Name: _____ Pd: ____

Measuring Speed, Velocity, Acceleration
(Outdoor Version: Student Locomotion)

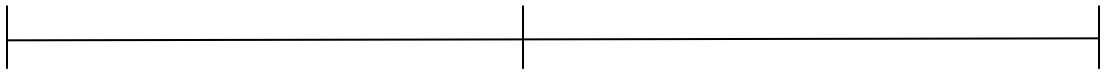
Testable Question: How do you measure velocity?

Prediction: The speed of a person running on a flat surface **_____** over time.

Materials
40 meter track stop watches meter stick/measuring tape

Directions

1. Using the meter stick, measure a track that is 40 m long. Place a mark at the half way point, 20 m. Your track should look like the diagram below.



Start **Distance A** 20 m **Distance B** 40 m

Note: Distance C is the total distance which is 40 m.

2. Have 2 people in your group serve as timers. Both should start their watches at the start. Stop the first timer at the 20 m mark. Stop the second timer at the 40 m mark. Record the times in seconds in the data table and then clear the timers. Make note that you must calculate the time for Distance B by subtracting the Distance A time from the Distance C time **(B = C – A)**.

3. Each person in the group should complete 3 trials.

Observations/Data Tables

	Distance of Run			
Time of Run in Seconds	**Trials**	**Distance A Time to Travel 20 Meters**	**Distance B Time to Travel 20 Meters**	**Distance C Time to Travel 40 Meters**
	1			
	2			
	3			
	Average Time			

HINT
(Distance C Time)
− (Distance A Time)
(Distance B Time)

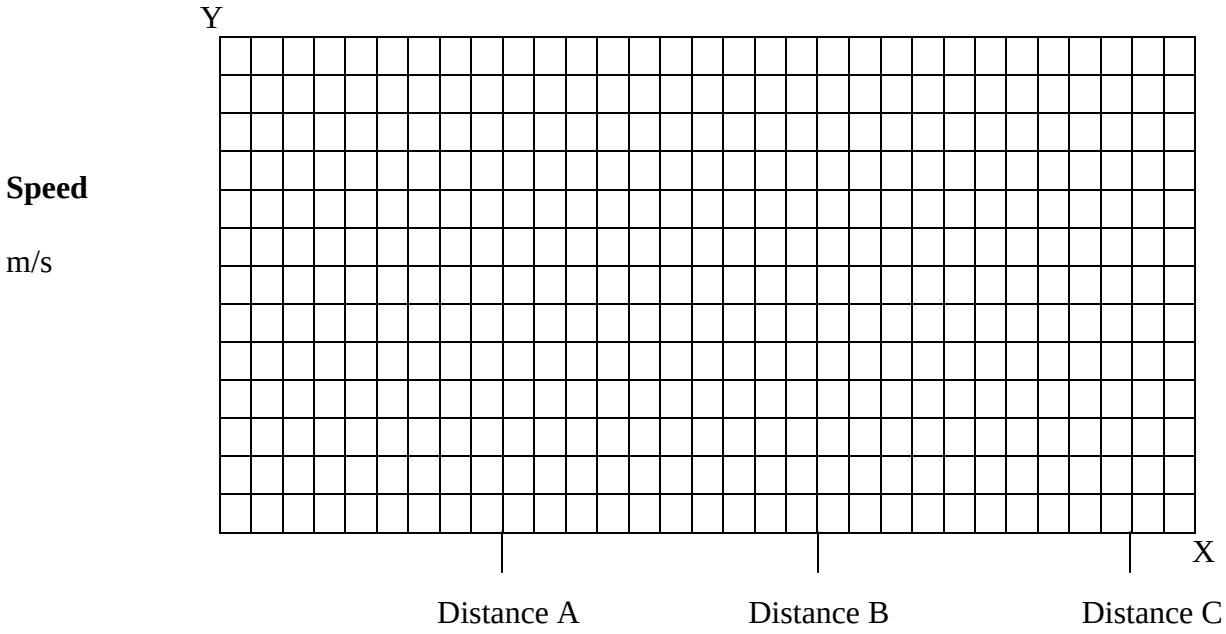
Average Time = Add up the times for Trial 1, 2, and 3 for Distance A, B, and C (respectively). Then, divide by 3 (the number of pieces of data you have). Write your answer for each in the "Average Time" space.

Velocity Calculations

$$\textbf{Average Velocity} = \frac{\textbf{Distance}}{\textbf{Average Time}} = \frac{\textbf{\# Meters}}{\textbf{Seconds}}$$

	Distance A (First 20 Meters)	**Distance B** (Second 20 Meters)	**Distance C** (Total Distance/Average Time)
Velocity (Speed) ***(Show your work)***			

Graph



Summary Questions

1. Describe what happened to the time it took you to run an equal distance as you moved farther down the track.

2. Did the velocities in this investigation remain constant? Explain your answer.

3. What factors could affect the velocity of a moving object but not the speed?

   Are there factors that could affect the speed but not the velocity?

4. The formula for acceleration is:

$$\frac{\text{Final velocity} - \text{Original velocity}}{\text{Time of change}}$$

   Use the data from the investigation to calculate the average acceleration of your run.
   (HINT: Use the velocity numbers you wrote in the box for Distances A and B on the 2nd page)

5. When we test our bumpers, why is it important to keep the velocity of each group's car constant?