Acceleration Lab

Name_____**Date**_____**Group**_____**Period**___

In the last activity you calculated the average speed of the car. You discovered that the speed was changing as the total distance traveled was changing. In this activity we will determine the instantaneous speed of the car at several places as it rolls down the ramp.

Problem: What effect does the location on the ramp where the speed is measured, have on the speed of the car at that location ?

Hypothesis:If_____

_____

Variables: By the time you finish this experiment ,you will need to identify the different types of variables present in this investigation. Consult your notes for definitions of the types of variables.

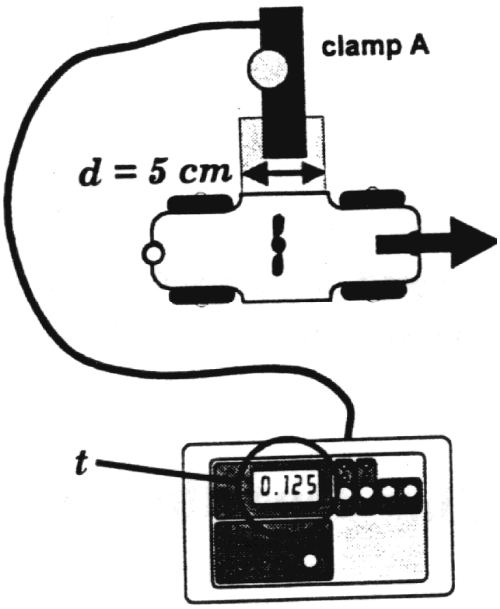
Independent Variables:_____

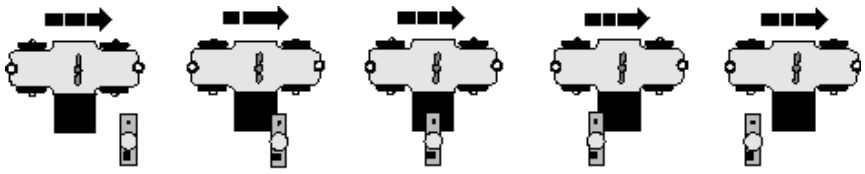
Dependent Variables:_____

Controlled Variables:_____

In this activity you will describe any changes in the speed of the Car as it rolls down the Ramp.

Here is how the lab works.





The wing on the Car breaks the light beam as it passes through the Clamp.

Two pieces of information are needed to find the speed of the Car.

1. The distance traveled

2. The time taken.

Refer to numbered steps in above diagram for what happens below!

1. Before the Car gets to the Clamp the Timer does not count since the light beam is not broken.
2. The Timer starts counting (at 0 seconds) as soon as the wing breaks the light beam.
3. The Timer keeps counting as long as the light beam stays broken.
4. The Timer stops counting as soon as the wing passes the light beam.
5. The Timer shows the time that the light beam was broken.

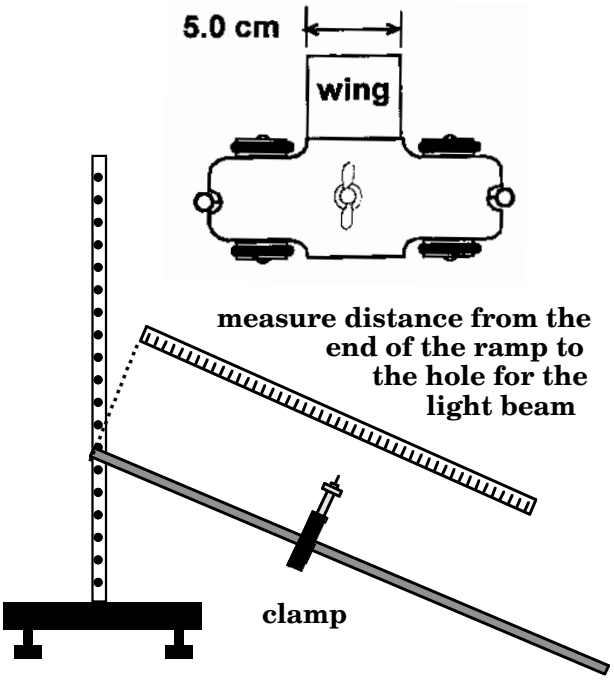
Set up Procedures:
Attach one Clamp to input A of the Timer and turn the A light on so the Timer shows the length of time (t) that the beam is broken in Clamp A. Remember to set the Timer in interval mode.

As the Car passes through the Clamp the Timer starts and stops. The Timer measures the length of time that the light beam was broken. The Car moves a distance equal to the width of the wing during the time that the light beam is broken.

During the time that the Timer is counting the Car moves a distance exactly equal to the width of the wing. This is because it is the wing itself that starts and stops the Timer.

The distance traveled is the width of the wing (5 cm) and the time taken is the time from Clamp A. The speed is then:

$$\text{speed} = \frac{5\text{ cm}}{\text{time from clamp A}}$$



To do the experiment

1. Put the Clamp on the Ramp and use a ruler to measure where it is. Measure from the top of the Ramp to the center of the hole for the light beam.

