Whatever Floats Your Boat:

Investigating the Effect of Mass on Terminal Velocity of a Coffee Filter

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Basic kinematics allows students to understand how falling objects worth. However, students can solve problems only if the object they are working with is a one dimensional point falling in a vacuum! In reality, it would be extremely difficult to reach any of these “ideal” situations, and many outside influences will come into play.

One of the biggest disappointments that a physics student may encounter is when they attempt to recreate Galileo’s Leaning Tower of Pisa experiment of dropping a bowling ball and a tennis ball. When they use two different objects, such as a bowling ball and a paper ball, they find that, sadly, the bowling ball falls much faster if they are the same size. Why is this so?

It is our hypothesis that there is another force in play at this situation. Not only is the gravitational force exerting influence on the falling mass, but a phantom drag force could be exerted upwards on the falling object. Eventually, these forces reach equilibrium, causing the object to fall with a terminal velocity. It is our hypothesis that the terminal velocity is therefore dependent on the mass.

Through real life observations, we observe objects that have a smaller Δmass and are both relatively heavy to have approximately the same velocity, so there should not be a linear relationship between terminal velocity and mass. A square root or a logarithmic relationship makes more sense, but a logarithmic equation would require the terminal velocity to be negative when the object’s mass is less than one gram. That is not physically possible. Therefore, our hypothesis is that if the square root of an object’s mass increases, the terminal velocity will also increase.

In order to conduct this experiment, we will use video analysis to record a falling paper coffee filter dropped from one meter. This video analysis will allow us to track the displacement of the coffee filter per time interval, and allow us to derive the velocity of the coffee filter. We should also be able to find the terminal velocity, which is the true dependent variable for this experiment. Our independent variable will be the mass of the paper coffee filter, which will be changed by varying the number of coffee filters that are dropped.

The most important constant for this lab is maintaining the same surface area that is dropped each time. Because we are unclear about what effect the surface area may have on the terminal velocity, we shall keep it as constant as we can by using the same coffee filter. Additional constants include using the same video camera to record and performing the experiment in the same area.

We shall allow the video camera to record over a one meter long area in order to mitigate potential parallax errors, or errors that occur when the angle of viewing is too large. A one meter long area does not have an extremely wide angle of viewing, while allowing for the coffee filter to drop a sufficient distance to build up speed. The coffee filter should be at terminal velocity before it passes the window of opportunity and viewing.

We will also use variations between one gram and fourteen grams, which provides a large range of masses to use. The mass doubles almost four times between this range, which provides a substantial percentage increase between the first data points and the last. In addition, by observation, we see that a single coffee filter dropping down takes some amount of time to float down, while a stack of perhaps twenty coffee filters behaves like a rubber ball being dropped. Therefore, taking between one gram and fourteen grams provides with a large range of terminal velocities to be found.

In this lab, we use 6 different trials in order to get a statistically significant data set. It will allow us to use the standard deviation as our error bars. In addition, because of the large likelihood that the video analysis does not produce perfect results, the larger number of different trials may be able to compensate for the inaccuracies in the video.

Materials:

- 7 medium coffee filters, 10 centimeter radius
- Video Camera: Sony Handycam HDR-CX160
- Tripod
- Tape
- 2 meter long paper strip with 5 centimeter marks
- Ruler
- Chair
- Long blank wall space
- Laser distance measurer, BOSCH DLR130w/ accuracy of 0.001 meter
- “Tracker” software published by Douglas Brown here
- “LoggerPro” software published by Vernier Software

Procedure:

1) Weight the different number of coffee filters. Record masses for 1, 2, 4, 6, 8, 10, and 12 coffee filters.
2) Using paper and a ruler, create a long 2 meter long strip of paper. Use the sharpie and ruler to place long straight lines every 5 centimeters.

3) Find a long blank wall space and attach the paper strip to the wall with the tape. Make sure that the paper is directly vertical down the wall.
4) Measure the starting distance to be 2.152 meters with the laser distance measurer. Mark the ending distance at 1.065 meters.
5) Position the camera and tripod to face the paper strip. The camera should be focused such that the entire starting distance to ending distance is in the view of the camera lens.
6) Place the chair near the paper and have a person stand on it. S/he should be able to reach the 2.152 meter mark easily.
7) Using one coffee filter, align the bottom of the coffee filter with the 2.152 meter mark.
8) Begin video recording with the video camera
9) Drop the filter
10) Stop the recording with the video camera after the filter has passed the 1.065m mark.
11) Repeat steps 6-9 five more times.
12) Repeat steps 6-10 while varying the number of coffee filters. Beginning with one filter, move to 2, 4, 6, 8, 10, and 12 filters.

Data Processing Technique:

13) Using the Tracker software, set the software such that the y axis is straight up the paper strip.
14) Using the "Calibration Stick" function, draw out a distance of 5centimeters on the paper strip.
15) Begin the video at the instant that the coffee filter begins to drop. Using the "Track Control" function, make a mark at the center of the coffee filter bottom at every frame of

the coffee filter's drop. An automatic list of times, x coordinates, and y coordinates should appear.

16) Copy the information into a Microsoft Excel spreadsheet.

17) Using LoggerPro, graph the time and y-coordinate data by pasting from Excel. Using the "Linear Fit" function, select a region of the graph at the end, where the data shows a more linear correlation.

18) Using the data outputted by LoggerPro, fill in a data table containing information about the mass of the coffee filters and the terminal velocity of the coffee filters. The slope of the LoggerPro linear fit is the negative of the terminal velocity.

<u>Illustrations and Screenshots:</u>

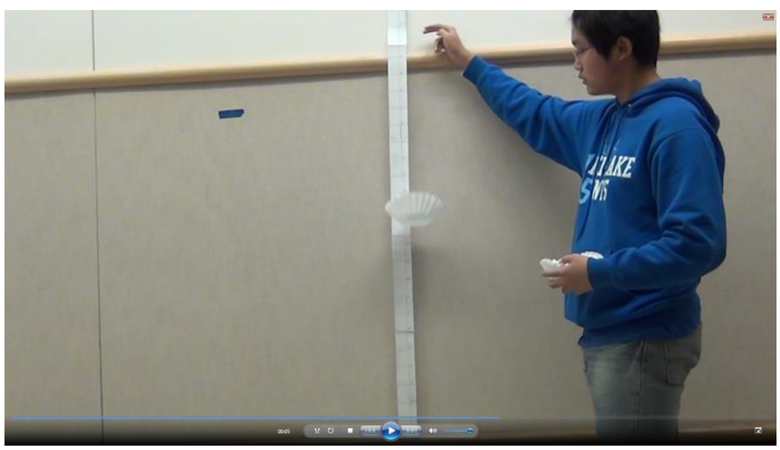


Fig 1: Video Recording of Experiment

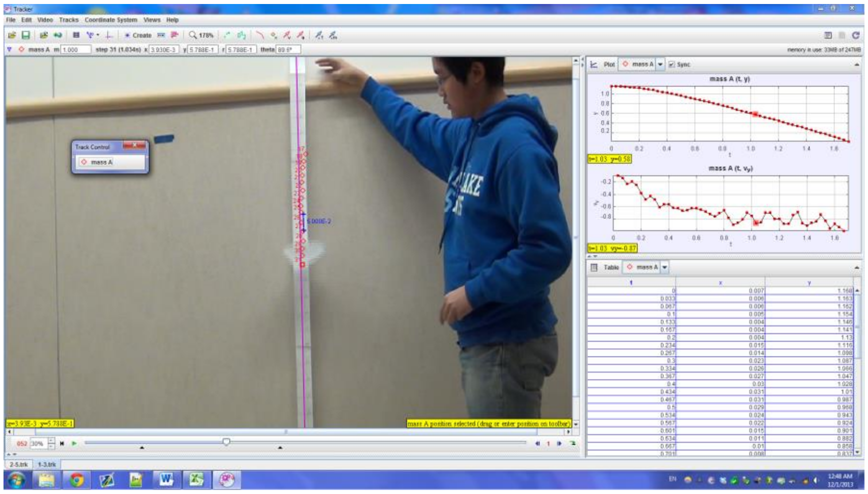


Fig 2: Tracker Video Analysis of Experiment

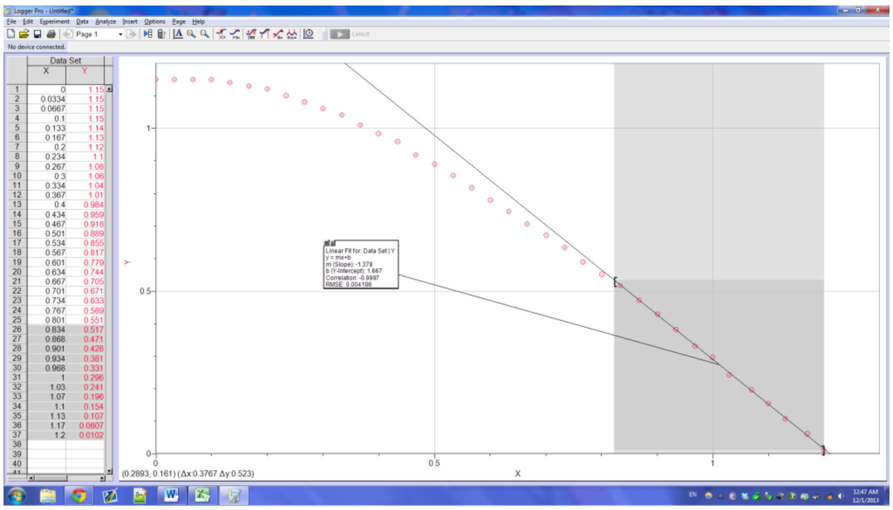


Fig 3: Determining Terminal Velocity with LoggerPro Software

Data Collection:

Sample of Full Raw Data:

Exp 1.1		
t	x	y
0.20	0.00	1.09
0.27	0.00	1.06
0.30	0.00	1.04
1.20	-0.05	0.29
1.33	-0.05	0.15
1.37	-0.05	0.12

Full data tables can be found in the appendix.

