

Kinematics Problems - Set 2

1

Bill and Ted are going to race. Bill can run 15 mi/hr and Ted can only run 11 mi/hr. How far from the finish line is Ted when Bill finishes a quarter mile race?



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2

I'm running errands in my car. I start at my house and drive due northeast at 40mi/hr for 10 minutes. Then, I turn East and drive 60 mi/hr for 4 minutes.

- a) Find the components of my final displacement from my house.
- b) If I drive directly home from this spot, how fast do I have to be going to get home in 5 minutes?

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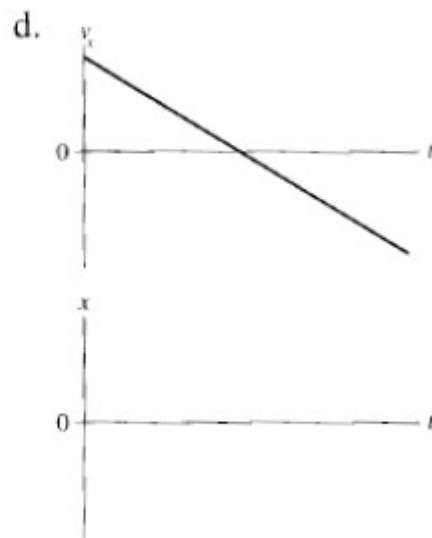
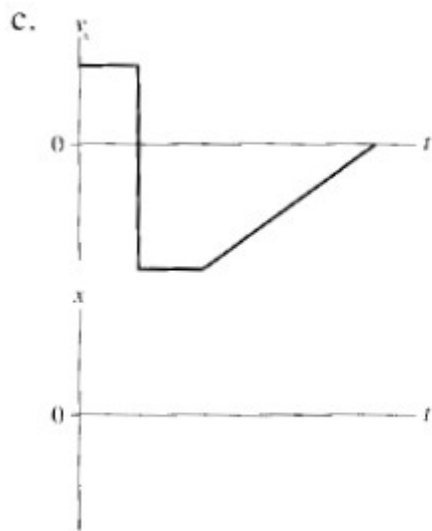
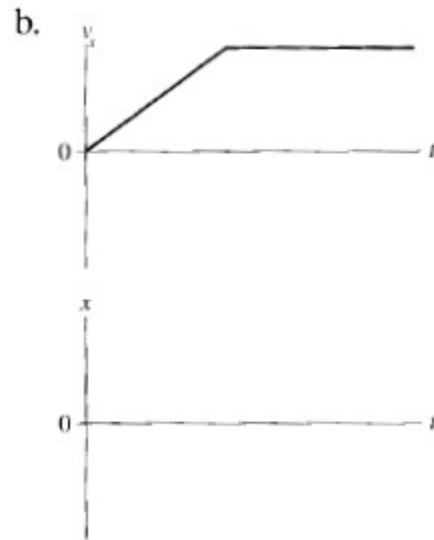
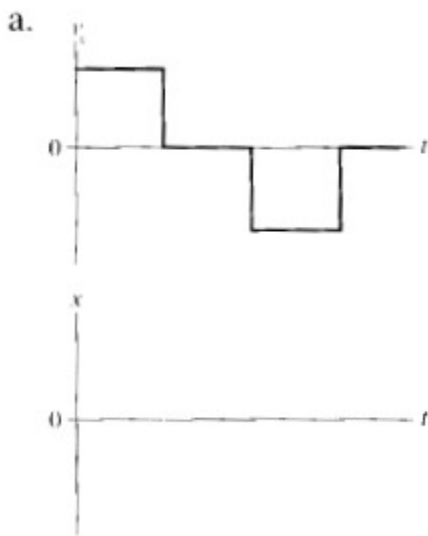
3

Sketch position vs. time graphs for the following situations. You should label your axes, but you don't need to include numbers.

- (a) A student walks to the bus stop, waits for the bus, then rides to campus. Assume that all the motion is along a straight street.
- (b) A student walks slowly from home to the bus stop, realizes he forgot his paper that is due, and *quickly* walks home to get it.
- (c) The quarterback drops back 10 yards from the line of scrimmage, then throws a pass 20 yards to the receiver, who catches it and sprints 20 yards to the goal. Draw your graph for the *football*. Think carefully about what the slopes of the lines should be.

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Below are four velocity vs. time graphs. For each, draw the corresponding position vs. time graph.



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You are traveling north in your car approaching a rail-road crossing. A 200 ft passenger train traveling east at 50 mi/hr is 40 ft away from the intersection. The front of your 10 ft long car is 30 ft away from the intersection.

- a) You want your whole car to get through the intersection before the train gets there. How fast do you have to be going?
- b) Alternately, you could slow down so that the front of your car gets to the intersection just as the back of the train is passing. How slow do you have to be going?

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6

Ma and Pa Ingalls are going to have another baby! Ma says "It's time!" so Pa gets the team hitched up and they take off for Doc Weber's place. Doc's place is 15 miles south and 10 miles east of the homestead. But in his excitement, Pa drives northeast at 18 miles per hour for 1.5 hours. The baby will arrive 4 hours after Ma said "It's time!"



How fast and in what direction does Pa have to drive to make it to Doc's before the baby arrives? Find the magnitude and the direction.