1. ~~yes~~ no, it axis of rotation is different

2. Hula hoop because its mass is further away from the axis of rotation

3. $J = I\alpha$ $J = 30 \cdot 6 = 180 \, Nm$
   $I = (\frac{1}{2})(200)(6^2) = 3600$
   $\alpha = \cancel{\cancel{\cancel{\cancel{}}}} J/I \rightarrow 0.05 \, m/s^2$
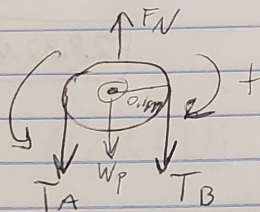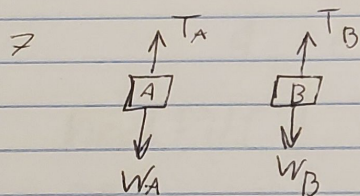 $\boxed{V_f = 1 \, m/s}$
   $C = \pi d \rightarrow 37.7 m$
   $x_f = \frac{1}{2}t^2 + 0t + 0 \rightarrow 200 m$

4. $\boxed{5.31 \, rev}$

5. it would be slightly slower due to the extra weight of cartman

6. No, but if they were the same, there would be no angular acceleration

7.

$r = 0.1 m$
$m_P = 2 kg$
$m_A = 0.1 kg$
$m_B = 0.05 kg$

8. $\Sigma J = \cancel{J_B J_A} J_B - J_A = \frac{1}{2}mr^2\alpha$
   $J_B = m_A g r \rightarrow 0.098 \, Nm$
   $J_A = m_B g r \rightarrow 0.049 \, Nm$
   $\frac{2(0.049)}{m_P r^2}$ $\cancel{0.049} 0.049 = \frac{1}{2}m_P r^2 \alpha$
   $\cancel{\cancel{}} \alpha = 4.9 \, m/s^2$
   $\Sigma F = T - m_A g = m_A a$

9. yes, yes

10. 0.639 seconds

11. 3.13 m/s

12. ~~yes~~, force is parallel to the motion

13.