Terminal Velocity vs Mass Data:

	Terminal Velocity (m/s)					
Mass of Coffee Filters (±0.1g)	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
1.353	-0.97	-0.94	-0.81	-0.87	-0.96	-1.03
2.707	-1.42	-1.41	-1.39	-1.61	-1.38	-1.38
3.442	-2.14	-2.10	-2.27	-2.17	-2.20	-2.05
5.532	-2.44	-2.38	-2.32	-2.36	-2.49	-2.58
7.045	-2.58	-2.49	-2.50	-2.58	-2.73	-2.50
10.106	-2.74	-2.96	-3.05	-2.82	-2.91	-2.94
13.489	-2.90	-2.94	-3.16	-3.02	-3.18	-3.09

One item to note: The mass of the coffee filters were found with a digital scale precise to 0.001g but accurate only to 0.1g. This is reflected in the data tables with the header showing 0.1g but the numbers extending to the thousandths place.

In order to process this data, the arithmetic average of the trials was found by the equation

$$Terminal\,Velocity_{Average} = \frac{V_1 + V_2 + V_3 + V_4 + V_5 + V_6}{6}$$

So that for the 1.353 gram data, there is:

$$Terminal\,Velocity_{Average} = \frac{(-.97) + (-.94) + (-.81) + (-.87) + (-.96) + (-1.03)}{6}$$

$$Terminal\,Velocity_{Average} = -\frac{5.58}{6}$$

$$Terminal\,Velocity_{Average} = -0.93\frac{m}{s}$$

However, for our purposes, we shall set the axis such that the velocity is increasing, rather than decreasing. Therefore, we would negate the average terminal velocity to get

$$Terminal\,Velocity_{Average} = 0.93\frac{m}{s}$$

Next, in order to find the error, we shall take the standard deviation of the trial data. Before doing this, we would like draw attention to the correlation coefficient for the calculation of the terminal velocity. One of the major sources of error that will be discussed later is the determining of terminal velocity through video analysis. However, all of our r values for the data is greater than 0.99, implying a reasonably high accuracy.

Applying the formula for standard deviation, as follows[1]:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{6}(x_i - \mu)^2}{6}}$$

Using this information for the 1.353g trial, we have:

$$\sigma = \frac{\sqrt{(.97 - .93)^2 + (.94 - .93)^2 + (.81 - .93)^2 + (.87 - .93)^2 + (.96 - .93)^2 + (1.03 - .93)^2}}{6}$$

So that

$$\sigma = \sqrt{\frac{.04^2 + .01^2 + (-.12)^2 + (-.06)^2 + .03^2 + .1^2}{6}}$$

$$\sigma = \sqrt{\frac{.0306}{6}}$$

$$\sigma = \sqrt{.0051}$$

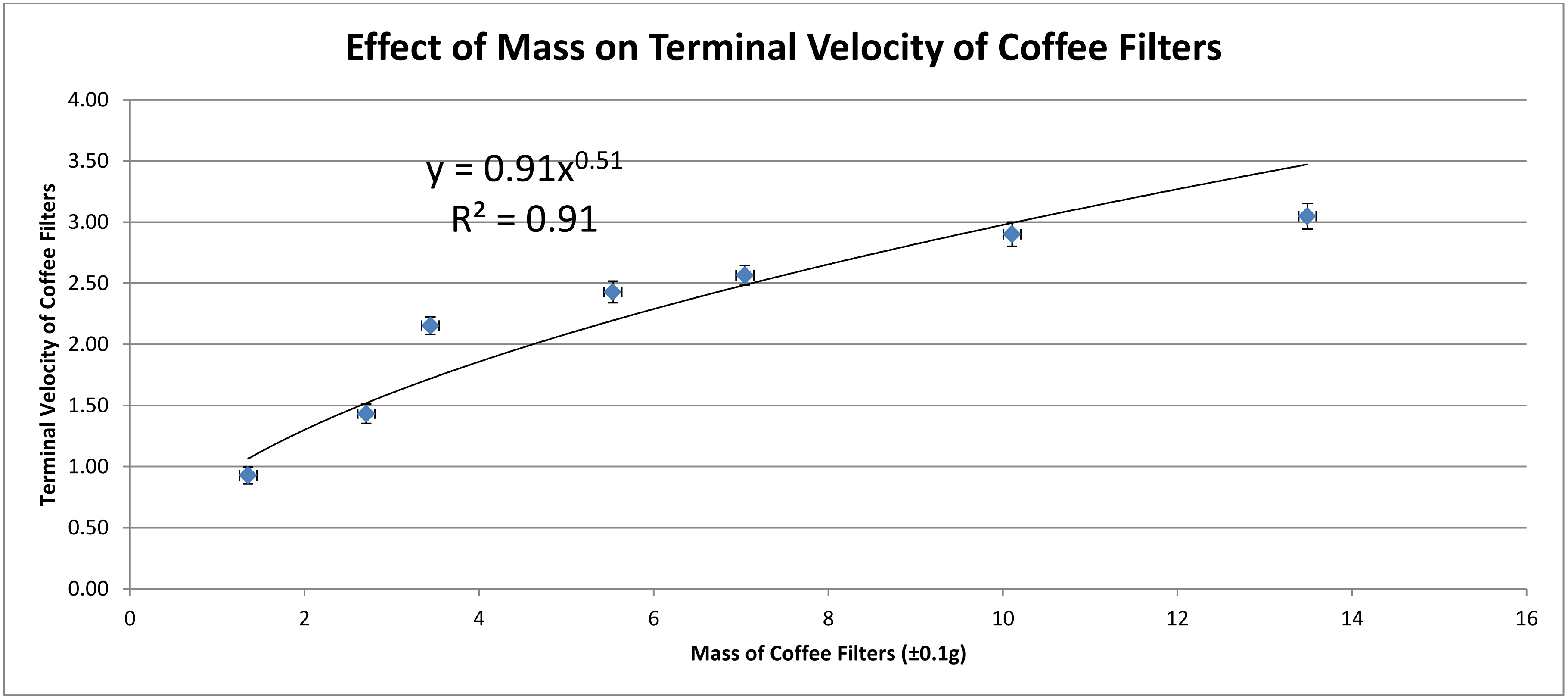
$$\sigma = .07$$

[1] "Standard Deviation and Variance." *Standard Deviation and Variance*. N.p., n.d. Web. 09 Dec. 2013. <http://www.mathsisfun.com/data/standard-deviation.html>.

Therefore, our processed data table is as follows:

Mass of Coffee Filters (±0.1g)	Average Terminal Velocity (m/s)	Standard Deviation for Terminal Velocity (m/s)
1.353	0.93	0.07
2.707	1.43	0.08
3.442	2.15	0.07
5.532	2.43	0.09
7.045	2.56	0.08
10.106	2.90	0.10
13.489	3.05	0.10

See the graph on the next page for a full plot of this data.



On this graph, the x axis represents the mass of the coffee filter while the y axis represents the terminal velocity of the coffee filter.

This graph shows that there seems to be a square root relationship between mass and the terminal velocity, or

$$\sqrt{Mass} \propto Velocity_{Terminal}$$

Our uncertainty areas come from the uncertainty in the digital scale that we used as well as from the standard deviation in the terminal velocity. An important item to note: Although our scale had a high amount of *precision*, accurate to the $\pm 0.001\ g$, it had a relatively low amount of *accuracy* after the many years of use and abuse by generations of high school physics students. Therefore, we gave it the accuracy of $\pm\ 0.1\ g$ in the diagram and in our data.

However, it does seem that this data is not perfect. The power curve does not pass through all of the uncertainty regions. While the correlation factor of 0.91 is encouraging, we shall linearize the data and try again to see if this is the best fit.

Data Processing:

In order to linearize the data, we shall find the square root of the mass and plot that against the terminal velocity. Based on our current power fit, this seems like the best choice to make. The calculations for this are relatively simple, with

$$Mass_{new} = \sqrt{Mass_{old}}$$

However, calculating the uncertainty is a little bit trickier. As found in the IB Physics Student Booklet, Dealing with Uncertainties, the formula is:

$$\Delta \mathrm{Mass_{new}} = \left(\frac{1}{n} \cdot \frac{\Delta A_{old}}{A_{old}}\right) \cdot A_{new}$$

And in our circumstance,

$$\Delta Mass_{New} = \left(\frac{1}{2} \cdot \frac{\Delta M_{old}}{M_{old}}\right) \cdot M_{new}$$

Using the 1.353 g as a sample calculation, we find:

$$Mass_{new} = \sqrt{1.353}$$

$$Mass_{new} = 1.163$$

$$\Delta M_{new} = \left(\frac{1}{2} \cdot \frac{\Delta M_{old}}{M_{old}}\right) \cdot M_{new}$$

$$\Delta M_{new} = \left(\frac{1}{2} \cdot \frac{0.1}{1.353}\right) \cdot 1.163$$

