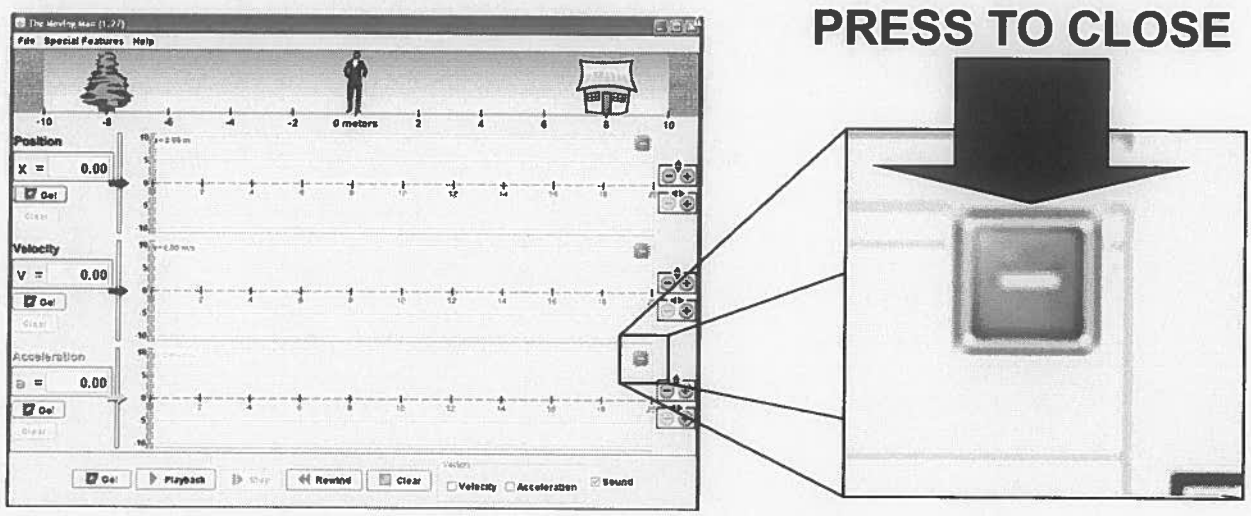
NOTES - **THE MOVING MAN (Competency 1)** Name: Mr. Bayer

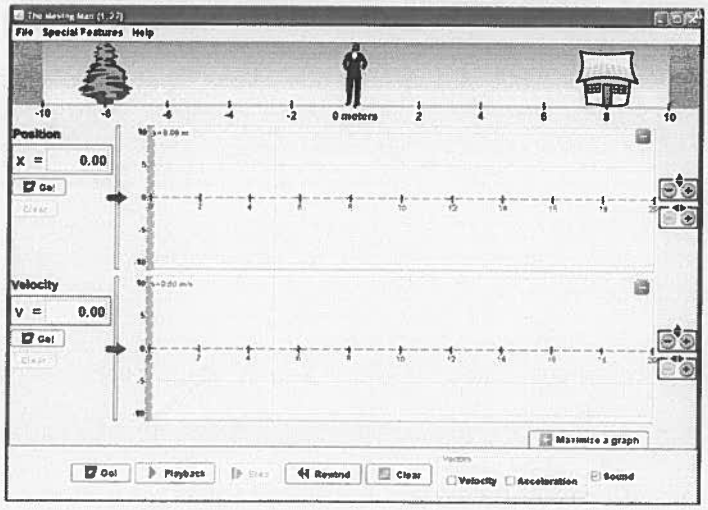
(Physics 20)

Instructions:

1. Open up the following website:
   http://phet.colorado.edu/simulations/sims.php?sim=The_Moving_Man
2. Click the green button that says "Run Now!" and a window will pop open and ask if you want to open it with Java. Press the "OK" button.
3. A window will open up called "The Moving Man" that looks like the image below. We are only interested in the Position and Velocity graphs, so we will close down the Acceleration graph.



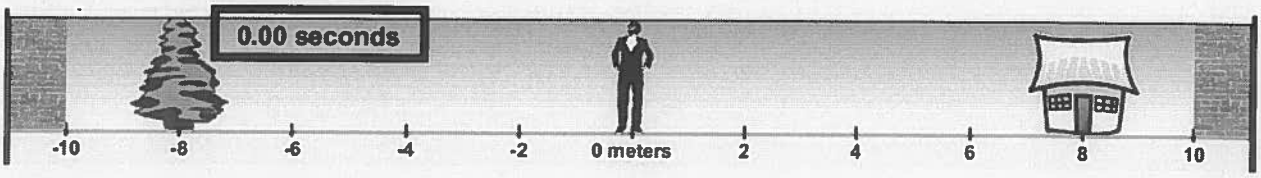
4. The program should now look like the image below.



