Name _____ Regents Physics

Conservation of Energy

Energy Lab

Goals:

- To measure change in potential energy of a cart as it moves down a track
- Calculate the final velocity of the cart using the law of conservation of energy and compare this to the measured value obtained using motion detectors

Materials:

- ✓ Cart and a mass bar
- ✓ Track
- ✓ Motion detector, computer and PASCO software

Procedure

- Make one end of the track higher than the other end.
- Calculate the potential energy at the max height of the track.
- Using the law of conservation of energy, calculate the final velocity of the cart at the bottom of the track
- **Release the cart** and find the final velocity of the cart at it lowest point (this should be the same point used for calculating the final velocity using the law of conservation of energy)
- Use the measured final velocity and calculate the kinetic energy at its lowest point. Compare this value to the value of kinetic energy obtained from the law of conservation of Energy

Place your information in the table below. Run the experiment from (3) different heights and do one final fun with the larger mass from the same height as your run 3.

height	Potential Energy	Kinetic Energy Calculated using Law of Conservation of Energy	Final Velocity from Law of Conservation of Energy	Measured Final Velocity using Motion Detector	Calculated kinetic Energy using Motion Detector Final Velocity
Add mass bar					

Calculations of values to be Placed in tables

1. **Height:** Run the trial from (3) different heights

2. **Potential Energy:** Use the formula for Potential Energy to calculate the potential energy at each of the different heights. Place these values in the table and show the work for the calculations below.

Trial 1
Trial 2
Trial 3
w/mass bar

3. Kinetic Energy Calculated using Law of Conservation of Energy: Show your work below and place your values in the table:

Kinetic Energy trial 1
Kinetic Energy trial 2
Kinetic Energy trial 3
w/ mass bar

4. Final Velocity from Law of Conservation of Energy

Final Velocity of trial 1
Final Velocity of trial 2

Final Velocity of trial 3
w/ mass bar

5. Measured Final Velocity using Motion Detector: Place the final velocity of the measured lowest point in the table provided for each trial.

6. Calculated kinetic Energy using Motion Detector Final Velocity: Use the kinetic energy formula and the final velocity value from the motion detector to calculate the final kinetic energy before stopping the cart.

Kinetic Energy trial 1
Kinetic Energy trial 2
Kinetic Energy trial 3
w/ mass bar

Post Lab

1. Calculate the percent difference between calculated final velocity using the law of conservation of energy vs. measured final velocity using the motion detectors.

Height 1	
Height 2	
Height 3	

2. How close were your calculated values of kinetic energy using the law of conservation of energy to the values obtained using the measured final velocity and kinetic energy formula? What accounts for the difference in the numbers?

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3. Was there a significant difference in the final velocities obtained from the motion detectors when using a larger mass? Using the law of conservation of energy, show why or why not mass is/is not important..

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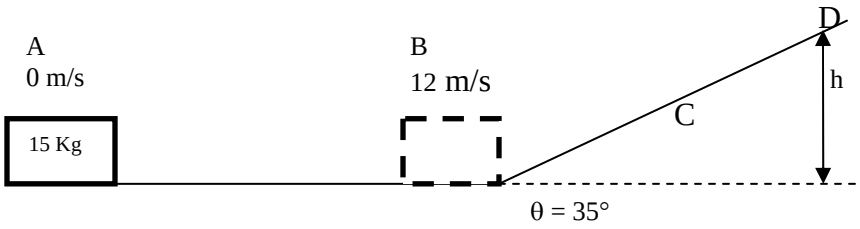
4. A 15.0 kg box starts from rest at point A and is accelerated uniformly to point B in 5.0 s by the application of a contant horizontal force F. At point B, the speed of the box is 12.0 m/s as it begins to move up a plane inclined at 35°. (Assume no friction)



a) Determine the distance the box travels in moving from point A to point B

b) Compared to the impulse to stop the box at point B, the impulse required to stop it at point c is
(1) less (2) greater (3) the same

c) What happens to the mass's potential energy as it moves up the incline? _____

d) Calculate the maximum vertical height the box will rise as it moves up the incline. Show all work below.