

**Ballistic Pendulum - The Conservation of Momentum in One-Dimension
(10 Points)**

Print Name _____

Lab Section _____ Date _____ TA _____

This Pre-lab is due when you come in to do the experiment. Enter your momentum results in scientific notations and using the measured units, i.e., grams, centimeters and seconds. Use the rules of significant figures in problems like this. You know where uncertainty begins in each value, but you do not know the quantifications of any precision as well as you do know that no precision increasing operations, like 1D or 2D averages, are being used.

1. A projectile, with mass $66.45 \pm 0.05 \text{ g}$, located $103.15 \pm 0.05 \text{ cm}$ above the ground is launched in the horizontal direction. Before it strikes the ground, it travels $360.25 \pm 0.05 \text{ cm}$ in the horizontal direction. Show the formulas for initial momentum and error calculation, then calculate and formally report the momentum of the steel ball in the horizontal direction, p_i .

 $p_f =$ _____

2. The same projectile, launched in the horizontal direction, is caught by a stationary pendulum with a mass of $265.2 \pm 0.2 \text{ g}$. The pendulum rises $12.55 \pm 0.01 \text{ cm}$ in the vertical direction. Show the formulas for final momentum and error calculations, then calculate and formally report the momentum of the ball-pendulum system at the moment the ball is caught by the pendulum, p_f .

 $p_i =$ _____

3. Calculate the percent fractional error of the loss of momentum to two significant figures.

$$PFE = \left| \frac{p_f - p_i}{p_i} \right| * 100$$

% difference = _____