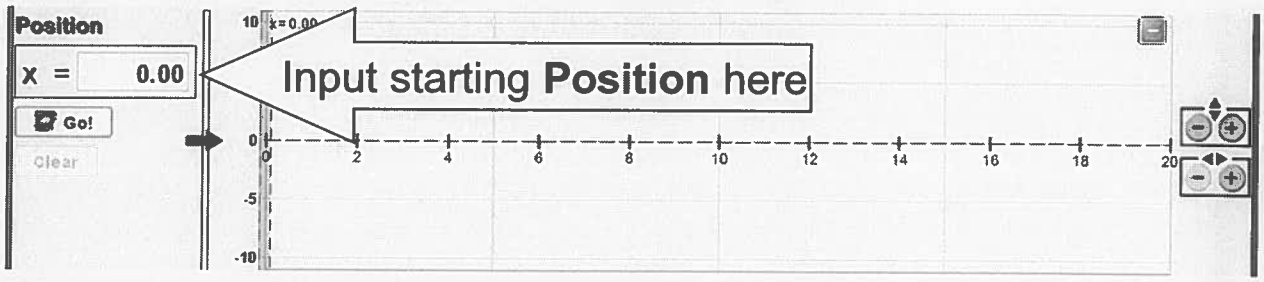
Instructions (Continued):

5. There are several important parts to the program:

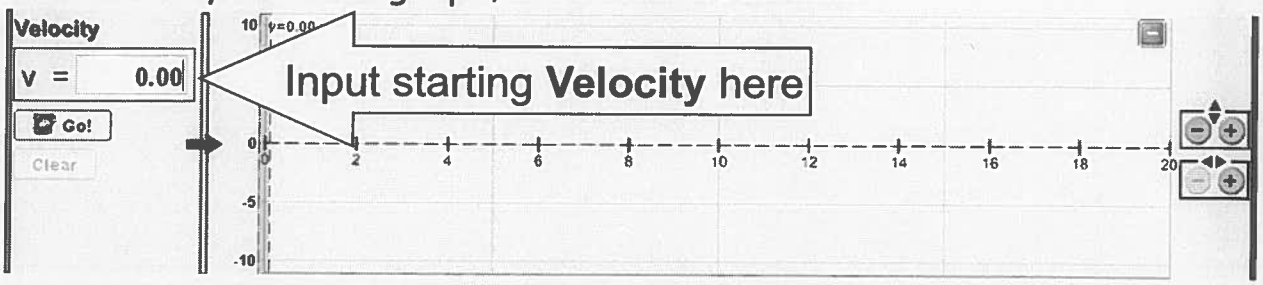
   A) The moving man, who we'll refer to as Abraham. He cannot move more than 10 meters from his starting position, and will stop if he runs into a wall. This window also shows the time, highlighted in the red box.



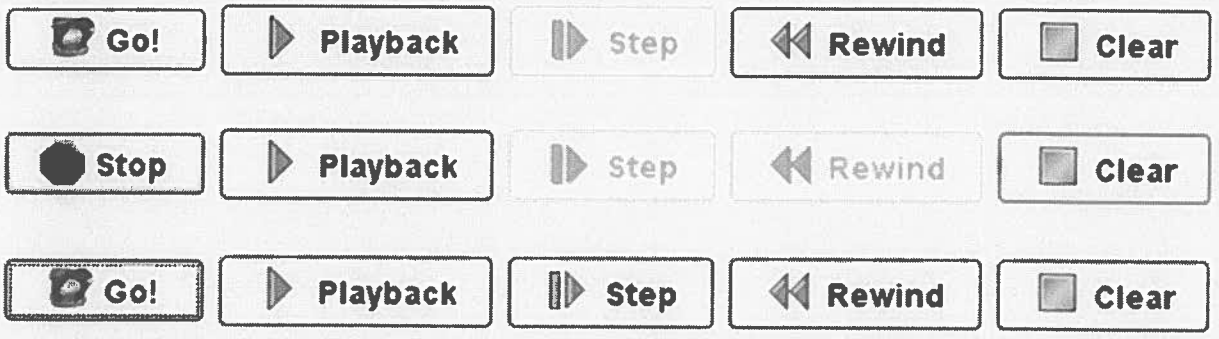
   B) The Position vs. Time graph, which uses a blue line.



