Error Analysis

The biggest source of error in this experiment is human error, one area with some human error is the measuring of the 1/60 dots, the human eye could only get to a point of accuracy especially with measuring by the millimeter.

The second potential error is with the free fall spark timer apparatus, as horizontally the sparks on the paper are not in a straight line. I think the lightning is the cause of the inaccuracy as the lightning might hit the ball in different places. Another possible error is through air resistance the equation of g = 908.665 does not factor in any air resistance. Air resistance is a problem as it slows down the fall of the ball.

The last error is the fact that the graph has initial velocity and initial position, the ball didn't have any velocity or position in the experiment so these two variables are throwing off the results. I think that the two variables exist because of the air resistance that is slowing them.

In the end I think that the best way to combat that is to get more accurate equipment like a vacuum and to repeat the experiment lots and lots of time to get the most accurate experiment. In my experiment I got an accuracy of half of a percent compared to the known g value so I think that the experiment was very accurate.

Conclusions

The physical law of nature that was investigated in this experiment was gravity and how fast gravity pulls an object to the ground. I learned the motion of the ball and how the position of the ball may change due to gravity. I learned that I can graph the experiment in two different ways. One way is a linear line where we had the average difference in centimeters in time while the other way to graph it is through an exponential way through the rate of change of distance versus time. In the end I learned that both ways of graphing the ball were valid and very close to the actual number. The exponential graph was twice as accurate as the linear graph with it being half of a percentage point from the actual number. I have also learned that many variables can affect an experiment like this, such as air resistance, human error, and machine error. All three of these things can really affect the numbers of the experiment. I think the best way to mitigate these errors is to put the machine in a vacuum and to repeat and average the experiment out.