

Physics 10154 - Exam #2A

Partial credit will be given provided you show all work and are solving parts of the problem correctly. Points will be deducted if you don't show your work (or if some parts are incorrect) even if you get the right answer. Clearly indicate your answer with a circle or box and remember to include correct units and significant figures.

1. (35 pts) A 35.0-kg block is initially at rest on a 27.7° inclined plane. The coefficient of static friction between the block and the incline is 0.368.
 - a) Does the block remain at rest? Justify your answer.
 - b) If a force is applied on the block with a magnitude of 77.0 Newtons directed parallel to and up the incline, what is the magnitude and direction of the force of static friction acting on the block, assuming it doesn't move in this case?

2. (30 pts) A small rock is tied to the end of a 54.0 cm long string and twirled around in a vertical circle at a constant speed so that it completes 1.58 revolutions per second. When the string makes an angle of 55.0° above the horizontal and the rock is on its way up, the string is cut, and the rock is in free-fall. The center of the circle is 1.37 meters above the ground. How much time does it take for the rock to land on the ground after the string is cut?

3. (35 points) In the situation shown below, $m_1 = 1.25$ kg, $m_2 = 2.50$ kg, and the coefficient of kinetic friction between m_1 and the table is 0.740. Starting from rest, an applied force of 41.0 N pulls m_1 to the left 88.0 cm. Assume m_1 and m_2 move together with the same speed and acceleration.

- What is the final velocity of m_1 ?
- How much work is done by kinetic friction on m_1 ?
- If there were no friction in this problem, what would be your answer to part (a)?