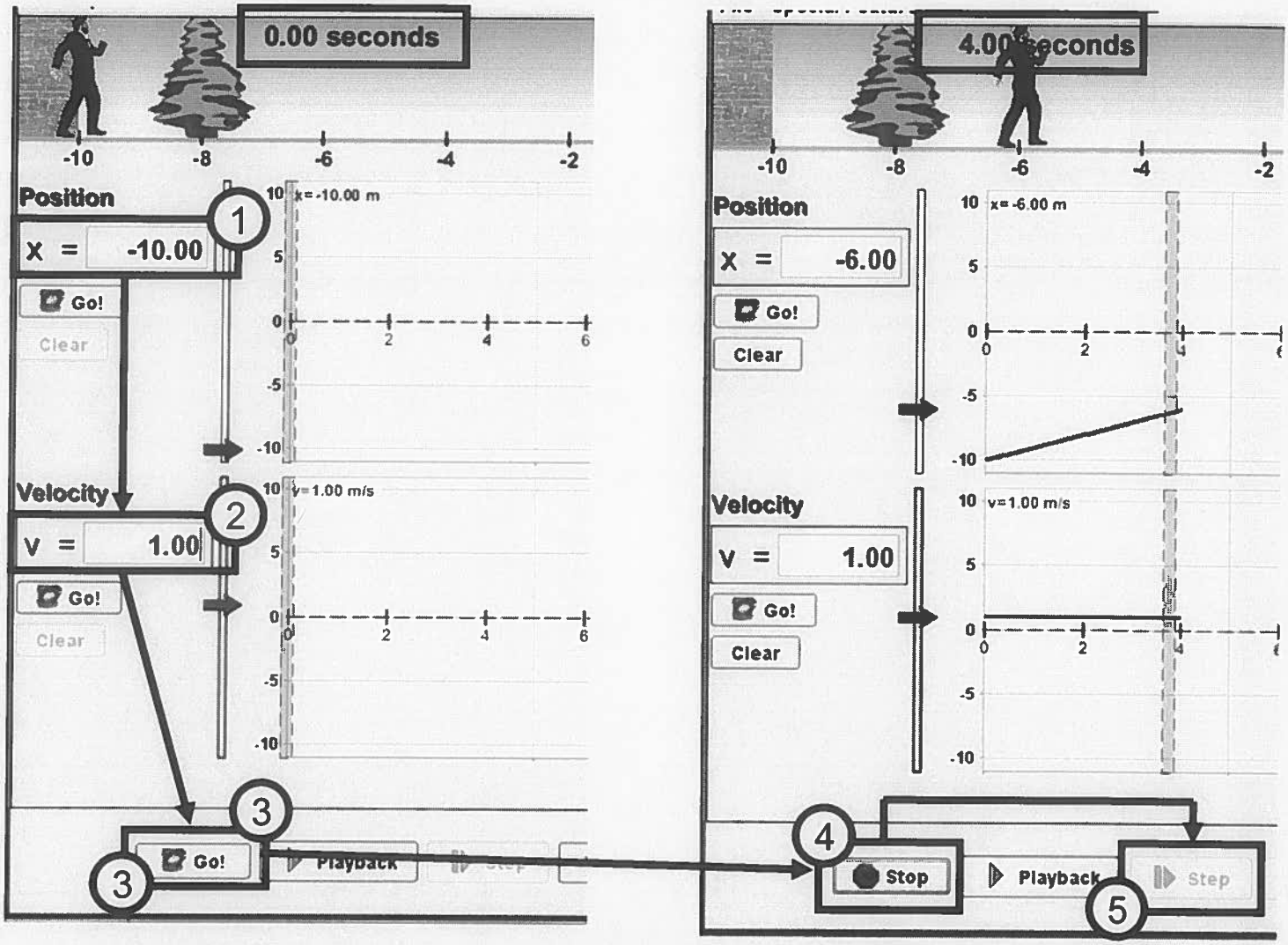
   C) The Velocity vs. Time graph, which has a red line.



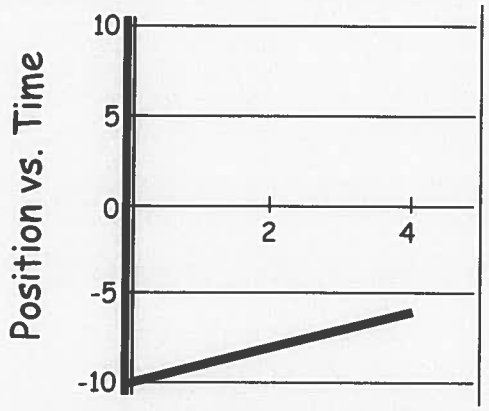
   D) The controls at the bottom of the page, which can look different depending on whether the program is idle (first picture), currently running (second picture), or stopped (third picture).

