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**(Example data at end)**

**QUESTIONS:**

1. The interval between the starting point and the first spark was not used in this lab. This was because the first interval was not a complete time interval of 1/60 th of a second. Explain why.
2. Does the falling weight have a velocity when it is at the spark mark labeled zero? If there is a velocity, use your graphs to estimate what that velocity is.
3. Find the area under the graphed line from the y-intercept up to the last graphed point down to the x-axis.

a triangle = \_\_\_\_\_\_\_\_

a = l \* w

a = ½ b h

a rectangle = \_\_\_\_\_\_\_\_

a total = \_\_\_\_\_\_\_\_

* 1. Compare these values to the total displacement after twenty time intervals for each graph. Provide thoughtful comments on your comparisons.
  2. What does this calculation of area indicate about the relationship between the area under a v-t curve and the total displacement of the falling object?
  3. Express this relationship as an equation, using the appropriate variables.

1. Calculate the slope of the v-t graph for the mass.

slope100 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What does the slope of the graph measure?
2. Does the mass of an object effect the acceleration caused by the force of gravity. Explain.

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| Spark Interval | Elapsed Time (s) | Time of Interval (s) | Total Δd (m) | Δd during spark interval (m) | Average velocity during spark interval (m/s) | Average acceleration during spark interval (m/s2) |
| 1 | 1/60 = .0167 | .0167 | **.003** |  |  |  |
| 2 | 2/60 = .0333 | .0167 | **.008** |  |  |  |
| 3 | 3/60 = .0500 | .0167 | **.015** |  |  |  |
| 4 | 4/60 = .0667 | .0167 | **.024** |  |  |  |
| 5 | 5/60 = .0833 | .0167 | **.042** |  |  |  |
| 6 | 6/60 = .1000 | .0167 | **.059** |  |  |  |
| 7 | 7/60 = .1167 | .0167 | **.074** |  |  |  |
| 8 | 8/60 = .1333 | .0167 | **.094** |  |  |  |
| 9 | 9/60 = .1500 | .0167 | **.119** |  |  |  |
| 10 | 10/60 = .1667 | .0167 | **.146** |  |  |  |
| 11 | 11/60 = .1833 | .0167 | **.185** |  |  |  |
| 12 | 12/60 = .2000 | .0167 | **.210** |  |  |  |
| 13 | 13/60 = .2167 | .0167 | **.240** |  |  |  |
| 14 | 14/60 = .2333 | .0167 | **.280** |  |  |  |
| 15 | 15/60 = .2500 | .0167 | **.320** |  |  |  |
| 16 | 16/60 = .2667 | .0167 | **.360** |  |  |  |
| 17 | 17/60 = .2833 | .0167 | **.410** |  |  |  |
| 18 | 18/60 = .3000 | .0167 | **.455** |  |  |  |
| 19 | 19/60 = .3167 | .0167 | **.505** |  |  |  |
| 20 | 20/60 = .3333 | .0167 | **.565** |  |  |  |
| Average Velocity for the Total Δd | | | |  |  |  |

1. **Evaluation:** Calculate the average velocity for each interval by dividing the displacement by the time for each respective interval.
2. Calculate the interval displacements for the entire fall by subtracting the displacements for each interval together. Record this value on the last line of the data table.
3. Also calculate the average velocity & acceleration for the total displacement. Record on the data table.
4. Create a v-t graph for 100-g mass. Determine the slope of the line, showing the points used and the calculation on your graph.