Quiz **Name**

1. The metal rim of a wagon wheel of radius 0.5 meters and mass of 2 kilograms and a bowling ball of 10.8 centimeters in diameter and a mass of 5 kilograms are poised for a race down a ramp that is 10 meters long and makes an angle of 30° with the horizontal. The index of inertia of the rim is given by the expression mr^2 and that of the ball by $\frac{2}{5}mr^2$. Under the assumption that the friction produced by the ramp is precisely that force that rotates the two objects do the following:

i. Draw pictures of the situations and use them as a guide towards your solutions of the problems that follow.

Compute the frictional force on the object f in terms of the angular acceleration.

ii. For the rim $f =$

iii. For the bowling ball $f =$

Compute the total force F on the object and use $F = ma$ to calculate the linear acceleration a of the motion of each of the two objects down the ramp.

iv. For the rim $a =$

v. For the bowling ball $a =$

vi. Assume that both the rim and the bowling ball start from rest (without being given a push) side by side. Which will win the race?