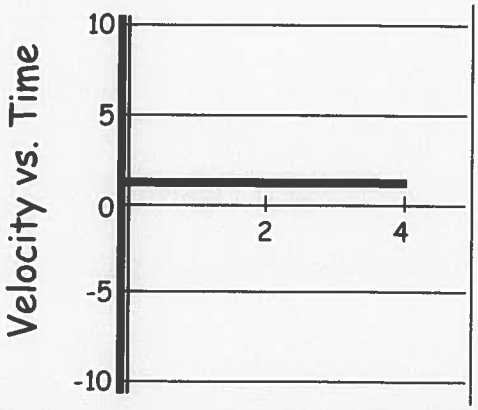


EXAMPLE #1: Abraham is initially at a position of -10 meters [East]. He moves with a velocity of 1 m/s [East] for 4 seconds. Draw the Position vs. Time and Velocity vs. Time graphs.



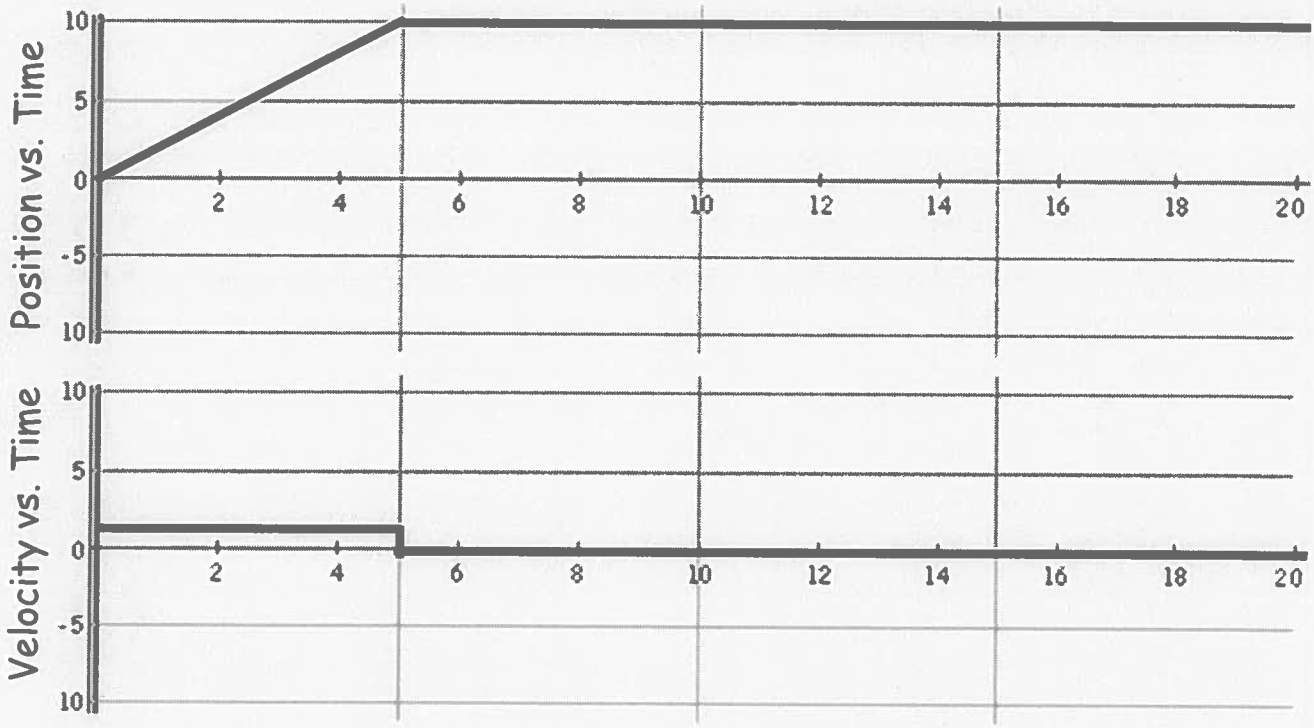
After inputting the numbers into the program and seeing the results, the student would draw it on the blank graphs provided.





QUESTION #1:

Abraham has an initial position of 0m [East] and moves at a velocity of 2m/s [East]. Draw the Position vs. Time and Velocity vs. Time graphs.



