PHYSICS 2A/SAMPLE EXAM 2

SHOW ALL WORK IN COMPLETE DETAIL. NO CREDIT WILL BE GIVEN IF NO WORK IS SHOWN!

1. A 5.0 kg block is placed on a horizontal surface where μ_k =0.3. The block is then connected to second block of mass 12.0 kg by a rope that runs over a massless, frictionless pulley as shown below.



- a) Draw the free-body diagram for both masses.
- b) Calculate the acceleration of the blocks.
- c) Calculate the tension on the rope.
- 2. Take your mass to be 65 kg and assume that the earth is a spherically symmetric with a radius of 6.38×10^6 m.
 - a) If you stand on a scale at the north pole, what does the scale read?
 - b) If you stand on a scale at the equator, what does the scale read?
 - c) Which reading gives your true weight? Explain your answer.
- 3. The two blocks shown below are not attached to each other. The coefficient of static friction between the blocks is μ_s =0.5, but the surface beneath the larger block is frictionless.



- a) Draw a free-body diagram for the 20-kg mass, 100-kg mass, and for both masses combined together.
- b) Calculate the minimum for F required to keep the smaller block from sliding down the larger block.
- 4. A skier of mass 70.0 kg is pulled up a slope by a motor-driven cable.
 - a) How much work is required to pull him a distance of 60.0 m up a 30.0° slope at a constant speed of 2.00 m/s?
 - b) A motor of what power is required to perform this task?