Science 2204

CORE LAB #1: AVERAGE SPEED OF UNIFORM MOTION

Question: What is the average speed of the object in uniform motion

MATERIALS:

- Ticker Tape
- Constant Velocity Car
- Adhesive Tape
- Carbon paper disc
- Roll of Tape
- 1m to 2m smooth surface
- Meter Stick

TICKER TAPE INSTRUCTIONS:

- **Use about 1 m of tape, perhaps a bit less**
- **Assume that the timer makes 60 dots per second (60 Hz = AC electrical frequency)**
- **Draw a line through every 6 dots (so that there are 6 intervals between dots) this distance corresponds to 0.1 second.**
- **For distance, measure distance from the end of the tape to each line.**

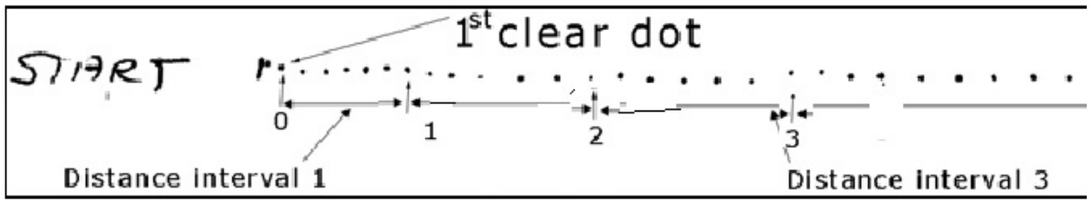

Figure 2

PROCEDURE:

1. Find a clean and flat surface in the classroom

2. Place carbon paper disc on the ticker time. Ensure that the carbon side is facing down.

3. Feed 1 m of ticker tape through the ticker timer.

4. Write "**Start"** on the end of the ticker tape and attached to the vehicle.

5. Start the ticker time and the car. Please, ensure that someone is there to catch the vehicle after the tape has run through the ticker timer.

6. Some of the dots at the start of the tape are crowded, select the first dot that is distinguished from all of the initial dots, mark this dot as "0".

7. Count off six more dots, mark this dot as "1". These numbers represent the distance traveled by the vehicle over an elapsed period of time of 0.10 seconds

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8. Measure the distance in centimeters between dot '0" and dot "1". Record this in Table 1 as the distance for time 0.1 seconds. Measure the successive distance intervals recording the displacements in the table.

9. Use the data from table 1 to create a distance - time graph on **page 2** . Draw a line of best fit.

10. Identify the independent and dependent variable for the d-t graph ***(Question 1on page 3)***?

10. What does the slope of this d-t graph represent? Convert your answer to m/s ***(Question 2 on page 3)***

11. How would the d-t graph change if you moved slower? ***(Question 3 on page 3)***

12. Create a velocity versus time graph. Make sure that you properly label the graph on **page 4.**

13. Calculate the slope of v-t graph. ***(Question 4 on page 4)***

14. What does the slope of the v-t graph represent? ***(Question 5 on page 4)***

15. Calculate the area under the graph from 0 s to 6 s. ***(Question 6 on page 4)***

16. What does the area under v-t graph represent? ***(Question 7 on page 4)***

17. Answer the discussion questions

18. Write an AWESOME conclusion

DATA/ CALCULATIONS:

Table 1: Motion of the cart **[1]**

t (s)	d (cm)
0	0
0.1	
0.2	
0.3	
0.4	
0.5	
0.6	
0.7	

Plot distance-time **[3]**

d-t Graph

1. Which is the independent and dependent variable? **[1]**

2. Calculate the slope of the best- fit straight line to determine the average speed in meters per second? **[2]**

3. How would the d-t graph change if you moved slower? **[2]**

Draw a v-t graph **[2]**

4. Determine the slope of the v-t graph? **[1]**

5. What does the slope of the v-t graph represent? **[1]**

6. Calculate the area under graph from 0s to 0.6 s? **[2]**

7. What does the area under v-t graph represent? **[1]**

ANSWER TO DISCUSSIONS QUESTIONS:

1. If your points did not line up in a straight line on the d-t graph, explain possible reasons for this? **[2]**

2. Did your car travel at a constant speed in this investigation? How did you know? **[2]**

3. The accepted value for the Constant Velocity Car is 40cm/s. What is the percent discrepancy? **[2]**

$$\text{Percent of Error} = \left| \frac{\text{measured value - actual value}}{\text{actual value}} \cdot 100\% \right|$$

CONCLUSION: **[10]**