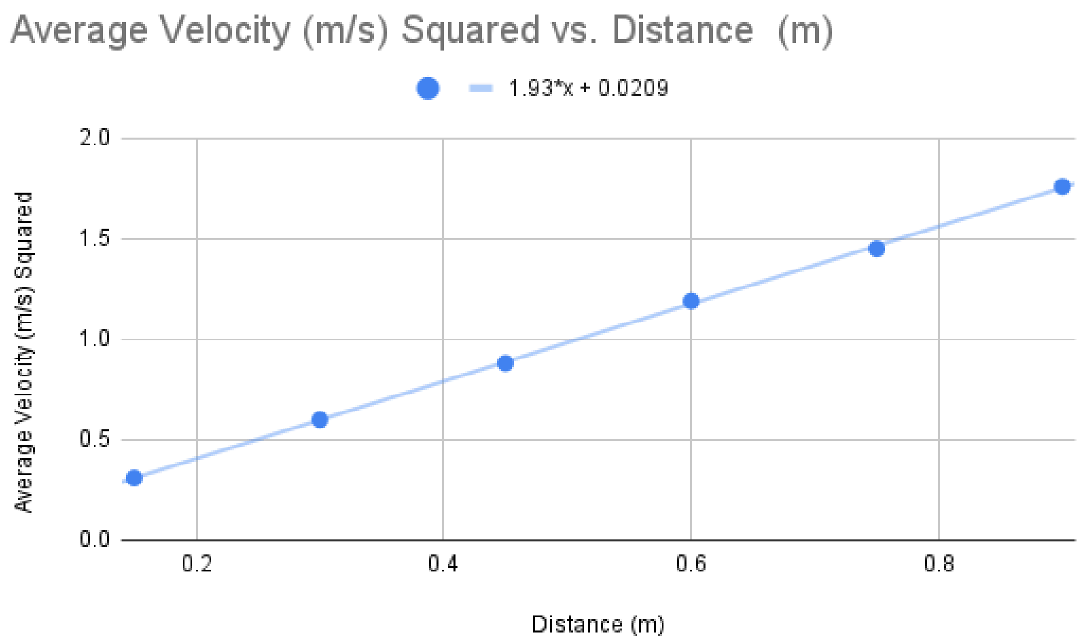
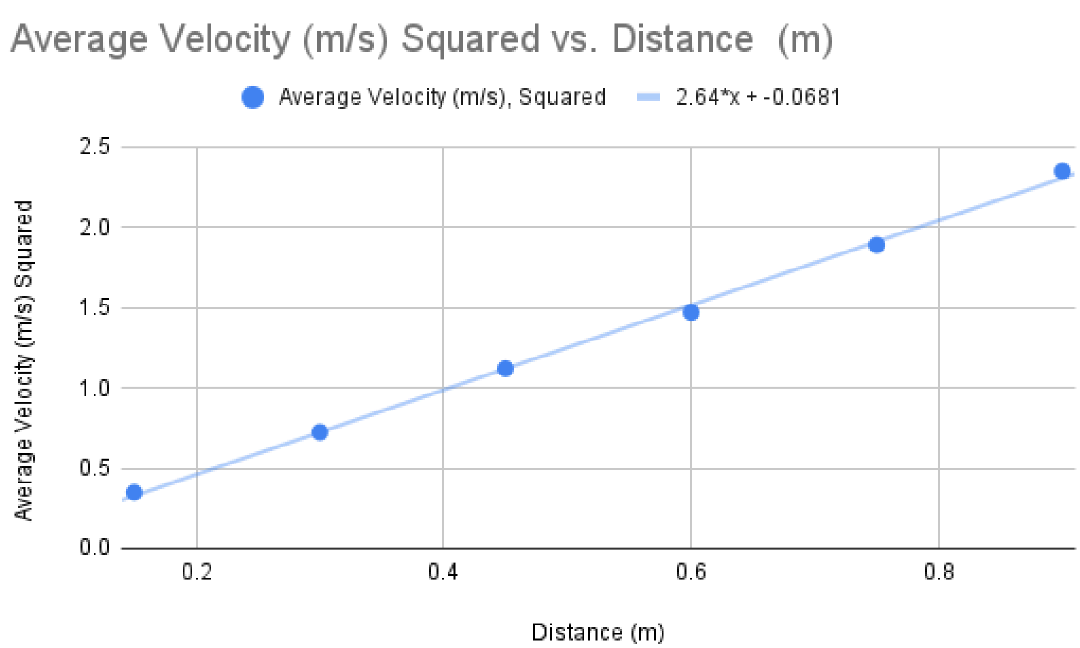
Incline 1 Graph:



Incline 2 Graph:



The above graphs are the results of the car traveling certain distances on Incline 1 (at a lesser angle, or less steep) and Incline 2 (at a higher angle and steeper). In order to make the graphs, I started with the kinematic equation:

$v^2 = v_0^2 + 2a\Delta x$

As this allows us to solve for acceleration without time. Seeing as we started with the car at rest, $v_0^2 = 0$, meaning the equation can be further simplified to:

$v^2 = 2a\Delta x$,

Which is in the form y = mx + b, y being v^2, m being 2a and x being Δx. This formula was also how I decided to put v^2 on the y-axis. Furthermore, distance is independent and belongs on the x-axis. Additionally, velocity data was squared to match equations in linear form.

After plotting on a scatter plot, lines of best fit were created for both. Incline 1 had an equation of:

$v^2 = 1.93\Delta x + .0209$

Incline 2 had an equation of:

$v^2 = 2.64\Delta x + -.0681$.

Because our initial value for m, or slope, was *2*a, 1.93 m/s^2 and 2.64 m/s^2 are not the actual values of a; .965 m/s^2 and 1.32 m/s^2 are, respectively.

Conclusion:

The results of the experiment are reasonable and realistic, taking into consideration real-life factors that influence results. Conceptually, the acceleration for the steeper incline (2) was larger than for the less steep ramp (1) which is to be expected. We can see this when comparing the acceleration of Incline 1, 0.965 m/s^2 to that of Incline 2, 1.32 m/s^2. Expected acceleration for Incline 1 and 2 would be:

For Incline 1:

0 = sin-1(12/113) = 6.096

a = 9.8 * sin(6.096) = 1.041

For Incline 2:

0 = sin-1(15.4/113) = 7.833

a = 9.8 * sin(7.833) = 1.336

Making the error percentage 7.3% for Incline 1 and 1.1% for Incline 2.

The most obvious error within our problem is that of the b value in the line of best fit, which should be equal to 0. However, given that the b value was equivalent to velocity at distance=0, thus when one of the experimenters were holding it, it is likely that a small force was applied up the ramp (resulting in the negative sign seen in Incline 2) or down the ramp. The second error is that of the difference between expected acceleration and demonstrated acceleration. Because the error percentage is small, we can likely explain this discrepancy with a small acting force, such as the friction we assumed to be negligible, slightly inaccurate starting/stopping points, or slight derailing of the car. All 3 of these would be able to make our actual acceleration smaller, as seen in our experiment.