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## 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
$\star$ Experiment.
D. Sketch the experimental results on your graphs above, using a solid line.
* Experiment about learning: Which half of the room did better?


## A new mistake-catching strategy

## 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.

GRAPH 1


GRAPH 2

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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