Name:_____ Date:_____ Period: ____

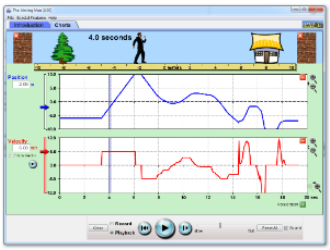
MOVING MAN SIMULATION DIRECTIONS: POSITION AND VELOCITY

Learning Goals:

Be able to describe movement by looking at a motion graph.

Materials:

Computer and Graphing Supplement worksheet.



Setting Up:

A) Go to http://phet.colorado.edu/en/simulation/moving-man or type "Moving Man" in Google.

B) Click on the green "Run Now" button. → Run Now!

C) Choose the dark blue tab at the top of the simulation titled "CHARTS." You will soon see three graphs → position, velocity, and acceleration.

D) Close the velocity and acceleration graphs by clicking on the red minus sign ⊟ at the right-hand side of each graph.

Directions:

1) Make sure the Record button is selected at the bottom of the page. Play with the *Moving Man* by dragging him back and forth. Click on the playback button at the bottom of the page to look at the graph when you are done. Notice what is happening to the graph line as he moves.

2) Play with the "Clear" and "Reset All" buttons to see how they differ.

3) Position the Moving Man at the tree and press Pause and Clear.

4) On graph A of the Graphing Supplement worksheet, draw a dashed line to show how you think the line will look when you move the *Moving Man* slowly from the tree to the house. Answer question A-1.

5) Now test your prediction by moving the *Moving Man* slowly from the tree to the house. Press pause when done. Compare your prediction to the experimental graph. Draw how the experimental line (use a solid line) looks on graph A and answer question A-2. Press the playback button to compare his motion to the graph.

6) Press Clear. On graph B of the Graphing Supplement worksheet, draw a dashed line to show how you think the line will look when you move the *Moving Man* slowly from the house to the tree. Answer question B-1

7) Now test your prediction by moving the *Moving Man* slowly from the house to the tree. Press Pause when done. Compare your prediction to the experimental graph. . Draw how the experimental line (use a solid line) looks on graph B and answer question B-2. Press the playback button to compare his motion to the graph.

8) Press Clear. On graph C of the Graphing Supplement worksheet, draw a dashed line to show how you think the line will look when you move the *Moving Man* quickly from the tree to the zero mark on the ruler, wait five seconds , and then move him ***very*** slowly to the house. Answer question C-1.

9) Now test your prediction by moving the *Moving Man* quickly from the tree to the zero mark, waiting five seconds, and then moving him ***very*** slowly to the house. Press Pause when done. Compare your prediction to the experimental graph. Draw how the experimental line (use a solid line) looks on graph C and answer questions C-2 . C-3, and C-4. Press the playback button to compare his motion to the graph.

10. Try to match graph D on the Graphing Supplement worksheet by moving the *Moving Man*. Ask your teacher to look over your experimental graph when you think you have it.

11. Close the Position graph by clicking on the red minus sign.  Open up the velocity graph by clicking the green plus sign. 

12. Place the *Moving Man* at the tree and click pause, then clear.

13. Click the "Show Vector" button and type 5.0 m/s in the Velocity box (the same thing can be accomplished by moving the red slider arrow upward).

14. Press play. Notice how smooth the line is as the *Moving Man* runs from the tree to the brick wall at a constant velocity of 5 m/s. Press playback and review the run.

15. Now let's see if you can manually make as smooth a run. Position the *Moving Man* at the tree and click pause and clear. Next, grab the *Moving Man* with your mouse and try moving him at a constant velocity of 5.0 m/s from the tree to the brick wall. Press playback to review how smoothly or jerkily the man runs. Repeat and record how your best run looks in graph E. Answer questions E-1 and E-2.

