

10. Add 250 g to the cart and repeat steps 4-9.
11. Add another 250 g to the cart for a total of 500 g riding in the cart and repeat steps 4-9.
12. Solve for the average velocity and propagate the error from the time measurements to find the experimental range of the velocity, $v = v_{\text{avg}} \pm \Delta v$.
13. Knowing the conservation of mechanical energy equation in the preliminaries, graph v^2 vs. $\frac{x_f^2}{M}$. Include error bars in the velocity squared. Note that $\Delta(v^2) \neq (\Delta v)^2$.
14. Use your program to determine the slope and the uncertainty in the slope, which will be the spring constant k .
15. Also, how close to zero is the intercept? Is it zero within uncertainty?

Equipment list: aluminum track, PAScar, photogate, 250 gram masses (2), cards, scotch tape.