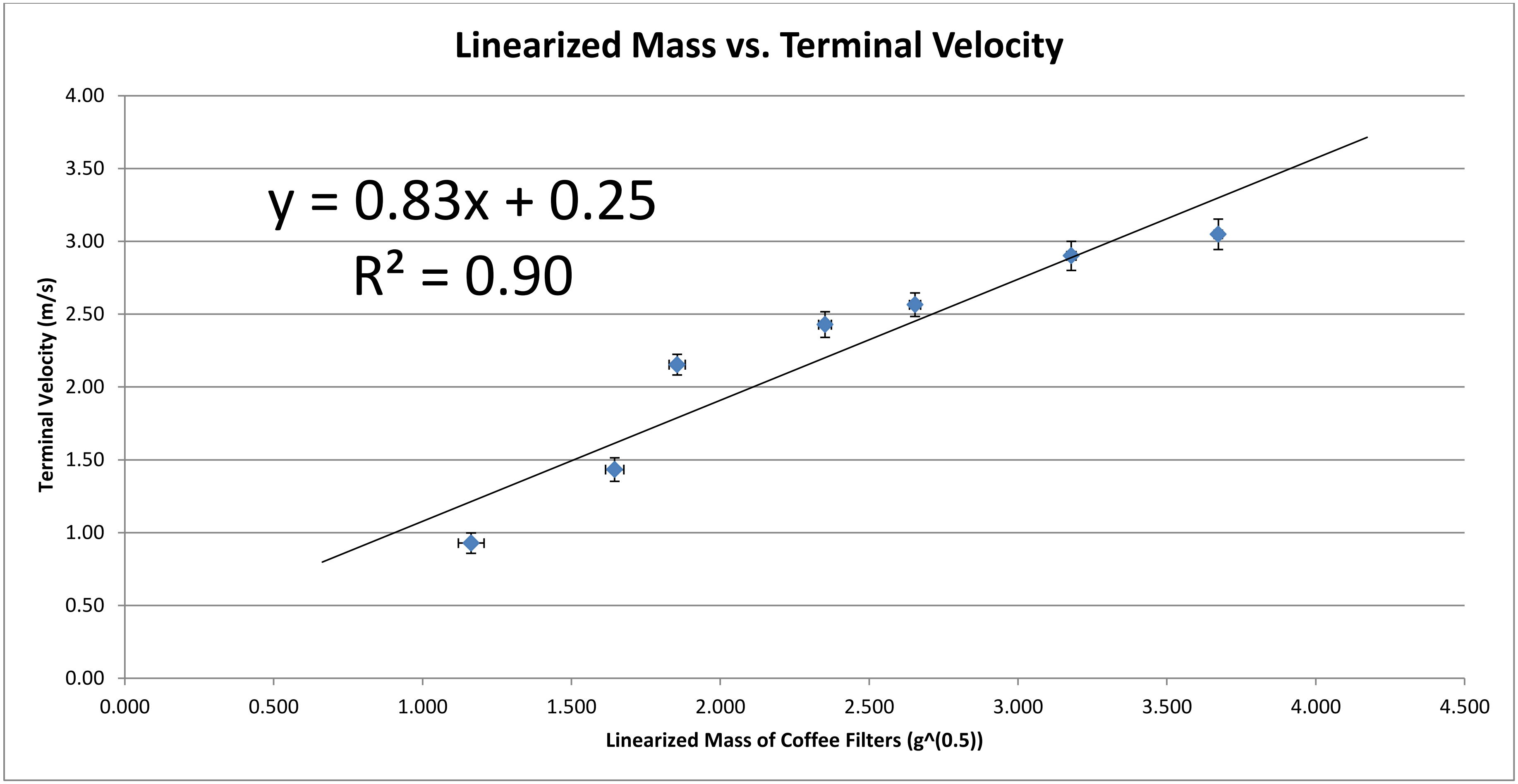
$$\Delta M_{new} = 0.3695 \cdot 1.163$$

$$\Delta M_{new} = 0.04298 \sim 0.04$$

Our new data table looks like the following:

Linearized Mass of Coffee Filters (g)	Linearized Error in Mass of Coffee Filters (g)	Average Terminal Velocity (m/s)	Error in Terminal Velocity (m/s)
1.163	0.04	0.93	0.07
1.645	0.03	1.43	0.08
1.855	0.03	2.15	0.07
2.352	0.02	2.43	0.09
2.654	0.02	2.56	0.08
3.179	0.02	2.90	0.10
3.673	0.01	3.05	0.10

This results in the graph on the next page:



While this is a linearized graph, it does not to have a very good correlation. The linearized best fit line does not pass through each of the uncertainty regions. However, data is evenly distributed along the line, and the high correlation constant encourages us to further work with this information.

Before we conclude our analysis of the graph, let us find the maximum and minimum slopes for the linearized graph.

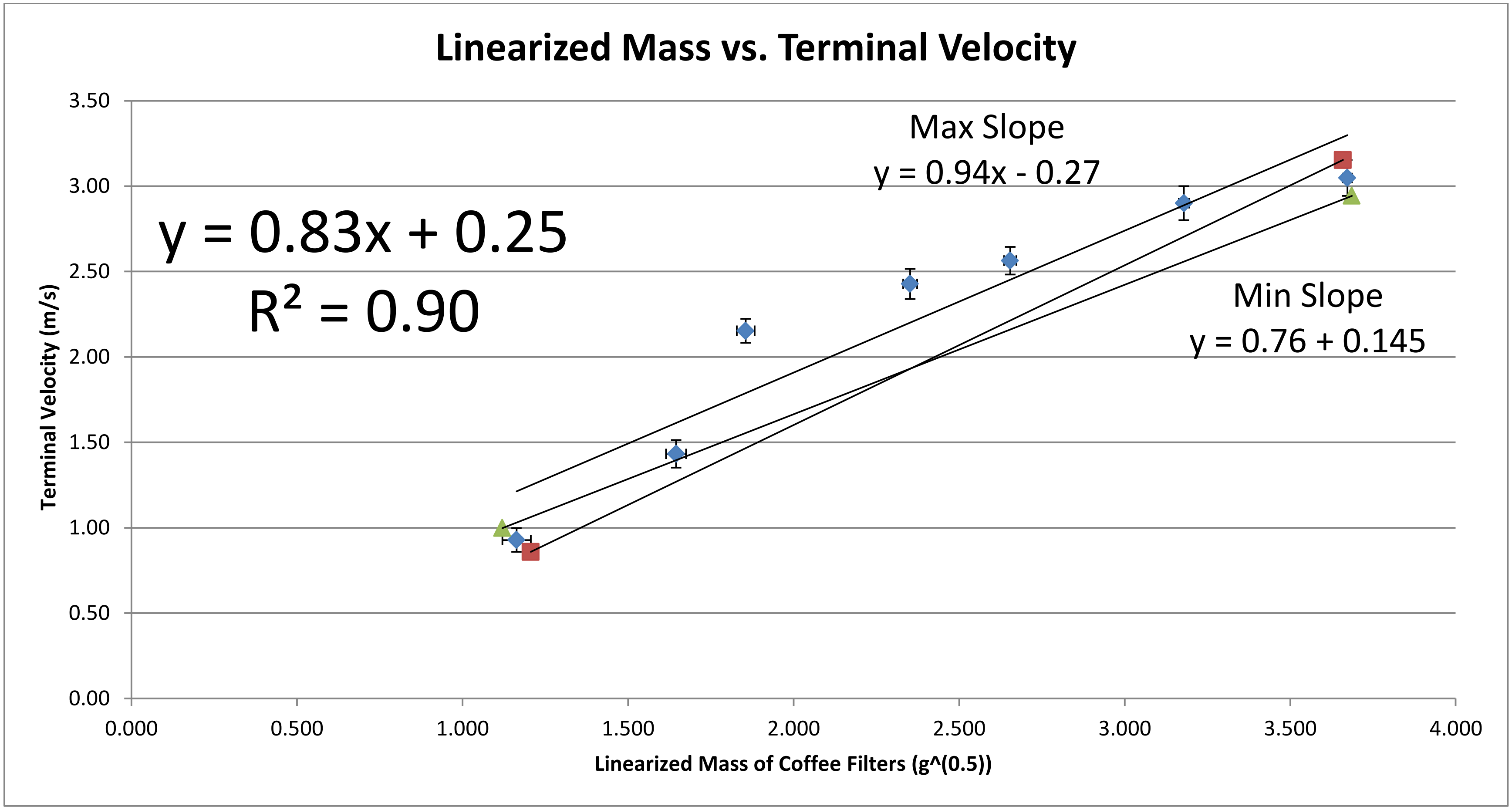
The maximum slope is determined from the maximum uncertainty values of the highest and lowest points, so that the two points responsible for this calculation would be: $(x_{min} + Uncert,\ y_{min} - Uncert)$ and $(x_{max} - Uncert, y_{max} + Uncert)$. Using our data, these two points would be (1.163 + 0.04, 0.93 – 0.07) and (3.673 - 0.01, 3.05 + 0.10), giving us the points $(1.206,\ 0.086)\ and\ \ (3.659\ ,\ 3.15)$

The minimum slope is similarly calculated, but with all of the signs switched, giving the points $(x_{min} - Uncert,\ y_{min} + Uncert)$ and $(x_{max} + Uncert, y_{max} - Uncert)$, or (1.163 - 0.04, 0.93 + 0.07) and (3.673 + 0.01, 3.05 - 0.10), and thus $(1.120\ , 1.00)$ and $(3.686\ , 2.94)$.