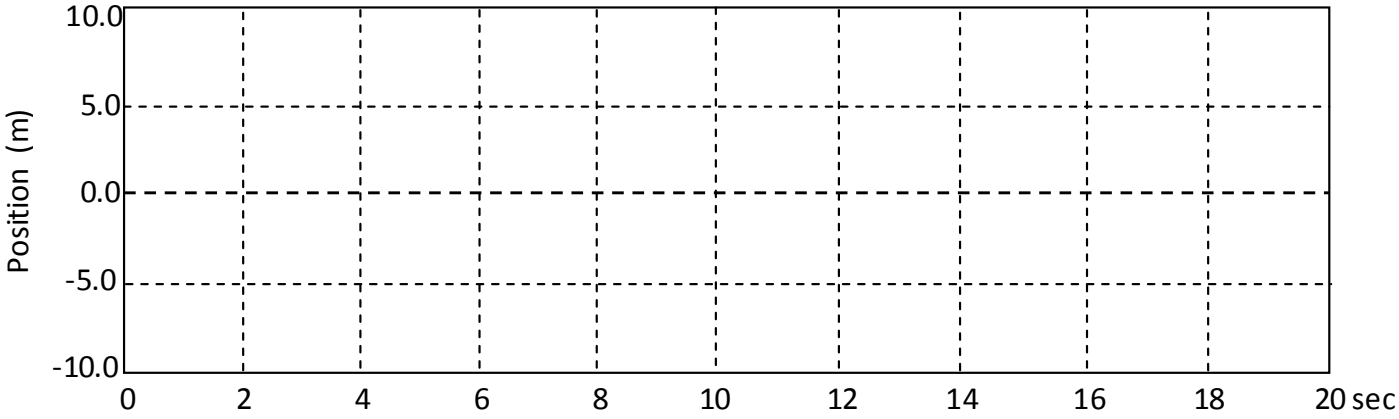
16. We will now close the Velocity graph. Before closing it, make sure the "Show Vector" box is checked. Close the Velocity graph by clicking on the red minus sign.  Now open up the acceleration graph by clicking the green plus sign. 

17. You should now be looking at the Acceleration graph. Be sure that the "Show Vector" box is **not** selected. Position the *Moving Man* at the tree and click pause and clear. Type in 5.00 m/s^2 in the box. Press play and watch the Moving Man's red vector arrow as he runs from the tree into the brick wall. Press playback and review the run. Answer question F-1.

18. Repeat #17 above but this time add the Acceleration "Show Vector" arrow. Press play and observe the green and red vector arrows. Playback as necessary. Answer question F-2.

19. Open up all three of the graphs and see if you can get the Moving Man to slow down and reverse direction by changing the velocity and acceleration values. In graphs F, G, and H, draw how your best experimental reversal looks in all three program graphs. Answer questions H-1 and H-2.

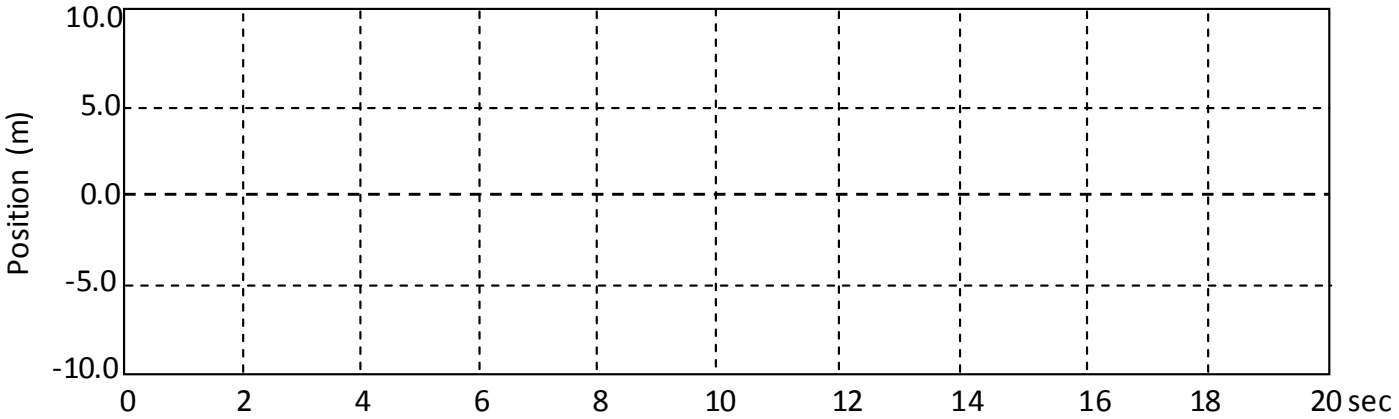
Graph A



A-1: Why did you predict the line to look like the way you drew it?

