Name: Tutorial section

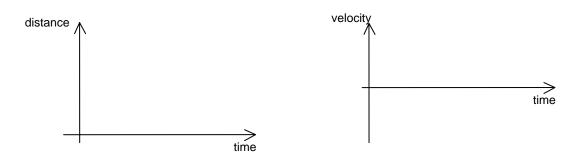
## A new mistake-catching strategy: The case of motion graphs

Today's interactive lecture demonstration, a continuation of this week's tutorial, will not only help you consolidate what you learned but will also teach you something new, the president-for-life of all mistake-avoidance strategies.

## I. Test your knowledge: an experiment

Consider a cart that

- (i) Rolls away from the detector slowly and steadily for 2 seconds, then
- (ii) Stops rolling for 2 seconds, then,
- (iii) Starts rolling away from the detector again, gradually speeding up, like a car merging onto a highway.
- A. (*Work alone*) **Prediction.** IF YOU'RE SITTING ON THE LEFT SIDE OF THE ROOM, draw a velocity graph only, using a dotted line. IF YOU'RE SITTING ON THE RIGHT SIDE OF THE ROOM, draw a position graph and also a velocity graph, using dotted lines. (Please bear with us; we're doing an experiment about learning.)

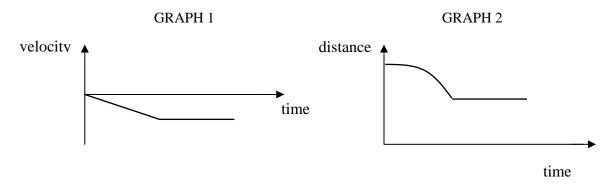


- B. (*Work alone*) While drawing your graph or graphs, did you change your mind about something, causing you to erase or redraw something? If so, explain why.
- Class discussion of velocity graph predictions. POLLING
- C. Discuss your prediction with a neighbor. See if you can come to consensus. DON'T ERASE YOUR ORIGINAL GRAPHS. Sketch your consensus prediction using a dashed line.
- Class discussion of velocity graph predictions. POLLING
- \* Experiment.
- D. Sketch the experimental results on your graphs above, using a solid line.
- Experiment about learning: Which half of the room did better?

## II. The president-for-life of all mistake-avoidance strategies

In this section, we'll help you figure out a mistake-avoidance strategy so useful that versions of it can be used throughout this course, not just with graphs.

Asked to graph the velocity vs. time of a certain motion (which we'll keep secret for now), a student draws graph 1 below. Then he draws graph 2, showing the position vs. time *for the same motion*.



A. For you, which kind of graph is generally easier to draw: Position vs. time or velocity vs. time? Why? Answer this and then briefly compare your answer to your neighbor's. There's no right answer, of course; it's a personal thing.

B. (*Work with a neighbor*) The student who drew the above graphs is generally more comfortable with position graphs. He's 99% sure he drew graph 2 correctly. Is there some way he can use his position graph to check for mistakes in his velocity graph? If so, do it and explain your reasoning. (Hint: What feature of a position graph indicates your velocity?)

C. (*Work with a neighbor*) Many experienced students tell us that, even when they're asked to draw a velocity graph only, they also draw a position graph. Why do you think that is?



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Class discussion: the president-for-life of mistake-avoidance strategies