These data points are shown below:

Max Slope		Min Slope	
X	Y	X	Y
1.206	0.86	1.120	1.00
3.659	3.15	3.686	2.94

Plotted on the graph, we see the following:



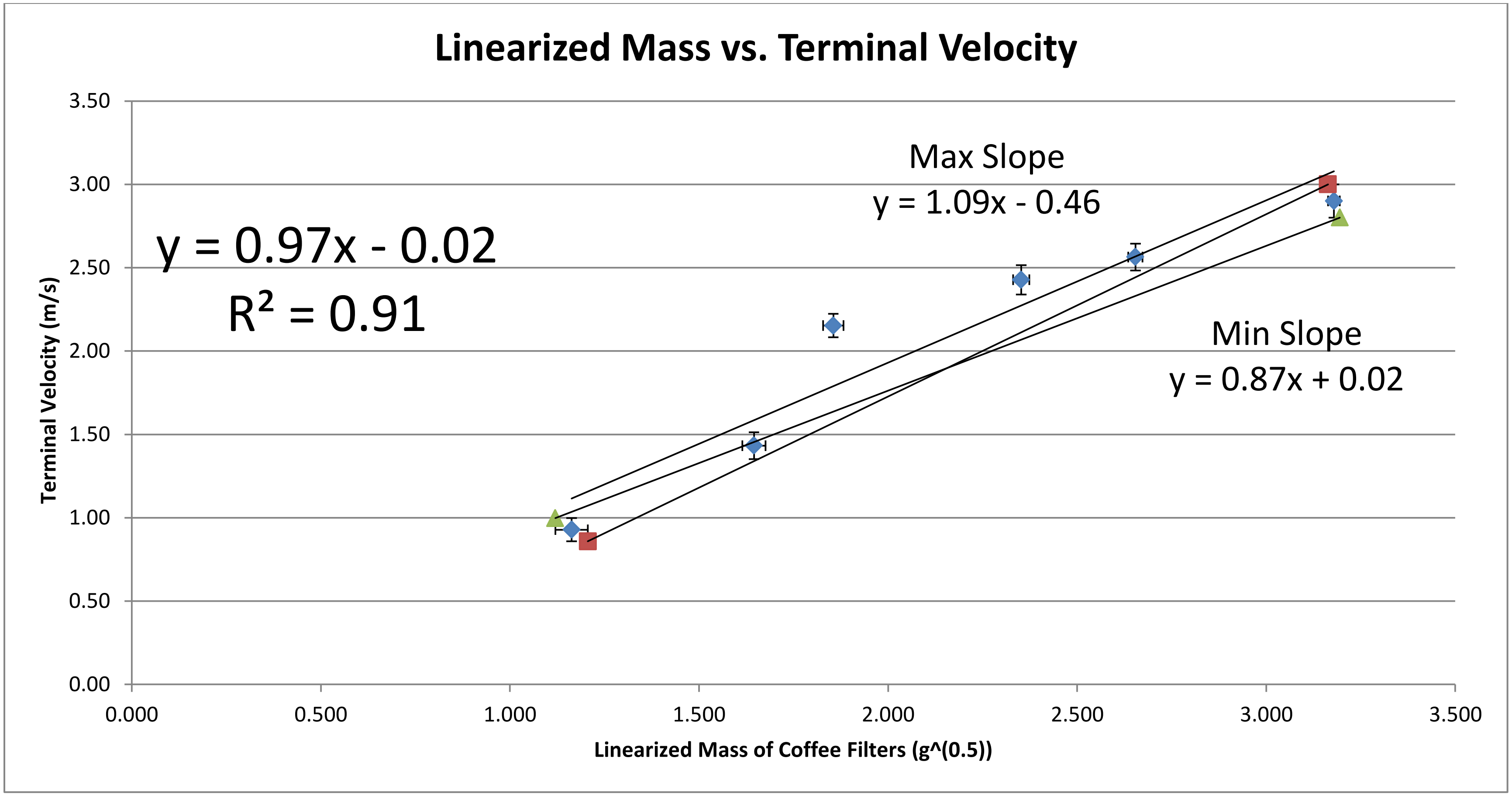
Unfortunately, as we can tell in this diagram, not every data point passes through the region of the max and min slopes, implying problems with our data. As we shall discuss in further detail in our conclusion, we shall remove the final point from our graph and replot. This will include recalculating the max/min slope, the linear regression, and the correlation.

Attached are the new data tables for the graph without the final data point. All of the calculations are done the same as before, so there is no need to run through more sample calculations.

Linearized Mass of Coffee Filters (g)	Linearized Error in Mass of Coffee Filters (g)	Average Terminal Velocity (m/s)	Error in Terminal Velocity (m/s)
1.163	0.04	0.93	0.07
1.645	0.03	1.43	0.08
1.855	0.03	2.15	0.07
2.352	0.02	2.43	0.09
2.654	0.02	2.56	0.08
3.179	0.02	2.90	0.10

Max Slope		Min Slope	
X	Y	X	Y
1.206	0.86	1.120	1.00
3.163	3.00	3.195	2.80

Plotting this data results in the following graph:



While this is not an optimal graph, this is at enough of a quality to begin further analysis.

From our linearized graph, we see that the correlation between the mass of the coffee filter does seem to have a square root relationship, although our data does not depict this perfectly. The correlation factor is reasonably high at $R^2 = 0.91$, although merely analyzing accuracy based on the correlation factor is meaningless. However, it does tell us that there the general trend is accurate. If we look at the uncertainty areas and the min/max slopes, they tell a different story. Because not every data point passes through the best fit line or between the min/max slopes, there is evidence for inaccuracies and errors in our data collection.

The reason why we chose to exclude the last data point in our second graph will be discussed more in depth in the conclusion.

On the other hand, the regressed data's x and y intercepts does make a lot of sense. Because these points are at (0, -0.02) and (.02 , 0) respectively, they are both very close to the origin. This makes physical sense because if no mass was dropped, the "no mass" would reach a terminal velocity of 0. While it is not absolutely conclusive, it does provide better evidence for our claim of $\sqrt{Mass} \propto Velocity$.

In addition, the positive slope in this diagram shows that there as the square root of mass increases, the velocity also increases proportionally. This makes sense in two ways: For heavy objects, there is very little variation in terminal velocity. The mass would have to square in order to see any difference whatsoever. In addition, at very small masses, the terminal velocity seems to increase very quickly.

Conclusion:

Upon conducting additional research, an additional formula was found as follows[2]:

$$C_D = \frac{F}{\frac{1}{2}\rho V^2 A}$$

Where C_D is the drag coefficient, F is the force, ρ is the density of the liquid and A is the area of the object that is falling.

This equation can be rearranged to be:

$$F_D = C_D \cdot \frac{1}{2} \cdot \rho V^2 A$$

Where the $F_D$represents the drag force on the object that is falling.

Therefore, a Free Body Diagram would look like the following:

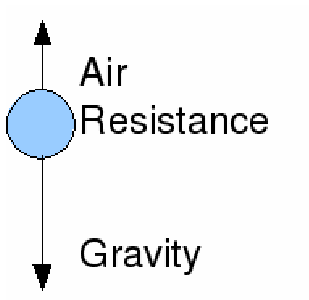


Figure 4: FBD of falling objec[3]t

Because the downwards force on the object is constant due to $F_g = ma$, or Newton's second law, we can calculate for terminal velocity.

[2] Feynman, Richard P., Robert B. Leighton, and Matthew ,. Sands. "The Flow of Dry Water." The Feynman Lectures on Physics. Vol. 2. New York: Basic, 2010. 40-1-0-12. Print.
[3] "Free Body Diagrams." *Private Maths and Physics Tuition*. N.p., n.d. Web. 09 Dec. 2013. <http://www.astarmathsandphysics.com/>.

Terminal velocity would be achieved when the forces cancel each other out, and there are no longer any external forces acting upon the object. Therefore,

$$F_g = F_D$$

$$ma = C_D \cdot \frac{1}{2}\rho V^2 A$$

$$V^2 = \frac{2 \cdot ma}{\rho A}$$

$$V_{Terminal} = \sqrt{2 \cdot \frac{ma}{\rho A}}$$

Therefore,

$$V_{Terminal} \propto \sqrt{m}$$

Our initial theory therefore is confirmed theoretically.

Through our various graphs, we have found that there exists a square root relationship between the mass and velocity. Our original power regression equation is $y = 0.91x^{0.51}$, which is remarkably accurate. In our original data points, this can be most clearly seen in the difference between the 2.707 g mass and the 7.045g mass. 2.707 squared is equal to 7.34, which is very close to 7.045. Therefore, we expect the velocity to also double. The velocity for 2.707g is 1.43 m/s while the velocity for 7.045g is 2.56, which is a ratio of 1:1.79. This is extremely close to our prediction and conclusively proves our initial hypothesis to be correct.

In addition, the properties of the graph align with what we would expect a falling object to do. When the object has 0 mass, the object has 0 terminal velocity, while a very heavy object would not perceive in a large difference in terminal velocity. However, this also comes to the point that objects with large masses will not reach their terminal velocity. Instead, they will be perceived to be constantly gaining mass.

For example, for a 500 g object, our equation would calculate it's terminal velocity to be

$$Velocity_{Terminal} = 0.91\sqrt{500}$$

$$Velocity_{Terminal} = 23.91\frac{m}{s}$$

Applying our kinematic equations, we can find that:

$$V_{terminal}^2 = V_{initial}^2 + 2 \cdot a \cdot d$$

Where if we approximate using $a = \frac{9.81m}{s^2}$, we would find d to be

$$d = \frac{21.65^2}{2 \cdot 9.81}$$

$$d = 23.91\ meters$$

Which is approximately 6 and a half stories tall, or approximately 6.29% tall of the Empire State Building[4]. Of course, people are not typically dropping heavy coffee filters from very high buildings, so it is reasonable that in most cases, terminal velocity cannot be seen.

Although we have proved our hypothesis with our data, the errors that we have are also quite plentiful. The largest error is not a parallax error or a measurement error, but one that is very similar to what was previously discussed. As the mass increases, the terminal velocity also increases and by kinematic equations, the falling mass requires a longer time to reach terminal

[4] http://skyscrapercenter.com/new-york-city/empire-state-building/

velocity. Therefore, at the final trials of our data, there was more and more uncertainty in the true terminal velocity of the object, or even if terminal velocity had been achieved! This was a systematic error caused by the design of the lab itself. It was assumed that one meter would be long enough to capture enough information about the extremely light coffee filter, but this is not the case.