A-2: Does your predicted line match the experimental line? If not, explain how it deviated.

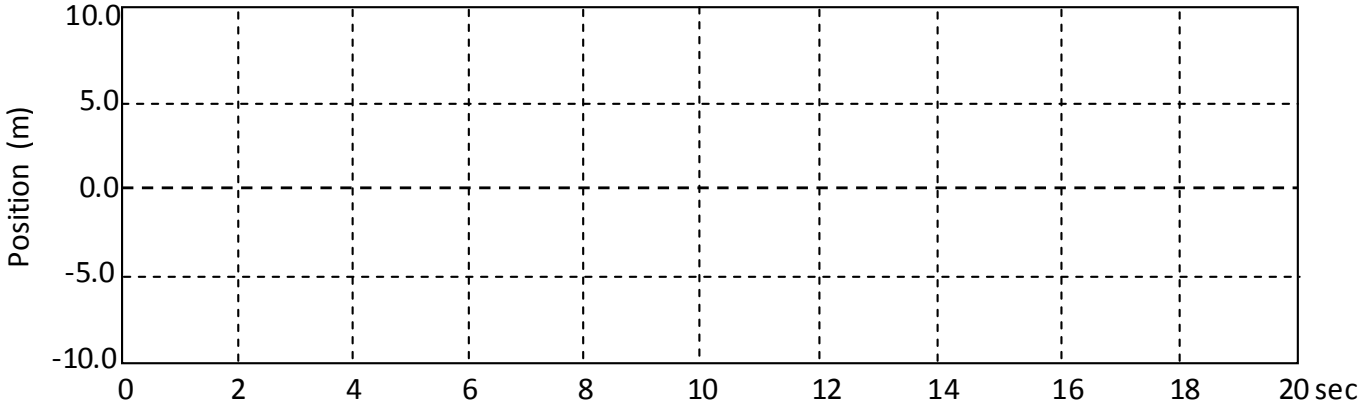
Graph B



B-1: Why did you predict the line to look like the way you drew it?

B-2: Does your predicted line match the experimental line? If not, explain how it deviated.

Graph C



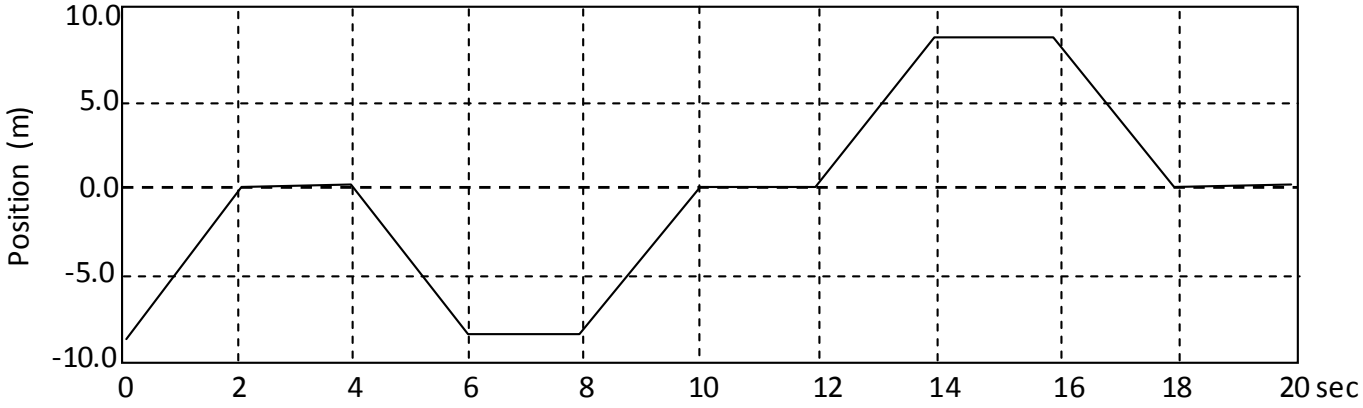
C-1: Label the part of your predictive line in graph C that represents a five-second wait time?

C-2: Label the part of your graph where the *Moving Man* travels at a fast speed.

C-3: Label the part of your graph where the Moving Man travels at a slow speed.

C-4: How does the steepness of the experimental line on your graph relate to how fast the man moves?

Graph D



D-1: Teacher Signature _____