When Abraham had a velocity of 2m/s [East], which direction was he moving?

Abraham was moving to the right.

Look at the Velocity vs. Time graph. Was Abraham moving at a constant velocity for the first 5 sec?

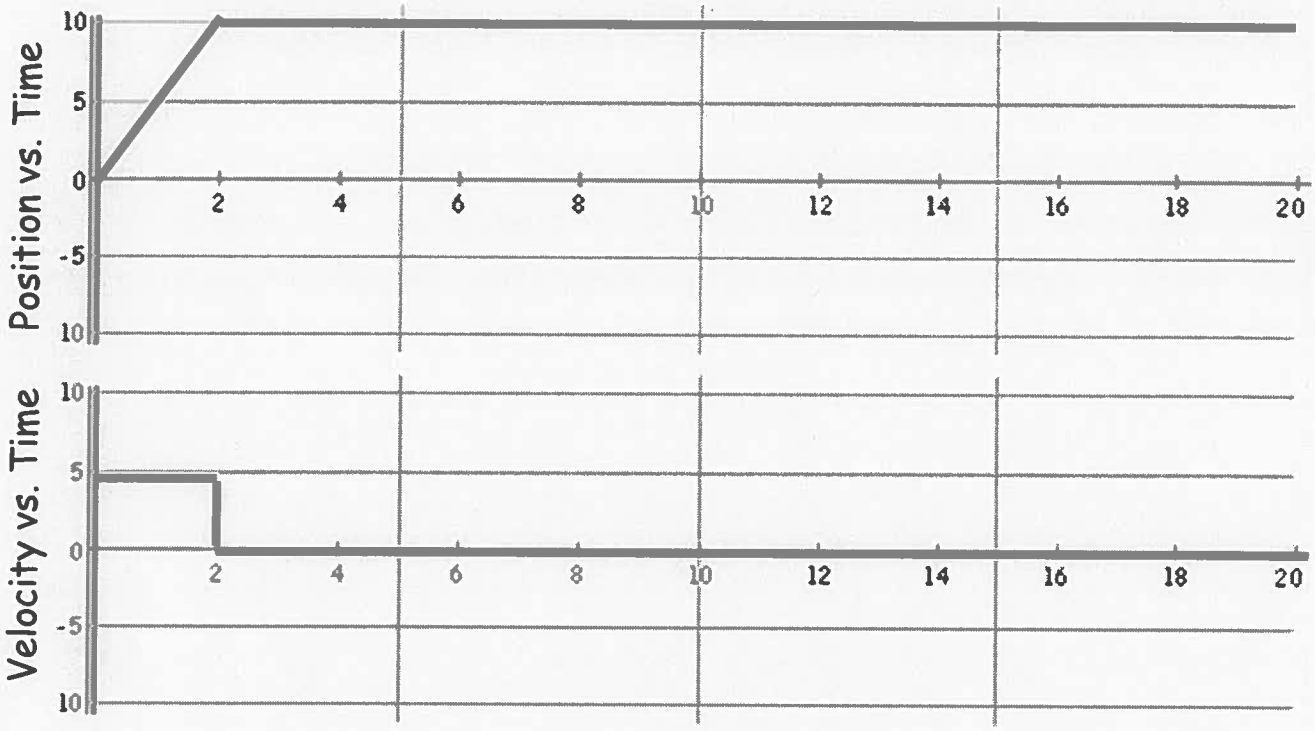
Yes, the graphs show he was moving at a constant 2m/s [East].

Look at the Velocity vs. Time graph. Did Abraham have a constant velocity after he hit the wall?

Yes, the graphs show he was moving at a constant 0m/s [East].

QUESTION #2:

Abraham has an initial position of 0m [East] and moves at a velocity of 5m/s [East]. Draw the Position vs. Time and Velocity vs. Time graphs.



When Abraham had a velocity of 5m/s [East], which direction was he moving?