This error was the reason why we ended up excluding the final data point in our graphical analysis. We are extremely uncertain about the accuracy of that final terminal velocity measurement preformed by LoggerPro; thus, we dropped it from our final graph. Although it can be solved by extending the view of the video camera to have a range of two meters, that would introduce a larger secondary error, which shall be discussed subsequently.

A secondary error is in the manner that data was collected, via video analysis. If a video camera is looking straight at a flat piece of paper, there would be compression of length at the top of the viewing area and an elongation along the center of the viewing area. This is due to parallax error, or the error that occurs when looking at images of objects at different angles. Each different perspective would therefore seem to be sized differently. This was a systematic error which could be solved, given the resources. In order to both accommodate the terminal velocity error as well as the parallax error, we need to move the video camera further away from the object it is recording. Therefore, this would enlarge the total viewing area while minimizing the viewing angle.

However, this actually results in a third error that is connected with the first two. Cameras are not perfect items, and have some amount of error in resolution of image. When using Tracker, there was a small amount of blur because the coffee filter was going faster than the frame rate at which the camera could track. The camera, a 24 frame per second device, could barely catch good concrete images for the coffee filters that were moving at 3 meters per second. A simple correction would be to buy a better camera with a faster frame rate. Other than improving the technology, there is not another way to truly fix this error without completely redesigning the lab.

Another error was in the falling of the coffee filter. As you can see in the video screenshot, the coffee filter is not falling directly down. Due to the minimal center of mass in the coffee filter, what was frequently seen was how the coffee filter would sway like a boat after directly being released, but then better stabilize into a falling formation afterwards. Because it was swaying, there was not an absolutely consistent area at all times. Because in our formula we anticipated a constant area, there is a slight random error depending on how exactly the filter was dropped. The best way to fix this is to first determine the center of gravity on the filter, and instead of adding additional coffee filters, add additional mass to the center point. This would force the coffee filter to stabilize much quicker, providing better data.

However, there is another error accompanied with our falling error. As the velocity increases and the center of mass becomes greater, the sides of the filter would be more compressed as well. This results in the “fix” to the previous error causing another error here. However, there is another way to accommodate. If we don’t use paper coffee filters, but rather something that is sturdier, such as cardboard sheets. Therefore, the dropping object would not bend in any way and would have a constant area that is in contact with the air. The only problem with this is that it transforms a “coffee filter” lab into a “cardboard cutout” lab!

One final minor error source is the area that the lab took place. Optimally, the lab should have taken place in a completely still room where there were no air currents whatsoever. Due to the light mass of the filter, a slight gust could knock it off course or possibly increase/decrease the velocity. However, due to space constraints, this was not possible for this lab and resulted in a random error. While this may have been canceled out due to the large amount of data we collected, it would be better to operate in a better room.

In summary, a list of improvements/equipment this lab would need is:

- A really large and empty room with a long flat wall and unobstructed space to film
- The room should be completely empty with no air currents.
- Using cardboard with paperclip attachments rather than paper coffee filters

Of these three improvements, the most effective one would be to have a larger room to work in. The biggest problem in the lab was an inaccurate determination for terminal velocity, so fixing that will resolve many other graph problems, resulting in a higher correlation and a better fit for the data.

Even though all of these items are achievable and practical, the current design has permitted the experimenters to collect very valid data which proves the hypothesis. This lab has been successful in proving what was needed and in implementing a sufficiently accurate design to be considered proper.

In conclusion, this was a successful lab in gathering empirical data about the factors that influence terminal velocity. This was a difficult lab to conduct, due to the high amounts of uncertainty that measuring a light, falling object had. The video analysis work was more work than was perhaps expected, but it resulted in very clear data conclusions. While the improvements are clear and practical,

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Appendix: Full Data Charts

Exp 1.1			Exp 1.1		
t	x	y	t	x	y
0.00	0.01	1.15	0.73	-0.04	0.72
0.03	0.00	1.14	0.77	-0.04	0.69
0.07	0.00	1.13	0.80	-0.05	0.66
0.10	0.00	1.12	0.83	-0.06	0.63
0.13	0.00	1.11	0.87	-0.05	0.61
0.17	0.00	1.11	0.90	-0.05	0.57
0.20	0.00	1.09	0.93	-0.05	0.55
0.23	0.00	1.08	0.97	-0.05	0.51
0.27	0.00	1.06	1.00	-0.05	0.49
0.30	0.00	1.04	1.03	-0.05	0.46
0.33	0.00	1.02	1.07	-0.05	0.42
0.37	0.00	1.00	1.10	-0.05	0.39
0.40	0.00	0.98	1.13	-0.05	0.36
0.43	-0.02	0.96	1.17	-0.05	0.33
0.47	-0.01	0.94	1.20	-0.05	0.29
0.50	-0.02	0.91	1.23	-0.05	0.26
0.53	-0.02	0.89	1.27	-0.05	0.23
0.57	-0.03	0.85	1.30	-0.05	0.19
0.60	-0.03	0.83	1.33	-0.05	0.15
0.63	-0.03	0.80	1.37	-0.05	0.12
0.67	-0.04	0.78	1.40	-0.05	0.08
0.70	-0.04	0.74	1.43	-0.05	0.05

Exp 1.2			Exp 1.2		
t	x	y	t	x	y
0.00	-0.01	1.16	0.80	-0.01	0.82
0.03	0.00	1.16	0.83	0.00	0.79
0.07	0.00	1.15	0.87	0.00	0.76
0.10	0.00	1.15	0.90	0.00	0.74
0.13	0.00	1.15	0.93	0.00	0.72
0.17	0.00	1.15	0.97	0.00	0.69
0.20	0.00	1.15	1.00	0.00	0.66
0.23	0.00	1.14	1.03	0.00	0.63
0.27	0.00	1.13	1.07	-0.01	0.59
0.30	0.00	1.11	1.10	-0.01	0.56
0.33	0.00	1.09	1.13	-0.02	0.54
0.37	0.00	1.08	1.17	-0.03	0.50
0.40	0.00	1.06	1.20	-0.03	0.48
0.43	0.00	1.05	1.23	-0.04	0.44
0.47	0.00	1.03	1.27	-0.04	0.42
0.50	0.00	1.01	1.30	-0.04	0.38
0.53	0.00	0.99	1.33	-0.05	0.35
0.57	0.00	0.97	1.37	-0.06	0.32
0.60	0.00	0.95	1.40	-0.06	0.29
0.63	0.00	0.93	1.43	-0.05	0.25
0.67	0.00	0.91	1.47	-0.05	0.22
0.70	0.00	0.89	1.50	-0.05	0.18
0.73	-0.01	0.87	1.53	-0.06	0.15
0.77	0.00	0.84			

Exp 1.3		
t	x	y
0.00	0.01	1.17
0.03	0.01	1.16
0.07	0.01	1.16
0.10	0.01	1.15
0.13	0.00	1.15
0.17	0.00	1.14
0.20	0.00	1.13
0.23	0.01	1.12
0.27	0.01	1.10
0.30	0.02	1.09
0.33	0.03	1.07
0.37	0.03	1.05
0.40	0.03	1.03
0.43	0.03	1.01
0.47	0.03	0.99
0.50	0.03	0.97
0.53	0.02	0.94
0.57	0.02	0.92
0.60	0.02	0.90
0.63	0.01	0.88
0.67	0.01	0.86
0.70	0.01	0.84
0.73	0.01	0.81
0.77	0.00	0.79

Exp 1.3		
t	x	y
0.80	0.00	0.76
0.83	0.00	0.74
0.87	0.00	0.71
0.90	0.01	0.68
0.93	0.01	0.65
0.97	0.00	0.63
1.00	0.00	0.61
1.03	0.00	0.58
1.07	0.00	0.55
1.10	0.00	0.52
1.13	0.00	0.50
1.17	0.00	0.48
1.20	0.00	0.45
1.23	0.00	0.42
1.27	0.00	0.39
1.30	0.00	0.36
1.33	0.00	0.34
1.37	0.00	0.32
1.40	-0.01	0.28
1.43	-0.01	0.26
1.47	-0.01	0.22
1.50	-0.01	0.20
1.53	-0.01	0.18
1.57	-0.01	0.15
1.60	-0.01	0.11

Exp 1.4		
t	x	y
0.00	0.01	1.16
0.03	0.01	1.16
0.07	0.01	1.16
0.10	0.01	1.16
0.13	0.02	1.15
0.17	0.02	1.14
0.20	0.02	1.12
0.23	0.02	1.11
0.27	0.02	1.10
0.30	0.03	1.08
0.33	0.03	1.07
0.37	0.03	1.05
0.40	0.03	1.03
0.43	0.03	1.01
0.47	0.03	0.99
0.50	0.03	0.96
0.53	0.02	0.94
0.57	0.01	0.92
0.60	0.00	0.90
0.63	0.00	0.87
0.67	0.00	0.85
0.70	0.00	0.83
0.73	0.00	0.80
0.77	0.00	0.78
0.80	0.00	0.75

Exp 1.4		
t	x	y
0.83	0.00	0.73
0.87	0.00	0.71
0.90	0.01	0.68
0.93	0.01	0.66
0.97	0.00	0.63
1.00	0.01	0.60
1.03	0.01	0.58
1.07	0.00	0.55
1.10	0.00	0.52
1.13	0.00	0.49
1.17	0.00	0.47
1.20	0.00	0.44
1.23	0.00	0.41
1.27	0.00	0.38
1.30	0.00	0.34
1.33	0.00	0.32
1.37	0.00	0.29
1.40	0.01	0.25
1.43	0.01	0.22
1.47	0.01	0.19
1.50	0.01	0.16
1.53	0.01	0.13
1.57	0.02	0.09

