Friday, October 17, 2014	Physics 210: UnQuiz05	Name:_____

A wheel has a moment of inertia given by $I=mr^2$ about an axis running through its center of mass. A torque given by $\Gamma = b$ where b has SI units of Nm is applied to the wheel. You may assume the wheel is initially at rest.

(1) At a time t, what is the angular momentum of the wheel?

(2) What is the angular velocity of the wheel at a time t?

(3) What is the kinetic energy of the wheel at time t?

(4) Provide numerical answers with correct SI units for the case t=1 s, m=1 kg, r=1 m and b=2 Nm.

(4:a) (4:b) (4:c)

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(1) At a time t, what is the angular momentum of the wheel?

$$\Gamma = \frac{\Delta L}{\Delta t} \Rightarrow L = \Gamma t = bt$$

(2) What is the angular velocity of the wheel at a time t?

$$L = I\omega \Rightarrow \omega = \frac{L}{I} = \frac{bt}{mr^2}$$

(3) What is the kinetic energy of the wheel at time t?

$$K = \frac{1}{2} I\omega^2 = \frac{L^2}{2I} = \frac{b^2 t^2}{2mr^2}$$

(4) Provide numerical answers with correct SI units for the case t=1 s, m=1 kg, r=1 m and b=2 Nm.

(4:a) L=2 kg m^2 / s (4:b) ω=2 "rad"/s (4:c) K=2 J