

Individual Quizbit 3

PH201, Fall 2022

You are encouraged to discuss these questions with others, but those conversations need to be only in words. Please do not write down steps for others, draw pictures, show math steps, or consult online resources. Any work shown here should be your own thoughts and not copied from any source. You will be graded on the clarity of how well you communicate your steps and reasoning, not on absolute correctness. Hand write your solutions (paper or tablet) and turn your work into Gradescope.

Problem Statement | Consider driving along a straight horizontal road at a constant speed of 60 mph. At $t = 0$ seconds, you spot something in the road ahead of you. It then takes you about 0.320 seconds to activate the brakes. Once the brakes are activated, your car stops in a distance of about 150 feet. Assume that the car slows down uniformly when the brakes are applied.

- (a) How far (in meters) did you travel from $t = 0$ seconds to $t = 0.320$ seconds? This is the time you did not apply the brakes yet.

- (b) What is the total distance (in meters) you travelled from $t = 0$ seconds to the moment your car came to a stop?

- (c) Using the total distance you found in part (b), calculate a reasonable amount of time you should follow behind other cars while travelling at 60 mph.

- (d) Are there other human factors that would be cause to adjust your answer to part (c)? If so, how would you adjust your answer to part (c)?

Group Quizbit 3

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You will be working with your group to create a single solution for these questions. You are encouraged to think about the questions beforehand, and discussing with your classmates is encouraged, but do not bring a solution to your group's working session. You are working to develop a shared solution, with the input and problem solving skills of all your group members. You will be graded on both the clarity of how well you communicate your steps and reasoning, and on absolute correctness.

Problem Statement | When a tennis ball hits the ground it makes a sound. Consider the arrangement of tennis balls near the surface of the Earth shown in the image. Tennis ball 1 is an unknown h meters above the horizontal ground. Tennis ball 2 is $2h$ meters above the horizontal ground. Tennis balls 3, 4, and 5 are $3h$, $4h$, and $5h$ meters above the horizontal ground respectively. The tennis balls are all released from rest at the same time. Each tennis ball hits the ground once and emits one short sound. Ignore air resistance for this question.

- (a) The time interval between each successive sound will not be equal. Use words, diagrams, equations, or graphs to support why this is true.
- (b) If tennis ball 1 is 1.00 meters above the ground, sketch an arrangement of tennis balls that, if released from rest at the same time, will have equal time intervals between the sound they make hitting the ground.