Exp 1.5			Exp 1.5		
t	x	y	t	x	y
0.00	0.01	1.15	0.83	0.10	0.68
0.03	0.01	1.15	0.87	0.11	0.65
0.07	0.01	1.14	0.90	0.11	0.63
0.10	0.01	1.14	0.93	0.11	0.60
0.13	0.01	1.13	0.97	0.12	0.57
0.17	0.01	1.13	1.00	0.13	0.54
0.20	0.01	1.12	1.03	0.14	0.50
0.23	0.02	1.10	1.07	0.14	0.47
0.27	0.02	1.09	1.10	0.15	0.44
0.30	0.02	1.07	1.13	0.15	0.41
0.33	0.02	1.05	1.17	0.16	0.39
0.37	0.03	1.04	1.20	0.16	0.35
0.40	0.03	1.01	1.23	0.17	0.31
0.43	0.03	0.99	1.27	0.17	0.28
0.47	0.03	0.96	1.30	0.18	0.25
0.50	0.04	0.94	1.33	0.19	0.21
0.53	0.05	0.91	1.37	0.19	0.17
0.57	0.06	0.89	1.40	0.20	0.14
0.60	0.07	0.86	1.43	0.20	0.10
0.63	0.07	0.84	1.47	0.21	0.07
0.67	0.08	0.81	1.50	0.22	0.03
0.70	0.08	0.78	1.53	0.22	0.00
0.73	0.08	0.77			
0.77	0.09	0.74			
0.80	0.09	0.72			

Exp 1.6			Exp 1.6		
t	x	y	t	x	y
0.00	0.01	1.14	0.83	0.00	0.68
0.03	0.01	1.14	0.87	0.00	0.64
0.07	0.01	1.14	0.90	0.00	0.61
0.10	0.01	1.14	0.93	0.00	0.58
0.13	0.01	1.13	0.97	-0.01	0.55
0.17	0.01	1.13	1.00	-0.01	0.51
0.20	0.00	1.12	1.03	-0.01	0.48
0.23	0.00	1.11	1.07	-0.01	0.45
0.27	0.00	1.10	1.10	-0.01	0.42
0.30	0.00	1.08	1.13	-0.01	0.38
0.33	0.00	1.06	1.17	-0.02	0.34
0.37	0.00	1.04	1.20	-0.03	0.31
0.40	0.00	1.02	1.23	-0.03	0.27
0.43	0.00	1.00	1.27	-0.03	0.24
0.47	-0.01	0.97	1.30	-0.04	0.21
0.50	-0.01	0.95	1.33	-0.04	0.17
0.53	-0.01	0.93	1.37	-0.04	0.13
0.57	-0.01	0.91	1.40	-0.04	0.09
0.60	-0.02	0.88	1.43	-0.04	0.05
0.63	-0.02	0.85	1.47	-0.04	0.01
0.67	-0.02	0.82			
0.70	-0.02	0.79			
0.73	-0.02	0.77			
0.77	-0.01	0.74			
0.80	-0.01	0.71			

Exp 2.1			Exp 2.1		
t	x	y	t	x	y
0.00	0.00	1.14	0.70	-0.03	0.63
0.03	0.00	1.14	0.73	-0.03	0.59
0.07	0.00	1.14	0.77	-0.04	0.55
0.10	0.00	1.13	0.80	-0.04	0.50
0.13	0.00	1.13	0.83	-0.04	0.46
0.17	0.00	1.12	0.87	-0.04	0.41
0.20	0.00	1.10	0.90	-0.04	0.36
0.23	0.00	1.09	0.93	-0.05	0.32
0.27	0.00	1.07	0.97	-0.05	0.27
0.30	0.00	1.04	1.00	-0.06	0.22
0.33	0.00	1.02	1.03	-0.06	0.17
0.37	0.00	0.99	1.07	-0.07	0.12
0.40	0.00	0.96			
0.43	0.00	0.93			
0.47	-0.01	0.90			
0.50	-0.01	0.86			
0.53	-0.01	0.82			
0.57	-0.02	0.79			
0.60	-0.02	0.75			
0.63	-0.02	0.71			
0.67	-0.03	0.67			

Exp 2.2			Exp 2.2		
t	x	y	t	x	y
0.00	0.00	1.15	0.70	0.03	0.62
0.03	0.00	1.15	0.73	0.03	0.58
0.07	0.00	1.15	0.77	0.03	0.53
0.10	0.00	1.14	0.80	0.03	0.49
0.13	0.00	1.13	0.83	0.03	0.45
0.17	0.00	1.13	0.87	0.03	0.40
0.20	0.00	1.11	0.90	0.03	0.36
0.23	0.01	1.09	0.93	0.03	0.31
0.27	0.01	1.07	0.97	0.04	0.26
0.30	0.01	1.05	1.00	0.04	0.21
0.33	0.01	1.02	1.03	0.04	0.16
0.37	0.02	0.99	1.07	0.04	0.11
0.40	0.02	0.96	1.10	0.04	0.06
0.43	0.02	0.93	1.13	0.05	0.00
0.47	0.03	0.89			
0.50	0.03	0.86			
0.53	0.03	0.82			
0.57	0.04	0.78			
0.60	0.04	0.73			
0.63	0.04	0.70			
0.67	0.03	0.66			

Exp 2.3			Exp 2.3		
t	x	y	t	x	y
0.00	0.00	1.14	0.70	-0.02	0.56
0.03	0.00	1.13	0.73	-0.02	0.52
0.07	0.00	1.13	0.77	-0.02	0.47
0.10	0.00	1.12	0.80	-0.02	0.42
0.13	0.01	1.10	0.83	-0.02	0.38
0.17	0.01	1.09	0.87	-0.01	0.33
0.20	0.01	1.07	0.90	-0.02	0.29
0.23	0.01	1.05	0.93	-0.02	0.24
0.27	0.01	1.02	0.97	-0.02	0.19
0.30	0.01	0.99	1.00	-0.02	0.15
0.33	0.01	0.96	1.03	-0.03	0.10
0.37	0.00	0.92			
0.40	0.00	0.90			
0.43	-0.01	0.86			
0.47	-0.01	0.83			
0.50	-0.02	0.80			
0.53	-0.03	0.75			
0.57	-0.03	0.72			
0.60	-0.03	0.68			
0.63	-0.03	0.64			
0.67	-0.03	0.60			

Exp 2.4			Exp 2.4		
t	x	y	t	x	y
0.00	0.00	1.14	0.70	0.04	0.36
0.03	0.00	1.14	0.73	0.03	0.31
0.07	0.01	1.13	0.77	0.03	0.26
0.10	0.01	1.11	0.80	0.03	0.19
0.13	0.02	1.09	0.83	0.04	0.14
0.17	0.02	1.07	0.87	0.04	0.09
0.20	0.02	1.04			
0.23	0.02	1.01			
0.27	0.03	0.97			
0.30	0.03	0.93			
0.33	0.03	0.89			
0.37	0.03	0.85			
0.40	0.03	0.80			
0.43	0.03	0.76			
0.47	0.03	0.71			
0.50	0.04	0.66			
0.53	0.03	0.63			
0.57	0.02	0.57			
0.60	0.02	0.51			
0.63	0.03	0.46			
0.67	0.03	0.42			

Exp 2.5		
t	x	y
0.00	0.00	1.15
0.03	0.00	1.15
0.07	0.00	1.15
0.10	0.00	1.15
0.13	0.00	1.14
0.17	0.00	1.13
0.20	0.00	1.12
0.23	0.00	1.10
0.27	0.00	1.08
0.30	0.00	1.06
0.33	0.00	1.04
0.37	0.00	1.01
0.40	0.00	0.98
0.43	0.00	0.96
0.47	0.00	0.92
0.50	0.00	0.89
0.53	0.00	0.85
0.57	0.00	0.82
0.60	0.00	0.78
0.63	0.00	0.74
0.67	0.00	0.71

Exp 2.5		
t	x	y
0.70	0.00	0.67
0.73	0.00	0.63
0.77	0.00	0.59
0.80	0.00	0.55
0.83	0.00	0.52
0.87	0.00	0.47
0.90	0.00	0.43
0.93	0.00	0.38
0.97	0.00	0.33
1.00	0.00	0.30
1.03	0.00	0.24
1.07	0.00	0.20
1.10	0.00	0.15
1.13	-0.01	0.11
1.17	-0.01	0.06
1.20	-0.02	0.01

Exp 2.6		
t	x	y
0.00	0.00	1.15
0.03	0.00	1.14
0.07	0.00	1.15
0.10	0.00	1.14
0.13	0.00	1.14
0.17	0.00	1.13
0.20	0.00	1.12
0.23	0.01	1.11
0.27	0.01	1.09
0.30	0.01	1.07
0.33	0.01	1.05
0.37	0.01	1.02
0.40	0.01	0.99
0.43	0.01	0.96
0.47	0.01	0.92
0.50	0.01	0.89
0.53	0.01	0.86
0.57	0.01	0.82
0.60	0.01	0.78
0.63	0.01	0.75
0.67	0.01	0.71

Exp 2.6		
t	x	y
0.70	0.02	0.66
0.73	0.02	0.62
0.77	0.03	0.57
0.80	0.03	0.53
0.83	0.03	0.48
0.87	0.03	0.44
0.90	0.03	0.39
0.93	0.03	0.34
0.97	0.03	0.30
1.00	0.04	0.25
1.03	0.04	0.21
1.07	0.04	0.16
1.10	0.03	0.11
1.13	0.04	0.06
1.17	0.04	0.02

