PHY 201 Quiz #6

Name _____

Score _____

Instructions:
1. Do all of your work on this sheet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place you **answers in a box**. Do not forget **units**!
5. If you need more space, you may use the back of the page and write **On back** in the problem space.

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1. **Multiple Guess (3 pts)** Find the answer which best fits the question and <u>write it in the space provided</u>.
a. On which of the following is the moment of inertia of an object not dependent? The
a) axis of rotation.   b) object shape.   c) distribution of mass.   d) velocity.   e) none of these.

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b. The units of torque are
a) N/m.   b) N-m/s.   c) N-m.   d) J.   e) none of these.

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c. A hoop, a solid cylinder and a sphere of equal radii are placed at the top of an incline. They are released at the same time. Which one reaches the bottom last?
a) hoop. b) cylinder. c) sphere. d) One cannot tell.

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2. **Definition/Principle (4 pts)**

Fill in the <u>exact</u> missing analogous quantities:

Physical concept	Rotational	Translational
Displacement	_____	x.
Centripetal Acceleration	_____	v^2/r
Inertia	I	_____ .
Newton's Second Law	_____	$F = ma$.
Work	_____	$W = \int F\, dx$.

Bonus: A pen of length 34.5 cm stands vertically on a desk. It falls from this vertical position. Assuming the end on the desk does not slip, determine the speed of the other end just before it hits the desk surface. Assume the pen is a uniform rod.

3. **Problems (13 pts)** .

a. A merry-go-round rotates from rest with an angular acceleration of 1.50 rad/s^2. How long does it take to rotate through 2.00 rev?

b. In the figure below draw and label the line of action and moment arm. Determine the torque produced by the force on the rod.
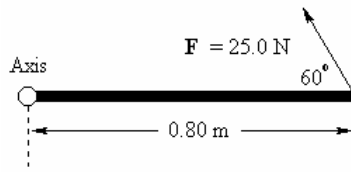
c. The angular position of a point on a wheel of radius 3.0 cm and mass 5.0 kg is given by $\theta = 2.0 - 3.0t + 4.0t^2$ rad.
i. Find the angular velocity at $t = 2.0$ s.

ii. What is the tangential velocity at $t = 2.0$ s?

iii. If the wheel is in the shape of a solid disk, then what torque is needed to maintain its constant angular acceleration?

d. A bowling ball, moving with a speed of 3.50 m/s, encounters a 0.760 m vertical rise on the way to the ball rack. Assuming that the mass is distributed uniformly and the ball rolls without slipping, find the translational speed of the ball at the top of the rise.