Name: _____

PHY 105 Test 2 November 1, 2005 60 minutes

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Do all work in the blue book! All answers must be in MKS units unless otherwise specified.

1. On a long journey, you travel from the equator to the North Pole. Given that your mass is 75 kg and the average radius of the earth is 6.378×10^6 m ,

   a) Calculate your centripetal acceleration at the equator and at the North Pole

   b) Calculate your apparent weight at the equator

   c) Calculate your apparent weight at the North Pole

2. Three masses are situated on a frictionless table, connected by wires over frictionless pulleys as shown. In this figure $m_1 > m_2 > m_3$ and therefore the masses accelerate

   a) Draw a free body diagram for each mass, indicating all forces, coordinate axes, and accelerations. (Define T_a to be the tension between m_1 and m_2 and T_B to be the tension between m_2 and m_3.)

   b) Write down the appropriate form of Newton's 2nd law for each mass

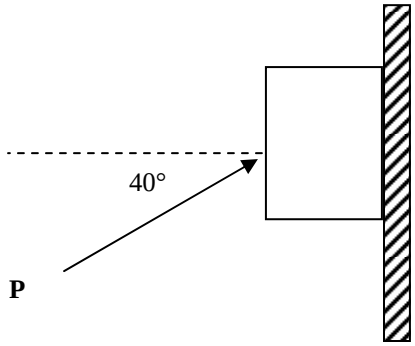
   c) Solve your system of equations in (b) to find the acceleration of the masses.

   d) What does your expression in (c) predict when $m_1 = m_3$? Is this what you expect? Please explain. What does it predict when $m_1 >>$ both m_2 and m_3 ?

3. A 1.9 kg is moving down a frictionless wall at 1.7 m/s when a 50N push is exerted as shown.

   a) Calculate the acceleration of the mass

   b) Use your answer from (a) to calculate the velocity of the mass after it has moved downwards 0.79 m,



4. For the situation described in Problem #3,

   a) Calculate the work done by gravity and by the push

   b) Use the Work-Kinetic Energy Theorem to determine the same velocity calculated in 3(b)

5. A 2.0 kg mass is being pushed at constant velocity up a 30° incline. If the coefficient of kinetic friction is 0.3, calculate the magnitude of the push.