Acceleration Lab: The Moving Man

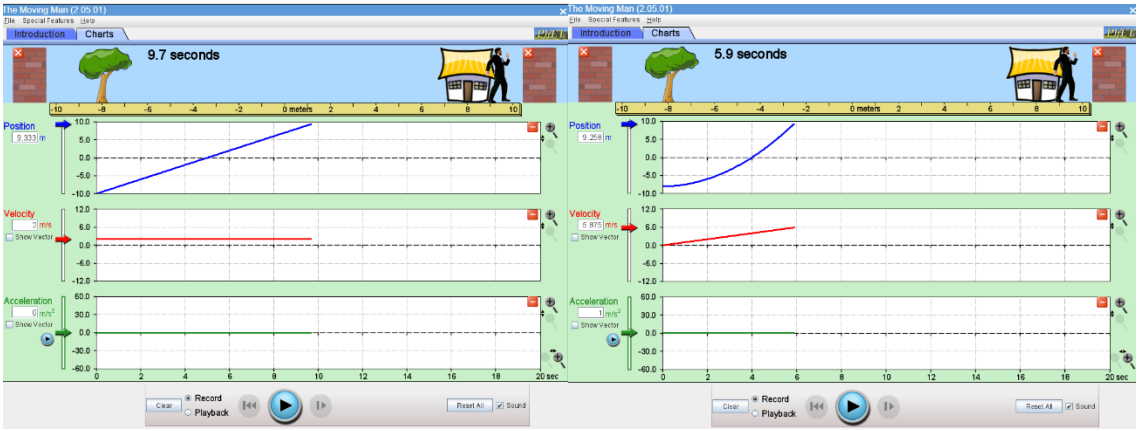
Data Collection – Example Trials

Trials	Initial Position (m)	Initial Velocity (m/s)	Acceleration (m/s^2)
1	-10	2	0
2	-8	0	1
3	-6	4	14
4	10	-1	-2

Results

You will compare the position-time, velocity-time, and acceleration-time graphs for three trials. In your comparisons, use the accurate geometry terms (procedure #4) to describe the shapes of the graph. Use complete sentences and at least three sentences for each comparison.

Comparison One: Compare the graphs of a zero-acceleration trial to a positive acceleration trial.



Trial 1 sees a linear diagonal increase within the position-time graph, a non-zero horizontal (constant) line for the velocity-time graph, and a horizontal line at 0 within the acceleration graph; representing a constant zero speed.

For Trial 2 we can see a half-parabola within the position-time graph, representing a power/quadratic relationship. On the velocity-time graph there is a linear diagonal line that increases, representing a linear relationship. To conclude the second trial, a horizontal line is located at 1, representing a constant speed of 1 m/s^2.

When comparing the two trials, the main difference is that there is no acceleration in the first, while there is in the second. Because of this acceleration, you can see some noticeable differences between the position and velocity graphs, such as the half-parabola in the second trial.

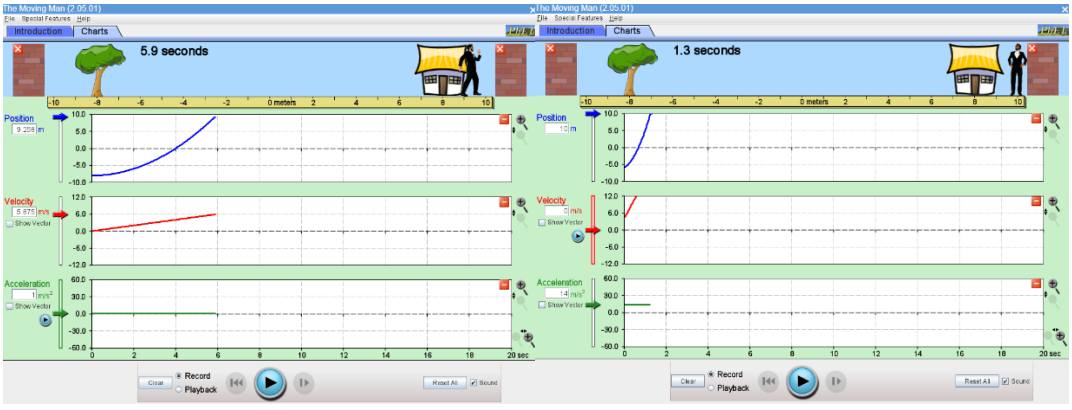
Comparison Two: Compare the graphs of a positive acceleration trial and a negative acceleration trial.

For Trial 2 we can see an increasing half-parabola within the position-time graph, that represents a power/quadratic relationship. On the velocity-time graph there is a linear diagonal line that increases, representing a linear relationship. To conclude the second trial, a horizontal line is located at 1, representing a constant acceleration of 1 m/s^2.

Trial 4 sees much different results as compared to the other trials. This trial sees a decreasing half-parabola, indicating a power/quadratic relationship, in the position-time graph. Within the velocity-time graph, we can see an increasing linear diagonal line, representing a linear relationship. For acceleration, a horizontal line located at -2 is found, indicating a constant acceleration of -2 m/s^2.

Now let's compare the two trials. The graphs in each trial look pretty similar, however are almost the opposite of each other (almost because 1 versus 2). This is due to the fact that trial 2 has a positive acceleration, while trial 4 has a negative acceleration.

Comparison Three: Compare the graphs of a small acceleration trial and a large acceleration trial.



For Trial 2 we can see an increasing half-parabola within the position-time graph, that represents a power/quadratic relationship. On the velocity-time graph there is a linear diagonal line that increases, representing a linear relationship. To conclude the second trial, a horizontal line is located at 1, representing a constant acceleration of 1 m/s^2.

Trial 3 is a heavy hitter as compared to the rest. We see a power/quadratic relationship in the position-time graph, due to the half-parabola within it. The velocity-time graph shows an increasing diagonal line, meaning there is a linear relationship. As well for the acceleration graph, we see a horizontal line located at 14, indicating a constant acceleration of 14 m/s^2.

The two trials in this case again are pretty similar to each other in terms of what they do. However, their shapes are a bit different directionally wise. The position-time graphs in both trials have an increasing half-parabola, and the velocity-time graphs here both have an increasing linear diagonal line. However, the main difference is fueled by the big difference in acceleration. Since trial 3 has a much larger acceleration than trial 2, the lines shoot up at a much sharper angle. As well, more distance is covered much more quickly because most notably of this larger acceleration.