Ramp Angle Acceleration Lab

Name _____ **Date** _____ **EN_____**

Question: How does changing the angle of an incline influence the velocity and acceleration of an object rolling down it?

Hypothesis: If _____

Materials: incline (hot wheels track), timer, meter stick, three textbooks, rolling objects (car/marble)

Procedure:
1. Set up an inclined plane at an angle of _____ **degrees**.
2. Measure the exact length of the incline in centimeters to the nearest tenth of a centimeter (one decimal place).
3. Place your car at the very top of the incline and allow your object to roll down the incline. Record the exact amount of time that is required to go from top to bottom.
4. Repeat step three two more times.
5. Calculate the average **velocity** and **acceleration** of your object down the incline by using the formulas from class. $V = D / T$ and $A = V_f - V_o / t$
6. Repeat steps one through five for your object – but change the angle of the incline to _____ **degrees**
7. Again, repeat steps one through five for the object at an angle of _____ **degrees**.
8. Repeat procedure steps one through seven with a different object of different mass (car and marble).

Data:

Rolling object – Car

Incline Angle	Time Trial 1	Time Trial 2	Time Trial 3	Average Time for three trials	Distance of incline plane (cm)	Velocity (cm/s) (average of your three trials)	Acceleration (cm/s^2) (average of your three trials)
_____ °							
_____ °							
_____ °							

Rolling object – Marble

Incline Angle	Time Trial 1	Time Trial 2	Time Trial 3	Average Time for three trials	Distance of incline plane (cm)	Velocity (cm/s) (average of your three trials)	Acceleration (cm/s^2) (average of your three trials)
_____ °							
_____ °							
_____ °							

Graphing Section
** Construct a graph for **acceleration** of the car at the different angles of the incline. This should be a line graph.

Conclusion Questions:

1. How did changing the slope of the incline change your velocity and acceleration values?

2. How did the acceleration of the car compare to the acceleration of the marble. Explain similarities or differences.

3. What force(s) caused the object to roll down the incline?

4. Would increasing the mass of the object rolling increase or decrease its acceleration down the ramp? Explain.

5. Think about the motion of the object as it rolls down the ramp. Place an X in the box that you think will be the higher number value for each.

	First ½ of Ramp	**Second ½ of Ramp**
Amt. Time		
Velocity		
Acceleration		

6. At what point on the ramp is the object at its highest velocity? Explain.

7. What ramp angle would result in an acceleration be 9.8 m/s^2?

8. Construct the following to show the motion of the object as it travels down the ramp:

Particle Diagram	**P-T Graph**	**V-T Graph**

9. Using a similar procedure, what question could you ask next in your next experiment?