Name: _____Period: _____ Date: _____ EN: _____

Watch the Skydiving video and take notes: http://www.youtube.com/watch?v=ur40O6nQHsw

Question: Does the _____ of an object affect its _____ _____?

What is terminal velocity:

Free body diagram of coffee filter:

Hypothesis/Testable Prediction: If the mass **increases** then the terminal velocity will

_____ (increase, remain constant, decrease) because the force of gravity will_____

(increase, remain constant, decrease) and the friction force will _____ (increase, remain constant, decrease)

Procedure:
1. Measure a reference height against an open wall that is greater than 1.5 m above the ground and record this height. _____ m
2. Begin dropping coffee filters from the above distance in order for the filter to reach terminal by 1.5 m.
3. Begin timing the coffee filter when the filter passes the 1.5 m mark.
4. Stop timing when the filter hits the ground.
5. Repeat 3 times.
6. Repeat this procedure with 2, then 3, then 4….all the way up to 8 filters.
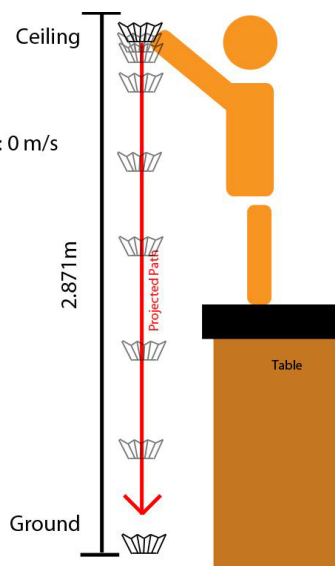
Terminal Velocity Lab Apparatus

Ni Hao TEAM

Recorder   Timer

Ceiling

Release Velocity : 0 m/s

2.871m

Projected Path

Table

Ground

Independent Variable:
_____

Dependent Variable:
_____

DV goes on the _____ axis.

RESULTS

# of filters	1	2	3	4	5	6	7	8
Trial #1 time (sec)								
Trial #1 time (sec)								
Trial #1 time (sec)								
Average time (sec)								

Record the mass of 8 filters and then divide by 8 to get the average mass for one filter.

Since Terminal Velocity is constant, calculate the velocity of falling by using the formula d = v x t.
Manipulate the formula here to get velocity:

# of filters	Mass (grams)	Average Velocity (m/sec)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

TRENDS: _____

Graph your results using a best-fit line: Don't forget title, units, labels, and largest scale possible!

What is the slope of your line? Steep or shallow.

What is the actual value? Remember the formula: y_2-y_1/x_2-x_1
    Show your work on the graph:

A large value for slope means there is a high correlation or effect between the two variables. Is there a high or low correlation between mass and terminal velocity?

CLAIM: (make a claim based on your evidence)

Evidence: primary data that you collected or data from a reliable source including observations of the natural world	Reasoning: Information that explains how the evidence supports your claim. Often includes scientific background from the text, lecture or other source.

Alternative Claim: Mass does not affect terminal velocity: Think of Neil Armstrong's experiment on the moon: http://www.youtube.com/watch?v=5C5_dOEyAfk

    Notes on video:

Rebuttal: How would you explain what happened on the moon?

CHALLENGE REBUTTAL: Explain why these two balls of different mass hit the ground at the same time. http://www.youtube.com/watch?v=_mCC-68LyZM :Misconception about Falling Objects

    Notes on video:

Answer these post lab questions in complete sentences:

1. Was the rate of acceleration in this lab greater, less than or equal to the acceleration of gravity? Explain in terms of Newton's second law. F = ma

2. What would you think would happen if one coffee filter had been wadded up and then released? Would it take the same amount of time to fall as the unwadded filter paper? Explain

3. Upon reaching **terminal velocity**, which would have a higher final air resistance: wadded or unwadded coffee filter? Or is there no difference?   Make a model (Draw a force diagram) to explain.

4. Would the paper wad's terminal velocity be less, the same, or greater than its terminal velocity obtained in the experiment? Explain

Extension activity:
http://www.education.com/science-fair/article/terminal-velocity-falling-slowly/