

Lab 1

Groups of at least 10

Objective: Determine the average velocity of an object that is moving with nearly uniform motion.

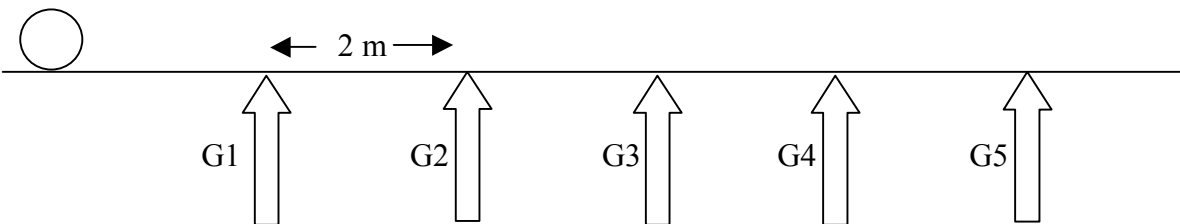
Define:
Speed

Velocity

Average Velocity

Uniform Motion

Part 1 – We will be going to the gym! Please respect other classes on the way and when we are there. We select the gym floor because it may provide the most uniform motion on campus. Is there a better place? We will take stopwatches & meter sticks & 2 bowling balls.



Someone will roll a bowling ball along a straight path. The group will determine a place for Gate 1, the position where everyone will start their timers. Two timers per “gate”.

Question: Should Gate 1 be close to the person starting the roll, or some distance away?

A distance of 2 meters should separate each gate. Mark of the 2 meters with blue tape. **Students will be assigned to measure the time it takes to travel from Gate 1 to their gate** (read that sentence again). Students should all start their timers at the exact same time, when the ball goes through Gate 1, then stop it when it passes directly in front of your gate.

Before any data is recorded, practice the run a few times. Keep the following in mind:

- The bowling ball is massive, and may cause injury
- Don't make the ball move too fast
- Do not drop the ball. Release it low to the ground, in a rolling motion
- Someone should shout out when the ball enters gate 1 so everyone starts their timers at the same time.
- Someone should stop the ball before it hits walls, humans, or items in the gym
- The three trials DO NOT have to be the same speed! We just want to see if each trial is "uniform" or not.

Gate	<u>Trial 1</u> average time	<u>Trial 2</u> average time	<u>Trial 3</u> average time
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____

Plot: Plot position vs. time using a full page. Label axis & show units. Plot all 3 sets on the same graph. Use different color marks for the different runs. Sketch the best-fit line through each data set. A best-fit line should NOT go through data points. Attach to this handout. **On a separate paper (or back)** estimate the average velocity of each trial. Show all work. Carry all units through. Compare the velocities. Rank, in order, the fastest to the slowest.

Questions:

- 1) Which trial showed the most uniform motion?
- 2) Why did you select the particular Trial in question 1?
- 3) Explain a situation with the experiment that would yield a negative velocity.
- 4) Is there any evidence from your graph of the ball changing speed? Explain.