Exp 3.1		
t	x	y
0.00	0.00	1.15
0.03	0.00	1.15
0.07	0.00	1.15
0.10	0.00	1.14
0.13	0.00	1.13
0.17	0.00	1.13
0.20	0.00	1.12
0.23	0.01	1.10
0.27	0.01	1.07
0.30	0.02	1.04
0.33	0.02	1.00
0.37	0.03	0.95
0.40	0.03	0.90
0.43	0.04	0.86
0.47	0.04	0.81
0.50	0.04	0.75
0.53	0.05	0.69
0.57	0.05	0.62
0.60	0.06	0.56
0.63	0.07	0.49
0.67	0.07	0.43
0.70	0.08	0.37
0.73	0.08	0.29
0.77	0.07	0.21
0.80	0.05	0.15
0.83	0.07	0.07
0.87	0.07	-0.01

Exp 3.2		
t	x	y
0.00	0.00	1.14
0.03	0.00	1.14
0.07	0.00	1.13
0.10	0.00	1.12
0.13	0.00	1.11
0.17	0.01	1.09
0.20	0.01	1.07
0.23	0.01	1.03
0.27	0.01	0.99
0.30	0.01	0.95
0.33	0.02	0.90
0.37	0.02	0.85
0.40	0.02	0.80
0.43	0.03	0.74
0.47	0.03	0.68
0.50	0.03	0.62
0.53	0.02	0.56
0.57	0.02	0.47
0.60	0.02	0.41
0.63	0.03	0.35
0.67	0.04	0.28
0.70	0.04	0.20
0.73	0.03	0.14
0.77	0.04	0.06
0.80	0.04	-0.01

Exp 3.3		
t	x	y
0.00	0.01	1.15
0.03	0.01	1.14
0.07	0.01	1.14
0.10	0.01	1.13
0.13	0.01	1.12
0.17	0.01	1.10
0.20	0.01	1.07
0.23	0.01	1.04
0.27	0.01	1.00
0.30	0.00	0.95
0.33	0.00	0.91
0.37	0.00	0.85
0.40	0.01	0.80
0.43	0.01	0.74
0.47	0.02	0.68
0.50	0.02	0.61
0.53	0.02	0.55
0.57	0.02	0.48
0.60	0.02	0.41
0.63	0.02	0.33
0.67	0.02	0.27
0.70	0.03	0.18
0.73	0.03	0.10
0.77	0.04	0.02

Exp 3.4		
t	x	y
0.00	0.00	1.14
0.03	0.00	1.14
0.07	0.00	1.14
0.10	0.00	1.14
0.13	0.00	1.14
0.17	0.00	1.13
0.20	0.00	1.13
0.23	0.01	1.11
0.27	0.01	1.09
0.30	0.01	1.07
0.33	0.01	1.03
0.37	0.01	0.99
0.40	0.01	0.95
0.43	0.01	0.90
0.47	0.02	0.84
0.50	0.02	0.80
0.53	0.02	0.74
0.57	0.02	0.68
0.60	0.02	0.62
0.63	0.02	0.56
0.67	0.02	0.49
0.70	0.02	0.42
0.73	0.02	0.34
0.77	0.03	0.27
0.80	0.02	0.20
0.83	0.02	0.11
0.87	0.02	0.03

Exp 3.5		
t	x	y
0.00	0.01	1.15
0.03	0.01	1.14
0.07	0.01	1.14
0.10	0.01	1.13
0.13	0.01	1.11
0.17	0.02	1.09
0.20	0.02	1.07
0.23	0.02	1.03
0.27	0.01	0.98
0.30	0.01	0.95
0.33	0.01	0.90
0.37	0.01	0.85
0.40	0.01	0.80
0.43	0.00	0.74
0.47	0.00	0.68
0.50	0.00	0.61
0.53	0.00	0.54
0.57	0.00	0.48
0.60	-0.01	0.41
0.63	0.00	0.33
0.67	0.00	0.25
0.70	-0.01	0.18
0.73	0.00	0.09

Exp 3.6		
t	x	y
0.00	0.02	1.15
0.03	0.01	1.14
0.07	0.01	1.14
0.10	0.02	1.13
0.13	0.02	1.11
0.17	0.02	1.09
0.20	0.02	1.05
0.23	0.03	1.01
0.27	0.04	0.98
0.30	0.04	0.93
0.33	0.04	0.89
0.37	0.04	0.84
0.40	0.04	0.78
0.43	0.04	0.72
0.47	0.07	0.65
0.50	0.07	0.60
0.53	0.07	0.52
0.57	0.07	0.45
0.60	0.08	0.40
0.63	0.08	0.33
0.67	0.08	0.26
0.70	0.08	0.19
0.73	0.08	0.11
0.77	0.08	0.04

Exp 4.1		
t	x	y
0.00	0.00	1.15
0.03	0.00	1.14
0.07	0.00	1.14
0.10	0.00	1.15
0.13	0.00	1.14
0.17	0.00	1.13
0.20	0.01	1.12
0.23	0.01	1.10
0.27	0.01	1.06
0.30	0.01	1.03
0.33	0.01	0.98
0.37	0.01	0.92
0.40	0.02	0.87
0.43	0.02	0.81
0.47	0.01	0.75
0.50	0.02	0.69
0.53	0.01	0.61
0.57	0.01	0.53
0.60	0.00	0.46
0.63	0.01	0.39
0.67	0.01	0.30
0.70	0.01	0.21
0.73	0.01	0.13

Exp 4.2		
t	x	y
0.00	0.00	1.14
0.03	0.00	1.14
0.07	0.00	1.14
0.10	0.00	1.14
0.13	0.00	1.14
0.17	0.00	1.13
0.20	0.01	1.10
0.23	0.01	1.07
0.27	0.01	1.03
0.30	0.01	1.00
0.33	0.02	0.94
0.37	0.01	0.89
0.40	0.02	0.84
0.43	0.01	0.78
0.47	0.01	0.72
0.50	0.01	0.64
0.53	0.01	0.58
0.57	0.00	0.50
0.60	0.01	0.41
0.63	0.01	0.32
0.67	0.00	0.25
0.70	0.00	0.16
0.73	0.00	0.07

Exp 4.3		
t	x	y
0.00	0.01	1.14
0.03	0.01	1.14
0.07	0.01	1.14
0.10	0.00	1.13
0.13	0.00	1.13
0.17	0.00	1.13
0.20	0.00	1.13
0.23	0.01	1.12
0.27	0.02	1.10
0.30	0.02	1.09
0.33	0.03	1.07
0.37	0.04	1.04
0.40	0.04	1.01
0.43	0.04	0.96
0.47	0.04	0.90
0.50	0.05	0.84
0.53	0.04	0.80
0.57	0.04	0.73
0.60	0.03	0.67
0.63	0.02	0.59
0.67	0.02	0.52
0.70	0.01	0.44
0.73	0.01	0.37
0.77	0.01	0.29
0.80	0.00	0.20
0.83	0.00	0.11
0.87	-0.01	0.02

Exp 4.4		
t	x	y
0.00	0.01	1.15
0.03	0.01	1.15
0.07	0.01	1.14
0.10	0.01	1.13
0.13	0.02	1.12
0.17	0.02	1.09
0.20	0.02	1.06
0.23	0.01	1.02
0.27	0.02	0.97
0.30	0.02	0.91
0.33	0.02	0.86
0.37	0.02	0.80
0.40	0.02	0.74
0.43	0.02	0.67
0.47	0.03	0.61
0.50	0.02	0.53
0.53	0.03	0.45
0.57	0.03	0.37
0.60	0.04	0.30
0.63	0.04	0.22
0.67	0.04	0.14
0.70	0.04	0.05

Exp 4.5		
t	x	y
0.00	0.00	1.15
0.03	0.00	1.14
0.07	0.01	1.14
0.10	0.01	1.14
0.13	0.01	1.13
0.17	0.01	1.12
0.20	0.01	1.09
0.23	0.00	1.06
0.27	0.00	1.02
0.30	0.01	0.98
0.33	0.01	0.93
0.37	0.01	0.87
0.40	0.00	0.82
0.43	0.01	0.76
0.47	0.01	0.68
0.50	0.01	0.61
0.53	0.01	0.54
0.57	0.01	0.46
0.60	0.01	0.38
0.63	0.01	0.30
0.67	0.01	0.22
0.70	0.01	0.11
0.73	0.01	0.04

Exp 4.6		
t	x	y
0.00	0.01	1.15
0.03	0.01	1.14
0.07	0.01	1.13
0.10	0.02	1.13
0.13	0.01	1.12
0.17	0.02	1.08
0.20	0.03	1.05
0.23	0.03	1.01
0.27	0.04	0.94
0.30	0.04	0.88
0.33	0.04	0.82
0.37	0.05	0.76
0.40	0.05	0.68
0.43	0.05	0.61
0.47	0.07	0.54
0.50	0.06	0.47
0.53	0.09	0.41
0.57	0.08	0.32
0.60	0.08	0.23
0.63	0.09	0.13
0.67	0.08	0.02

Exp 5.1		
t	x	y
0.00	0.01	1.14
0.03	0.01	1.13
0.07	0.01	1.12
0.10	0.00	1.10
0.13	0.00	1.07
0.17	0.00	1.03
0.20	0.01	0.99
0.23	0.01	0.94
0.27	0.01	0.88
0.30	0.02	0.81
0.33	0.02	0.75
0.37	0.02	0.67
0.40	0.02	0.59
0.43	0.02	0.52
0.47	0.02	0.43
0.50	0.02	0.33
0.53	0.02	0.26
0.57	0.02	0.16
0.60	0.02	0.08
0.63	0.02	0.00

Exp 5.2		
t	x	y
0.00	0.00	1.14
0.03	0.00	1.13
0.07	0.00	1.12
0.10	0.00	1.11
0.13	-0.01	1.08
0.17	-0.01	1.05
0.20	-0.01	1.01
0.23	0.00	0.96
0.27	0.00	0.91
0.30	0.01	0.85
0.33	0.01	0.78
0.37	0.02	0.71
0.40	0.02	0.65
0.43	0.02	0.58
0.47	0.02	0.49
0.50	0.00	0.41
0.53	-0.01	0.33
0.57	0.01	0.24
0.60	0.00	0.16
0.63	0.00	0.07
0.67	-0.01	0.00

