cylindrical) merry go round going 45.0 RPM stops in 37.0 rotations because of an 8.30 N force applied tangentially at the edge. What is the mass of the merry go round?

IB Physics
FA8.3 - Rotational Energy and Momentum

Name_____

Favorite Musician_____

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

I (about centers): cylinder = $^1/_2mr^2$, ring/point = mr^2, sphere = $^2/_5mr^2$, rod = $^1/_{12}mL^2$ (= $^1/_3mL^2$ about end)

1-3: A 12.0 g, 0.0140 m radius marble rolls down an incline that is 3.80 m long, and loses 0.120 m of elevation.

1. 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. $a = \frac{5}{7} g \bullet \sin(\theta)$ $v = \sqrt{\frac{10}{7} gh}$

2. Solve for the final velocity of the marble at the bottom of the incline.

3. Calculate the acceleration of the marble as it rolls down the incline.

4-5: A 45.0 kg child is 1.80 m from the center of a 2.00 m radius merry go round that is a 160. kg cylinder.

4. If the merry go round speeds up from 1.40 rad/s to 2.10 rad/s in 4.00 seconds, what torque was applied?

5. If the merry go round is spinning at 45.0 RPM and the child moves from 1.80 m from the center to 0.600 m from the center, what is the new angular velocity of the merry go round in RPMs?