Name: _____ Problems Solved __/ 6

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

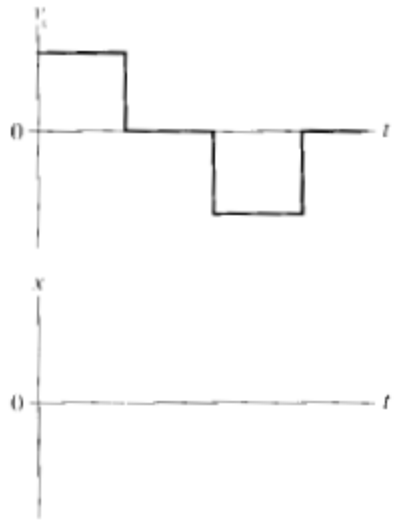
(a) A student walks to the bus stop, waits for the bus, then rides to campus. Assume that all the motion is along a straight street.

(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.

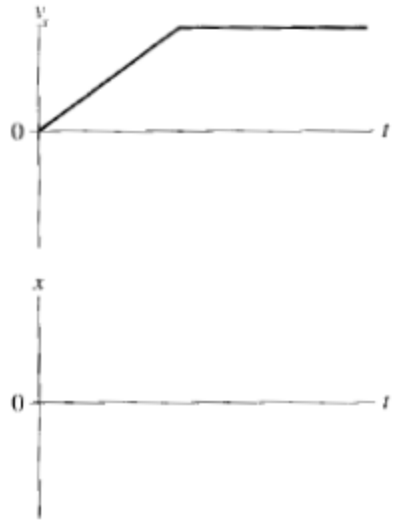
(c) The quarterback drops back 10 yards from the line of scrimmage, then throws a pass 20 yards to the receiver, who catches it and sprints 20 yards to the goal. Draw your graph for the *football*. Think carefully about what the slopes of the lines should be.

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

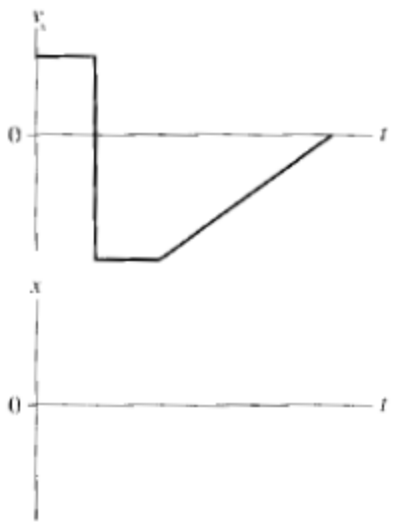
a.



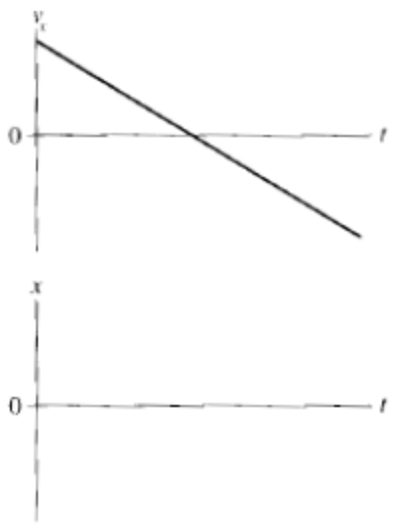
b.



c.



d.



I am 10 miles away from my house traveling at 60 miles per hour. The doctor's office is ahead of me 17 miles from my house. How long will it take me to get to the doctor's office?

a) Think carefully about the problem. Play a movie in your mind of what's going on.
b) Draw a CLEAR picture of the situation. Pick an ORIGIN for your coordinate system.
c) List the GIVEN information and the WANTED information off to the side. Assign variables to each piece of information.
d) Label all of the relevant distances and velocities as given in the problem statement. Do NOT put numbers on your picture, use the variables that you assigned.

Picture	Given Wanted

e) What's the physics here? What variables are you trying to relate? How are they related? Write down the appropriate mathematical relationship(s) from the your understanding of the physics. Fill in your mathematical statement using variables from your Given/Wanted list.

f) Solve the equation above for the variable of interest. Put in numbers only after you have an analytical answer.

Bill and Ted are going to race. Bill can run 15 mi/hr and Ted can only run 11 mi/hr. If they start at the starting line at the same time, how far from the finish line is Ted when Bill finishes a quarter mile race?

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?

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 fron your car gets to the intersection just as the back of the train is passing. How slow do you have to be going?