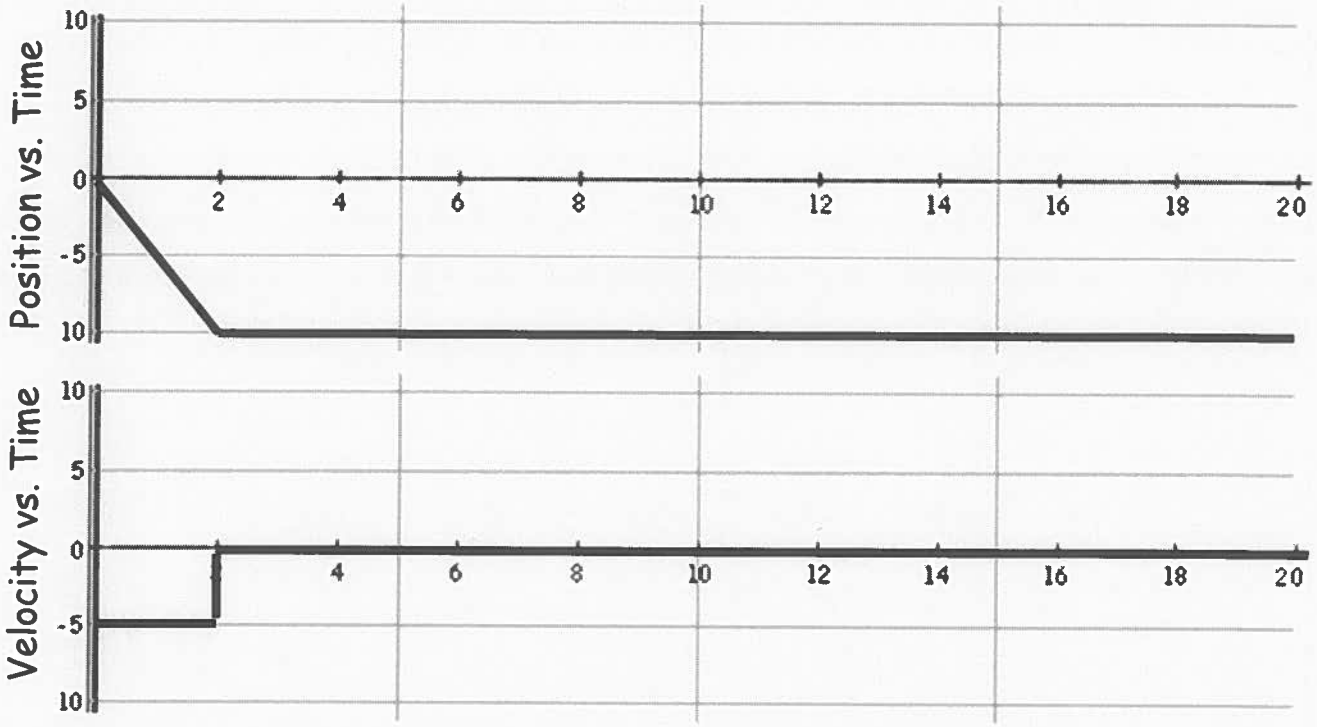
Abraham was moving East/right.

In both question #1 and question #2, Abraham is moving in the same direction. Why don't the Position vs. Time graphs look the same?

The slope of a Position vs. Time graph is the velocity. Abraham is moving faster in the second question, so it shows a steeper slope.

QUESTION #3:

Abraham has an initial position of 0m [East] and moves at a velocity of -5m/s [East]. Draw the Position vs. Time and Velocity vs. Time graphs.



When Abraham had a velocity of -5m/s [East], which direction was he moving?

Abraham was moving West/left.

How does the Position vs. Time graph look different from the graph you drew in question #2?

In Q2, the slope is positive.

In Q3, the slope is negative.

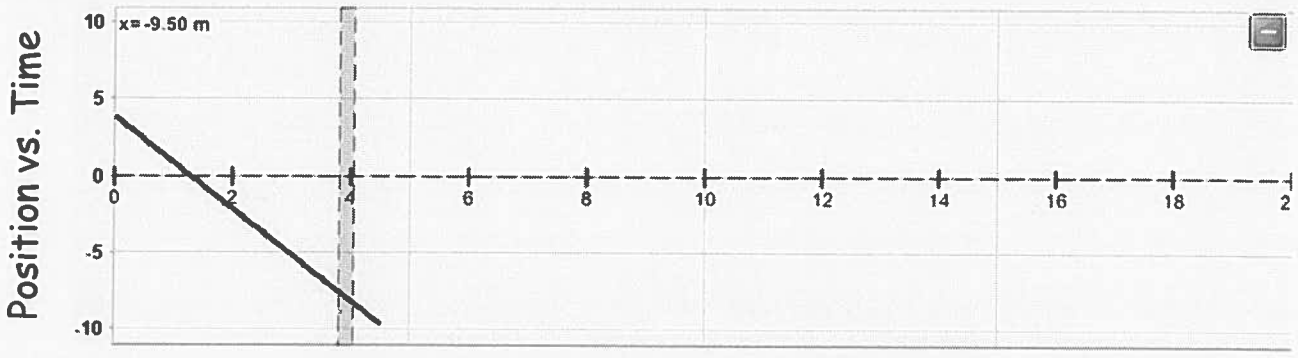
How does the Velocity vs. Time graph look different from the graph you drew in question #2?

