Name: _____

Class Period: _____

AP Physics 1: Work, Power, & Energy
Conservation of Energy & Work by Non-Conservative Forces

Conceptual Questions

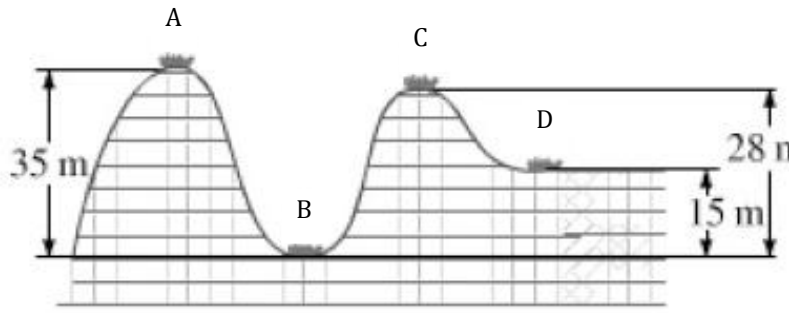
1. In your own words. What is the difference between a conservative and non-conservative force?

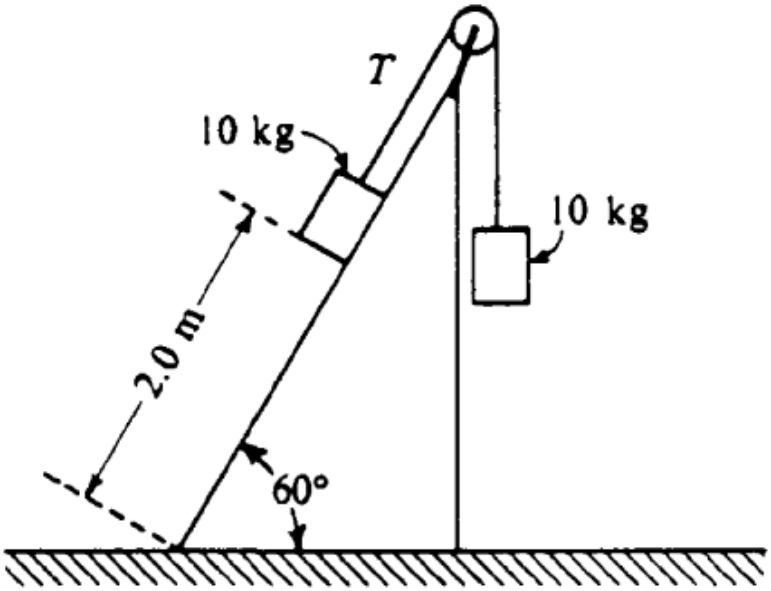
2. Based on conservative and non-conservative forces, if a crazy college kid on a sled starts from rest and sleds down a hill, does the final velocity at the bottom depend on the angle of inclination of the hill if…
   A. …The hill is icy and friction is negligible?
   B. …The snow is deep and provides a resistive force of friction?

Mathematical Questions

3. Santa's elves are hard at work! They have a 110 kg box that must be packed into the sleigh! They pull on the box with a constant, horizontal force of 350 N. They pull the box 15.0 m across the slick workroom floor that is virtually frictionless. But they get outside where the next 15.0 m has a coefficient of kinetic friction of 0.30. After these two moves, what is the final velocity of the box?

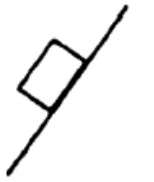
4. The Intimidator is a most excellent roller coaster at Carowinds on the border between North and South Carolina. So in the image provided, let's say that the roller coaster car on the Intimidator reaches point A with a velocity of 1.70 m/s. A force of friction 1/5 of the car's weight slows its progress as the car travels a total distance of 45.0 m. What velocity will the car have a point B?





5. Two 10-kilogram boxes are connected by a massless string that passes over a massless, frictionless pulley as shown. The boxes remain at rest, with the one on the right hanging vertically and the one on the left 2.0 meters from the bottom of an inclined plane that makes an angle of 60° with the horizontal. The coefficients of kinetic friction and static friction between the left-hand box and the plane are 0.15 and 0.30, respectively. You may use $g = 10\ m/s^2$, $\sin 60° = 0.87$, and $\cos 60° = 0.50$.

   A. What is the tension T in the string?
   B. On the diagram below, draw and label all the forces acting on the box that is on the plane.



   C. Determine the magnitude of the frictional force acting on the box on the plane.

   The string is then cut and the left-hand box slides down the inclined plane.

   D. Determine the amount of mechanical energy that is converted into thermal energy during the slide to the bottom.
   E. Determine the kinetic energy of the left-hand box when it reaches the bottom of the plane.