Quiz, Rotational Dynamics-1

1)

M, R

m_1, r

m_2
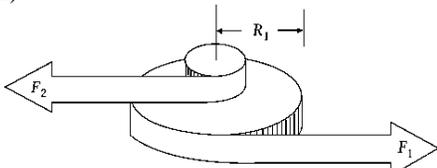
(3 pts) A wheel (to the left) of radius R_1 has an axle of radius $R_2 =$ ¼R_1. If a force F_1 is applied tangent to the wheel, a force F_2, applied tangent to the axle that will keep the wheel from turning, is equal to

A) $F_1/4$ B) F1   C) 4F1   D) 16F1   E) F1/16 F) None of these
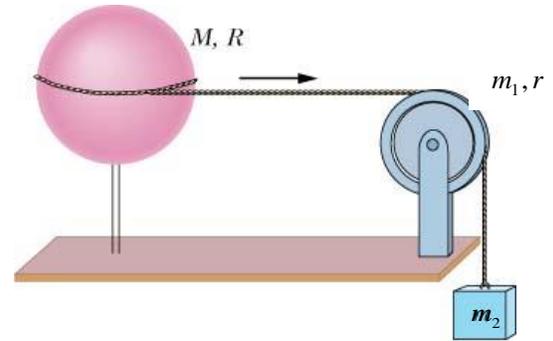
2) The system to the right consists of a <u>solid sphere</u> of mass M = 5 kg and radius
R = 25 cm, a pulley (assume it is shaped like a disk) <u>with mass</u> m_1 = 300 grams and radius $r = 10$ cm, and a falling mass, m_2
= 50 grams. Assume the system is released from rest, the string unwinds smoothly as the block falls and the sphere rotates about a frictionless pivot. (KEEP at least 3 SIG. FIGS for this problem!)
(a) Draw FBD's of all relevant forces acting on the system.
(b) Using Newton's Laws (NOT ENERGY METHODS) determine the acceleration of the block. (You MUST write the entire solution in terms of variables until the very last step and then plug in the values!)
(c) Determine the block's final speed after it has fallen 50 cm.