In Q2, the velocity is +5 m/s [East].

In Q3, the velocity is -5 m/s [East].

QUESTION #4:

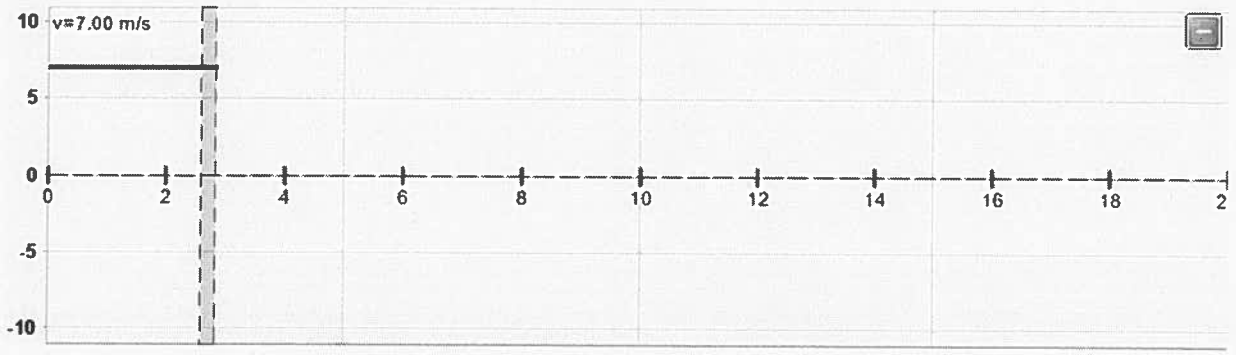
Mr. Bayer says that Abraham is moving East. Is he telling the truth? Explain.



No. The negative slope means that Abraham is moving West/left.

QUESTION #5:

Mr. Bayer says that Abraham is moving East. Is he telling the truth? Explain.



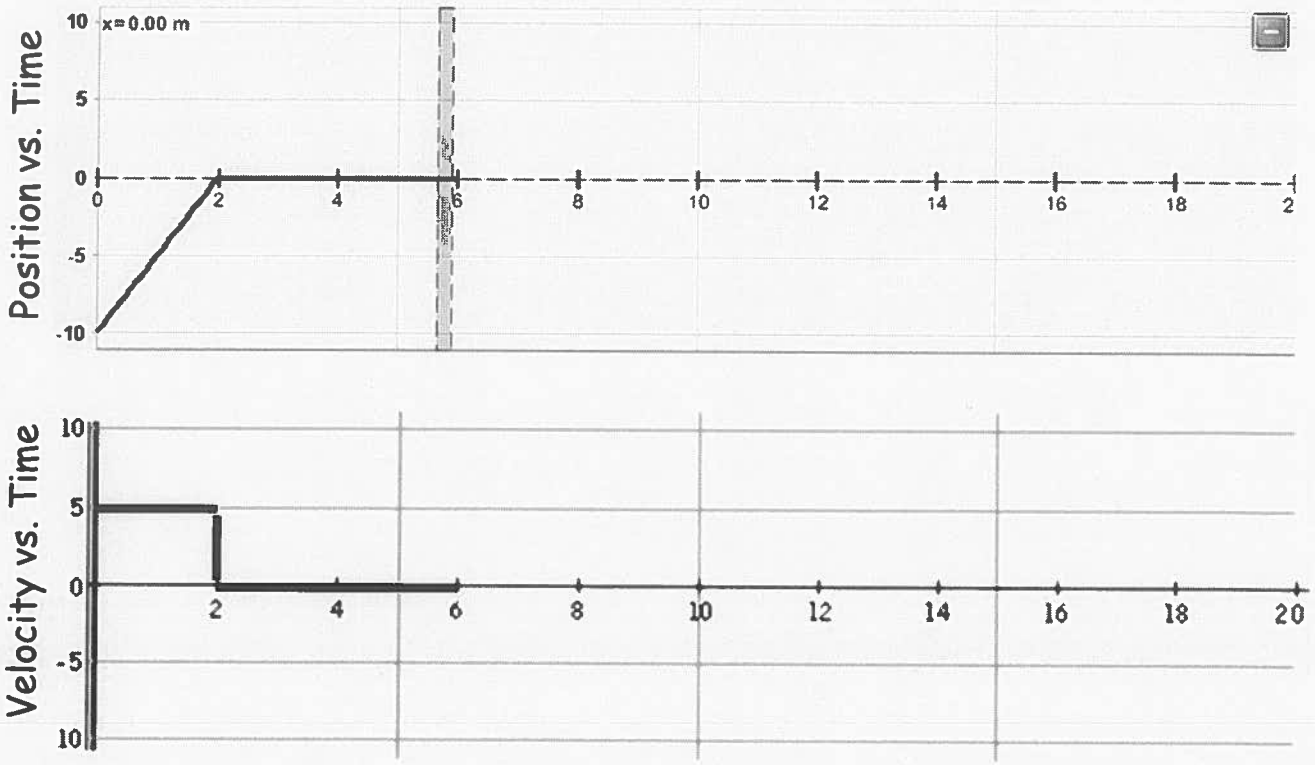
Yes. Abraham has a positive velocity, which means he is moving to the East.