Exp 5.3		
t	x	y
0.00	0.01	1.15
0.03	0.01	1.14
0.07	0.01	1.13
0.10	0.01	1.12
0.13	0.01	1.08
0.17	0.01	1.05
0.20	0.01	1.00
0.23	0.00	0.95
0.27	0.00	0.91
0.30	0.00	0.87
0.33	0.00	0.79
0.37	0.00	0.74
0.40	0.00	0.65
0.43	0.00	0.58
0.47	0.00	0.51
0.50	0.00	0.43
0.53	0.00	0.34
0.57	0.00	0.27
0.60	-0.01	0.18
0.63	-0.01	0.08
0.67	-0.01	0.00

Exp 5.4		
t	x	y
0.00	0.01	1.13
0.03	0.01	1.12
0.07	0.01	1.10
0.10	0.01	1.07
0.13	0.01	1.03
0.17	0.01	0.99
0.20	0.01	0.95
0.23	0.01	0.91
0.27	0.01	0.85
0.30	0.01	0.78
0.33	0.02	0.70
0.37	0.02	0.64
0.40	0.02	0.57
0.43	0.02	0.50
0.47	0.03	0.42
0.50	0.03	0.32
0.53	0.03	0.25
0.57	0.04	0.14
0.60	0.04	0.07

Exp 5.5		
t	x	y
0.00	0.00	1.14
0.03	0.00	1.13
0.07	0.00	1.13
0.10	0.00	1.13
0.13	0.00	1.12
0.17	0.01	1.10
0.20	0.01	1.07
0.23	0.01	1.04
0.27	0.00	0.99
0.30	0.01	0.95
0.33	0.01	0.89
0.37	0.01	0.84
0.40	0.02	0.77
0.43	0.01	0.71
0.47	0.01	0.64
0.50	0.02	0.57
0.53	0.01	0.49
0.57	0.01	0.39
0.60	0.02	0.31
0.63	0.01	0.22
0.67	0.01	0.13
0.70	0.02	0.02

Exp 5.6		
t	x	y
0.00	0.01	1.14
0.03	0.01	1.14
0.07	0.01	1.12
0.10	0.01	1.10
0.13	0.01	1.07
0.17	0.01	1.03
0.20	0.02	0.98
0.23	0.02	0.93
0.27	0.02	0.88
0.30	0.02	0.83
0.33	0.02	0.76
0.37	0.02	0.72
0.40	0.03	0.62
0.43	0.03	0.56
0.47	0.02	0.49
0.50	0.02	0.40
0.53	0.01	0.31
0.57	0.01	0.24
0.60	0.01	0.15
0.63	0.01	0.06

Exp 6.1		
t	x	y
0.00	0.01	1.13
0.03	0.01	1.14
0.07	0.01	1.12
0.10	0.01	1.10
0.13	0.01	1.07
0.17	0.01	1.02
0.20	0.01	0.96
0.23	0.02	0.91
0.27	0.02	0.85
0.30	0.02	0.80
0.33	0.02	0.74
0.37	0.02	0.65
0.40	0.02	0.58
0.43	0.02	0.48
0.47	0.02	0.38
0.50	0.02	0.28
0.53	0.03	0.19
0.57	0.03	0.13
0.60	0.03	0.02

Exp 6.2		
t	x	y
0.00	0.01	1.14
0.03	0.01	1.14
0.07	0.01	1.13
0.10	0.01	1.11
0.13	0.01	1.10
0.17	0.01	1.07
0.20	0.01	1.03
0.23	0.01	0.99
0.27	0.01	0.91
0.30	0.01	0.86
0.33	0.01	0.80
0.37	0.02	0.73
0.40	0.02	0.66
0.43	0.02	0.58
0.47	0.02	0.49
0.50	0.02	0.40
0.53	0.03	0.32
0.57	0.02	0.22
0.60	0.03	0.11
0.63	0.03	0.01

Exp 6.3		
t	x	y
0.00	0.02	1.14
0.03	0.01	1.13
0.07	0.02	1.12
0.10	0.02	1.11
0.13	0.02	1.11
0.17	0.02	1.08
0.20	0.02	1.05
0.23	0.03	1.02
0.27	0.04	0.97
0.30	0.05	0.91
0.33	0.04	0.85
0.37	0.05	0.78
0.40	0.05	0.71
0.43	0.05	0.63
0.47	0.05	0.55
0.50	0.05	0.48
0.53	0.05	0.37
0.57	0.05	0.28
0.60	0.06	0.17
0.63	0.06	0.07

Exp 6.4		
t	x	y
0.00	0.01	1.14
0.03	0.01	1.13
0.07	0.01	1.11
0.10	0.01	1.08
0.13	0.01	1.05
0.17	0.01	1.02
0.20	0.02	0.96
0.23	0.02	0.90
0.27	0.02	0.84
0.30	0.02	0.78
0.33	0.03	0.72
0.37	0.02	0.61
0.40	0.02	0.53
0.43	0.02	0.44
0.47	0.02	0.35
0.50	0.02	0.27
0.53	0.03	0.18
0.57	0.02	0.07

Exp 6.5		
t	x	y
0.00	0.00	1.13
0.03	0.01	1.11
0.07	0.01	1.09
0.10	0.01	1.06
0.13	0.01	1.02
0.17	0.02	0.97
0.20	0.03	0.91
0.23	0.03	0.85
0.27	0.03	0.79
0.30	0.04	0.73
0.33	0.03	0.65
0.37	0.03	0.59
0.40	0.04	0.49
0.43	0.04	0.38
0.47	0.05	0.29
0.50	0.04	0.19
0.53	0.04	0.09
0.57	0.04	0.01

Exp 6.6		
t	x	y
0.00	0.01	1.14
0.03	0.01	1.13
0.07	0.01	1.11
0.10	0.01	1.09
0.13	0.02	1.07
0.17	0.01	1.02
0.20	0.02	0.99
0.23	0.02	0.94
0.27	0.02	0.88
0.30	0.02	0.83
0.33	0.01	0.76
0.37	0.02	0.67
0.40	0.03	0.59
0.43	0.04	0.53
0.47	0.03	0.44
0.50	0.03	0.34
0.53	0.03	0.25
0.57	0.03	0.15
0.60	0.04	0.05

Exp 7.1		
t	x	y
0.00	0.02	1.14
0.03	0.02	1.13
0.07	0.02	1.12
0.10	0.02	1.10
0.13	0.02	1.06
0.17	0.02	1.03
0.20	0.02	0.99
0.23	0.02	0.93
0.27	0.03	0.86
0.30	0.03	0.80
0.33	0.02	0.73
0.37	0.03	0.65
0.40	0.02	0.57
0.43	0.03	0.48
0.47	0.02	0.39
0.50	0.03	0.28
0.53	0.01	0.19
0.57	0.02	0.07

Exp 7.2		
t	x	y
0.00	0.01	1.14
0.03	0.01	1.13
0.07	0.01	1.10
0.10	0.02	1.08
0.13	0.02	1.04
0.17	0.02	1.00
0.20	0.04	0.95
0.23	0.04	0.89
0.27	0.04	0.82
0.30	0.04	0.75
0.33	0.03	0.66
0.37	0.04	0.57
0.40	0.05	0.47
0.43	0.04	0.38
0.47	0.05	0.29
0.50	0.05	0.18
0.53	0.04	0.07

Exp 7.3		
t	x	y
0.00	0.02	1.15
0.03	0.02	1.14
0.07	0.01	1.13
0.10	0.01	1.12
0.13	0.01	1.09
0.17	0.01	1.06
0.20	0.01	1.02
0.23	0.02	0.97
0.27	0.02	0.91
0.30	0.02	0.84
0.33	0.02	0.76
0.37	0.03	0.69
0.40	0.02	0.63
0.43	0.01	0.54
0.47	0.02	0.42
0.50	0.02	0.32
0.53	0.02	0.21
0.57	0.02	0.11
0.60	0.03	0.01

Exp 7.4		
t	x	y
0.00	0.01	1.13
0.03	0.01	1.12
0.07	0.01	1.11
0.10	0.02	1.07
0.13	0.02	1.04
0.17	0.02	0.99
0.20	0.02	0.94
0.23	0.02	0.88
0.27	0.03	0.81
0.30	0.04	0.74
0.33	0.04	0.66
0.37	0.04	0.59
0.40	0.04	0.51
0.43	0.05	0.40
0.47	0.05	0.30
0.50	0.04	0.20
0.53	0.04	0.10
0.57	0.03	0.01

Exp 7.5		
t	x	y
0.00	0.01	1.15
0.03	0.01	1.14
0.07	0.01	1.13
0.10	0.01	1.11
0.13	0.01	1.08
0.17	0.01	1.05
0.20	0.01	1.00
0.23	0.01	0.94
0.27	0.02	0.88
0.30	0.02	0.81
0.33	0.02	0.75
0.37	0.03	0.68
0.40	0.02	0.60
0.43	0.01	0.53
0.47	0.03	0.42
0.50	0.03	0.31
0.53	0.03	0.21
0.57	0.03	0.10

Exp 7.6		
t	x	y
0.00	0.01	1.13
0.03	0.01	1.12
0.07	0.01	1.10
0.10	0.01	1.08
0.13	0.01	1.04
0.17	0.01	1.00
0.20	0.01	0.94
0.23	0.02	0.88
0.27	0.02	0.82
0.30	0.02	0.75
0.33	0.02	0.67
0.37	0.02	0.61
0.40	0.02	0.50
0.43	0.01	0.41
0.47	0.02	0.32
0.50	0.02	0.22
0.53	0.02	0.12
0.57	0.02	0.01