Name: _____ Date: _____

A Study of Distance, Speed, and Time

Objective: To complete a 50 m course in a variety of different ways, and then determine the speed of each "runner" both computationally and graphically.

Procedure:
1. As a group, measure out a 50 m course (not necessarily in a straight line). Make sure a timer is positioned at the 10, 20, 30, 40, and 50 m marks.
2. Each of the designated runners should travel the course in a different manner. You can choose to run, walk, hop, etc.
3. The runner must ask the timers to set their stopwatches to zero before starting.
4. When ready, the runner will give a countdown and yell "Go!" at which point ALL timers start their watch.
5. For the timers: as the runner passes you, stop the watch.
6. Each timer should record the time for their interval in the chart below.
7. After running is complete, groups will return to class, construct graphs and answer the questions that follow.

Data:

Runner 1: _____ Style: _____

Distance (m)	Time (s)	Instantaneous Speed (m/s)
0	0	
10		
20		
30		
40		
50		

Runner 2: _____ Style: _____

Distance (m)	Time (s)	Instantaneous Speed (m/s)
0	0	
10		
20		
30		
40		
50		

Runner 3: _____   Style: _____

Distance (m)	Time (s)	Instantaneous Speed (m/s)
0	0	
10		
20		
30		
40		
50		

Runner 4: _____   Style: _____

Distance (m)	Time (s)	Instantaneous Speed (m/s)
0	0	
10		
20		
30		
40		
50		

Analysis and Calculations:
1. Calculate the instantaneous speed of each runner at each of the distance intervals.
2. Construct a distance vs. time graph using the data above. Use a best-fit line for each runner's points.
3. Pick any two points on the best-fit line that are NOT points that were graphed and use them to find the slope of the line. This represents the average speed.
4. Use the graph to estimate the length of time it took each runner to move 35 m. Explain how you did this.
5. Compare your average speed (slope) to the instantaneous speed for each person. Are they similar? Should they be similar?

Conclusion:
Use the shapes of the slopes to answer these questions:
1. Which runner was fastest/slowest? Explain.
2. Which runner was most consistent? Explain.
3. If someone had fallen during the run, what will happen to the shape of the graph? Why?