2. Roll the Car down. Be sure to start the Car from the highest place it will go.

3. Calculate the speed of the Car from the time measurement you get from Clamp A.

4. Move the Clamp to another place and measure the distance and speed.

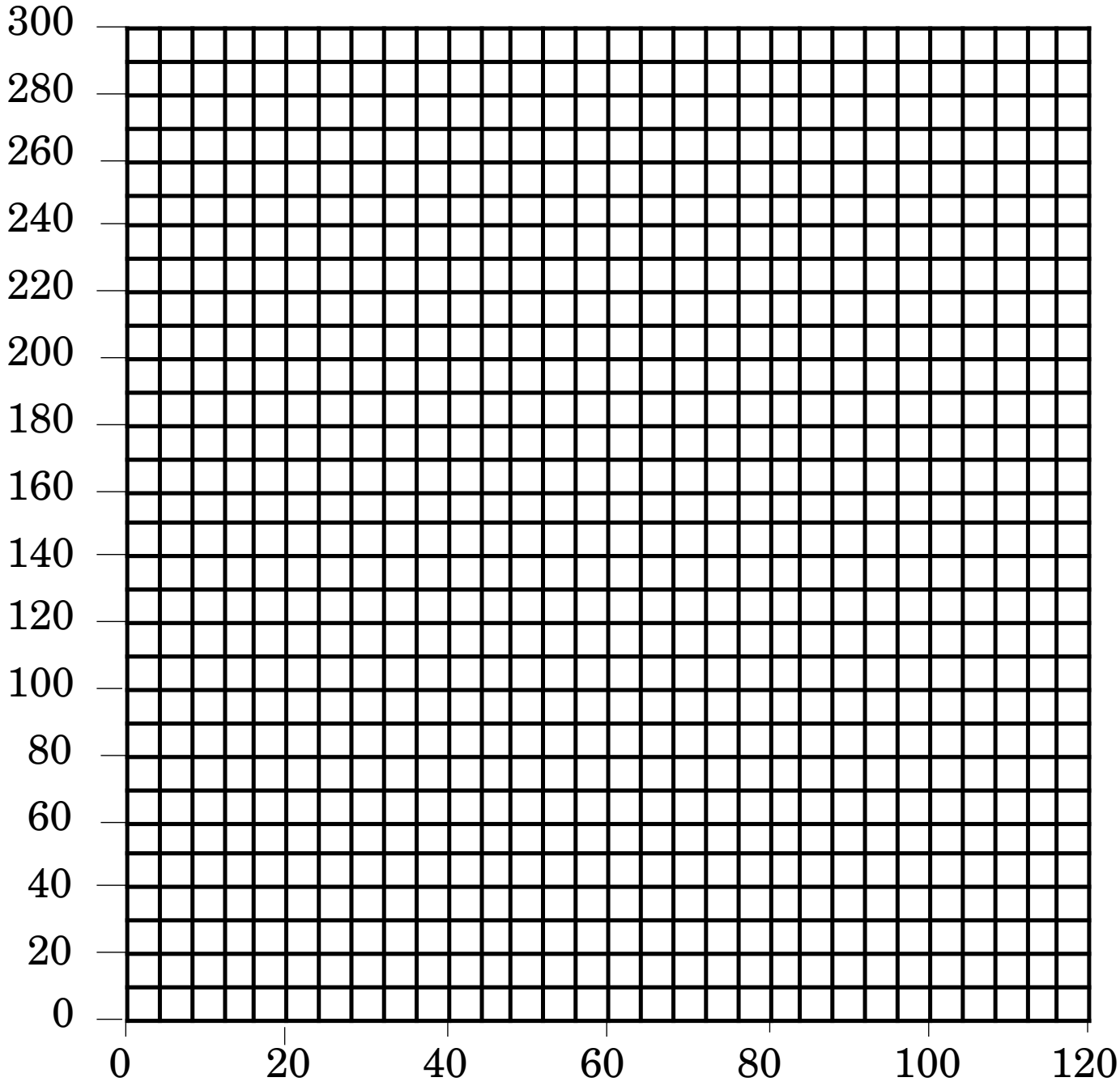
5. Repeat the measurements of distance and speed for at least 6 different places on the Ramp.

• Put either 1 or 2 weights on the car.
• Use the 5th hole from the bottom of the stand .

Trial #	Position of Clamp A from top of ramp (nearest 0.1 cm)	Time from Clamp A (nearest 0.0001 sec.)	Distance traveled by the car ,width of wing (nearest 0.1 cm)	Speed of the car (nearest 0.1 cm/ sec)
1				
2				
3				
4				
5				
6				
7				

• Use your data from the previous chart to construct a best–fit line graph, which shows how the speed of the Car changes as it rolls down the Ramp. Put "Speed of the car" on the y-axis and "Position of Clamp A from top of ramp" on the x-axis. Include the proper units for speed and position.

Title_____



Question

From your speed calculations, and by looking at the graph, what can you say happens to the speed of the car as it moves down the ramp?

Overall Conclusion: State if your original hypothesis was correct or incorrect using specific references from the lab to support your answer.

Sources of Error : Identify two things that people may have done incorrectly that would have caused them to get totally different answers from the rest of the class. These errors must be unique, in other words they have not been applicable in previous labs. They must be new sources of error. Be specific about what might have been done.