

Acceleration on a ramp

Introduction: In this lab you will calculate what the acceleration down a ramp should be by resolving “g” into its component “ a_p ” and then experimentally measure what the acceleration of a cart actually is. You will compare your data by using “error” analysis (E_A and E_R) and precision (D_A and D_R), and then screen dump your graph into your “sheets” document and share it with me. All data about your set up is in your sheets doc!

Procedure:

- 1) Set up your ramp at about a 15° angle and record your length and height. Calculate the acceleration due to gravity that acts down the ramp a_p for this angle- this is your “A” value for your experiment.
- 2) Hitch up the photogate to Dig Sonic port on the left of the Lab Pro and then open Logger Pro from the desktop. Click the interface icon in the left top ribbon and drag the photogate to the Dig Sonic box. Right click on the photogate icon and select *Motion Timing* and then *Set Distance or length to cart picket fence*.
- 3) Set up the photogate on a smaller ring stand at about the $\frac{1}{2}$ way point of the ramp and place the cart picket fence on the cart (the 13 opaque areas on the fence should be up). Make sure the infrared beam strikes the middle of the 13 opaque areas (use the LED indicator on the photogate to verify this).
- 4) Back the cart up the ramp so that the picket fence is just (about a cm) in front of the photogate. Click Start and let the cart go.
- 5) Autoscale your three graphs and use “f(x)” quadratic for the d/t graph, “R=” for the vel/t graph, and “Stat” for the a/t graph. Screen (or Snip) dump your graph and insert it into your sheets document. You will use the slope (m) of the vel/t graph as your experimental value for acceleration, “O”.
- 6) Error Analysis: Determine the Absolute and Relative Error for your experiment using the appropriate rounded value of 9.80665 m/s^2 as your “A” value. Do a precision analysis using Absolute and Relative Deviation. To do this find the “O” values from 3 other groups and include it with yours – be sure to list the lab station you took these values from!
- 7) Make sure to use formulas in your sheets document whenever possible.