Moving Man – Position and Velocity Graphs

Goals: After completing this lab activity, you should be able to interpret and draw position and velocity graphs for some common situations.

1. Download and open "**The Moving Man**" simulation.

2. After "**The Moving Man**" is open, **click** the blue "**Charts**" tab at the top of the simulation page. ***See the image below***.

3. Leave the **Position** graph and the **Velocity** graph open but ***close the acceleration graph*** by clicking the **red minus-sign** in the upper right-hand corner of the acceleration graph.

   Investigate Moving Man by dragging the man around with your mouse. Now, try making the man move using the **blue** and **red** slider arrows on the left-hand sides of the **Position** and **Velocity** graphs. Use the "**Playback**" feature to look at the graphs after you move the man around. While you make observations, **discuss in your group** the reasons the graphs look the way they do.

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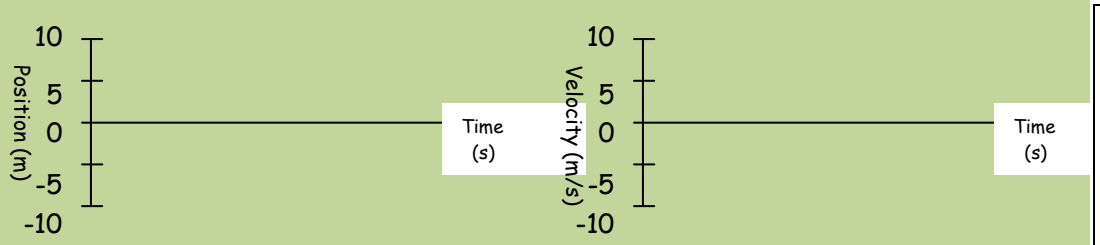
4. Now, it is time to make some predictions. ***On your own sheet of paper,*** sketch **what you believe** the motion graphs will look like for the six scenarios described below. Label them **A – F**. For each of the six scenarios below, in one color, **PREDICT** what the **Position vs. Time** graph and **Velocity vs. Time** graph will look like. **Don't be afraid to be wrong – and don't cheat** by looking at "The Moving Man" first! <u>Leave some space for explanations beside or below each graph.</u>



Explain your reasoning for the appearance of the graphs:

A) A man moving from the center of the screen (0 m) to the house (8m) at a slow, steady pace.
B) A man moving from 0 to the house at a faster pace than above.
C) A man standing still at 4 m.
D) A man moving from 0 to the house at a fast pace then moving back to 0 at a slower pace.
E) A man moving from 8 m to the tree m at a fast pace.
F) A man moving from 0 to the house, speeding up as he walks.

5. Use the *Moving Man* simulation to verify or correct your predicted graphs with a different colored pen.

6. In the space below or beside each graph, *explain* why the position and velocity graphs appear the way they do.

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7. Make new **Position vs. Time** and **Velocity vs. Time** graphs for each of the following four scenarios. Predict what you think the graphs will look like, and then use "The Moving Man" to verify or correct your predicted graphs and reasoning with a different color pen.

   G) The man stands still while he talks on his cell phone at the middle of the sidewalk, then walks toward the house at a constant rate trying to get better cell reception. He comes to a sudden stop when the coverage is good (about a meter before the house) and stands still to finish his conversation.

   H) The man starts close to the tree, stands still for a little while, then walks toward the house at a constant rate for a while, then slows gradually to a stop.

   I) A man wakes up from his nap under the tree and speeds up toward the house. He stops because he is worried that he dropped his keys. He stands still as he searches his pockets for his keys. Once he finds them, he continues calmly to walk toward the house and then slows to a stop as he nears the door.

   J) The man starts three meters from the house and speeds up as he walks towards the tree.

8. With your lab partners, write a motion scenario that you can test. Test it, and then write a description of how you used the program to generate the graphs. Sketch the graphs.

9. ***Individually*** write a possible scenario for the following **position vs. time** graph. Then compare your scenario with your lab partners to check if it is reasonable.