Uniform Motion Lab
IB Physics SL – Fall 2013

Purpose: In this lab, we will first study the relationship between distance and time using a constant speed vehicle.

Materials: Meter stick, tape, electric cars, stopwatches

Procedure:
- Place strips of tape on the tabletop or floor at 20 cm intervals. Label them with marker or pen: 0cm, 20cm, 40cm, …, 100cm
- Turn on the electric motor in the car and set the car down about 10 cm or so behind the 0 cm line.
- When the <u>front</u> of the car reaches the 0cm line, start the stopwatches. Stop the stopwatches when the <u>front</u> of the car reaches the 20cm mark.
- Complete at least 3 trials. Record each time and calculate the average time of the watches as the time for the car to travel 20cm.
- Repeat this procedure for 40cm, 60cm, 80cm, and 100cm.
- Repeat procedure with a second car.

Data: Organize in a table. Include both measurements from each trial and calculated averages.

Data Analysis (Position vs. Time graph):
- Plot your data points with distance on the vertical axis, and time on the horizontal axis.
- Include a key so you can distinguish between both cars (colors work well).
- Draw a best-fit line for each car.
- Calculate the slope of each line.
- Write the equation of each line.

Data Analysis (Average Velocity vs. Time graph):
- Plot your data points with average velocity on the vertical axis, and time on the horizontal axis.
- Include a key so you can distinguish between both cars (colors work well).
- Draw a best-fit line for each car.
- Calculate the slope of each line.
- Write the equation of each line.

Conclusion:
- What are the independent and dependent variables?
- What is the significance of the slope of your best-fit line for the first graph? Is this consistent with the units of your slope?
- Why do your lines of best-fit have different slopes?
- What are two reasons these are called "constant-velocity cars"?
- What is this type of motion called?
- What is the significance of the slope of your best-fit line for the second graph? Is this consistent with the units of the slope?
- What are possible sources of error?