**Unit 5 - Lab 3**

**Air Resistance**

**Pre-lab Questions**

1. Draw a system schema and force diagram for a coffee filter falling to the floor.
2. Describe the motion of the coffee filter as it falls.
3. What evidence would you need to collect to support your description? How would you collect this?

**Equipment**

* Paper coffee filters
* Meter stick
* Camera and video analysis software (LoggerPro or VideoPhysics app)

**General Procedure**

You will be using video analysis software to analyze the motion of a coffee filter as it falls to the floor. Some things to remember:

* keep the camera stationary
* place a meter stick in the background so it can be used for scale

This software will give you data for horizontal and vertical position, and horizontal and vertical velocity based on the points you mark. We only need to analyze the vertical motion of the filter.

Since we know that mass and gravitational force are related, you should measure the mass of the coffee filter. You may collect multiple data sets using a different number of coffee filters for comparison.

**Data**

On the axes below, label and sketch the collected graph of vertical position vs. time. What does this graph tell you?

#### 

**Discussion Questions**

1. How many coffee filters were used to obtain the previous data set? What was the total mass of these coffee filters? What would the force of gravity be for these coffee filters?
2. What does the graph tell you about the motion of the coffee filter as it falls? How do you know?
3. What does your answer to #2 tell you about the air resistance acting on the coffee filter as it falls?
4. Compare your data with that of another lab group who used a different number of coffee filters. What is similar? What is different?

1. Collect data for several numbers of coffee filters. This may require you to record more video to analyze. Use this data to complete the following table.

|  |  |  |
| --- | --- | --- |
| **Mass of Coffee Filters (kg)** | **Fg (N)** | **Terminal Velocity (m/s)** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

1. Construct and label a graph of Fg vs Terminal Velocity on the axes below. What does this graph tell you?