QUESTION #6:

Mr. Bayer accidentally lost Abraham's Velocity vs. Time graph. Help to reconstruct it using the Position vs. Time graph provided.

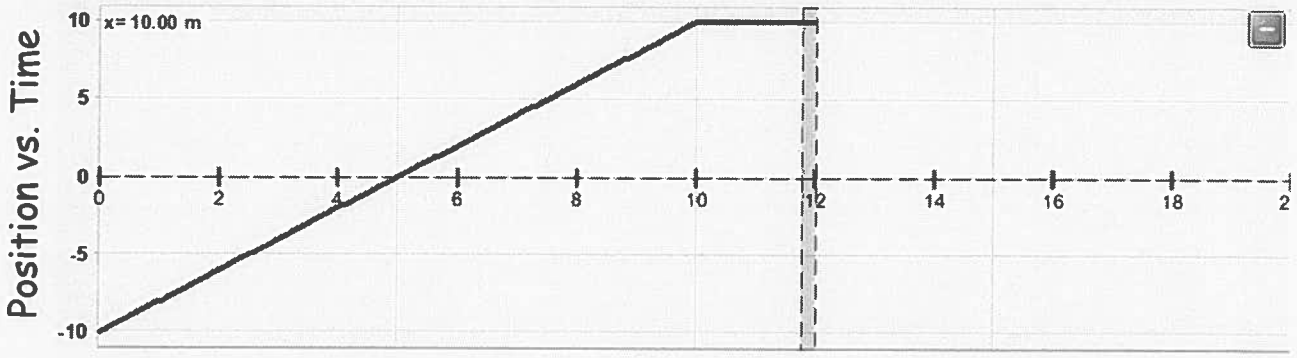
HINT #1: Remember that $\vec{v} = \frac{\Delta \vec{d}}{\Delta t}$

HINT #2: Confirm your answer by recreating the graph! =)



QUESTION #7:

The graph below shows Abraham's position over a 12 second period.



Between 0 seconds and 5 seconds, in which direction is Abraham travelling?

Abraham is travelling East/right.

Between 5 seconds and 10 seconds, in which direction is Abraham travelling?

Abraham is travelling East/right.

Does Abraham change velocity between 0 seconds and 10 seconds?

No, Abraham has a constant velocity.

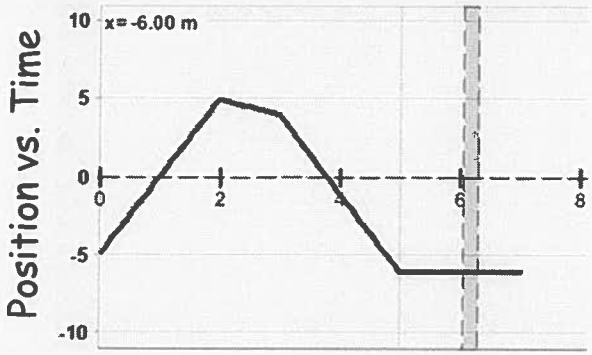
Between 2.312 seconds and 5.761 seconds, what is Abraham's velocity?

Between 0 and 10 seconds, Abraham travels 20 meters in 10 seconds, which is a velocity of 2 m/s [East].

Because Abraham's velocity is constant during this time, his velocity is still 2 m/s [East].

QUESTION #8:

The graph below shows Abraham's position over a 7 second period.



Which of the following graphs shows Abraham's velocity?