***Lab 9.2 Acceleration of a Toy Car***

**Problem:**

How does a velocity-time graph look like for uniform acceleration?

**Materials:**

* ticker tape apparatus, paper tape, toy car, string, weights, ruler

**Procedure:**

1. Put the ticker tape on the table.

2. Insert the paper tape inside the ticker tape apparatus and connect it to the car.

3. Put weights on the string and tie them to the car.

4. Hang the weights outside the table. Hold them first.

5. Turn on the ticker tape and release the weights.

6. Try **two** different weights and repeat the procedure. Remember, each time you use different weights you need to change a new paper tape.

7. Clean up and put away the equipment you have used.

8. After the lab, take 6 dots as an interval (0.1 s) and mark them.

9. Repeat step 8 until you have completed the paper tape.

10. Use a ruler to measure each interval and record the numbers.

**Graphing the data:**

1. Use the equation Vaverage = △d/△t to calculate the average velocity for each of the 0.1s time intervals.

2. Plot a velocity-time graph for the data you have collected. Remember to add sub-titles for the graph. After you have drawn all the dots on your graph, connect them with a **best-fit line**.

**Data Table:**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Time Interval(s)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-0.6** | **0.6-0.7** | **0.7-0.8** | **0.8-0.9** | **0.9-1.0** |
| **Displacement(m)** |  |  |  |  |  |  |  |  |  |  |
| **Average Velocity(m/s)** |  |  |  |  |  |  |  |  |  |  |

*Table 1. Weight: \_\_\_\_\_\_\_\_\_\_\_*

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Time Interval(s)** | **0-0.1** | **0.1-0.2** | **0.2-0.3** | **0.3-0.4** | **0.4-0.5** | **0.5-0.6** | **0.6-0.7** | **0.7-0.8** | **0.8-0.9** | **0.9-1.0** |
| **Displacement(m)** |  |  |  |  |  |  |  |  |  |  |
| **Average Velocity(m/s)** |  |  |  |  |  |  |  |  |  |  |

*Table 2. Weight: \_\_\_\_\_\_\_\_\_\_\_*

**Graph:**

**Sample Calculations:**

**Slope of the line = rise/run = (*y2 – y1) / (x2 – x1):***

**Questions:**

1. Calculate the slope of your velocity-time graph. Be sure to include the correct units. (Choose two points on your graph and form a triangle showing rise and run.)

2. What is the average acceleration of the cart down the ramp?

3. Was the cart’s acceleration perfectly constant? Explain your answer.

**Conclusion:**

If you were to repeat your experiment with a steep ramp (Appendix A), how would the slope of the new motion compare with the original slope? Explain your answer.

**Appendix A:**

