Name:

Partner:

AP Physics C
M. Lam

Coffee Filter Lab

Block:

Objective
Investigate the relationship between the terminal speed of a stack of falling paper coffee filters and its mass.

Introduction
1. What is the acceleration of an object when it is traveling at its terminal velocity?

2. When an object is at terminal velocity, how does that object's weight relate to the air resistance on that object?

3. There are two common models for drag force:
   1. $F_D = bv$
   2. $F_D = Cv^2$

   For each model, determine the terminal velocity in terms of *m*, *g*, and constants *b* and *C*.

4. Knowing the distance the coffee filter fell while at terminal velocity and the time it took the coffee filter to fall, how could you calculate its terminal velocity?

Experimental Method
Mark a point about 1.5 metres above the ground. If a stack of coffee filters is dropped well above this point, the stack should reach terminal velocity before reaching this height. Describe the overall procedure to be used to determine the relationship between the terminal velocity and mass for a stack of falling coffee filters. Be sure to address how experimental uncertainty could be reduced.

Data
Include a table of the raw data. Include all calculated data for the linearized plot.

Analysis and Discussion
Determine the relationship between terminal velocity and mass. Your report should include the following:

- A plot of the original data
- A linearized plot
- A statement about the relationship between the variables
- The equation of your best fit line
- The slope of your best fit line (include units)
- The equation for the drag force including the value of the constant *b* or *C*.

Component	Criterion	Weight	Mark
Introduction	*Objective and introductory questions*	1	
Experimental Method	*Experimental method which implements a method to reduce uncertainty*	1	
Data	*Data quality and presentation*	2	
Analysis and Discussion	*Plot of the original data*	1	
	Linearized plot and a statement about the relationship between the variables	1	
	Slope of the linearized plot with correct units	1	
	Equation for the drag force including the value of the constant b or C	1	
	At least two significant sources of error	1	
Conclusion	*Summary of the experiment and final results*	1	
TOTAL		10	