

Exploring Motion Graphs

Find the Lab

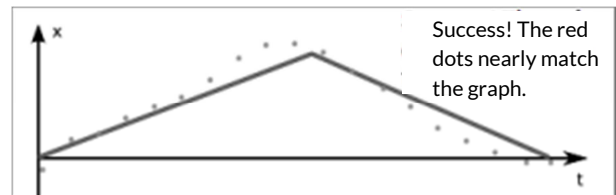
- In your web browser, go to **www.gigaphysics.com**, then click **Virtual Labs**, and finally **Exploring Motion Graphs**.

Part I: Explore the Controls

- Use your mouse and drag the caterpillar back and forth a bit. The caterpillar will stay on the ground, so you can just worry about left and right.
- Release the button and notice the red dots on the graph. These dots show how you moved the caterpillar. You'll learn to make sense of these dots in the rest of the lab.

Part II: Position vs. Time Graphs

- Set the **Choose a graph** menu to "Position vs. Time #1."
- You should now see a position vs. time graph on the screen. The vertical axis shows where the caterpillar is, and the horizontal axis shows the time.
- Drag the caterpillar, trying to recreate the graph. (You won't see your results until you release the mouse button.) Don't worry if you have to guess the first time.
- Does your graph look close to the example?
If not, keep experimenting until you figure it out.



What did the caterpillar have to do when the graph changed from an upward slope to downward?

What did the caterpillar have to do for the graph to return to the horizontal axis at the end?

- Now switch to "Position vs. Time #2" on the **Choose a graph** menu. Once again, experiment until you are able to reproduce the graph.

What did the caterpillar have to do during the horizontal segments of the graph?

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What did the caterpillar have to do for the graph to return to the horizontal axis at the end?

- Now try to create “Position vs. Time #3.”

What did the caterpillar have to do to create a steep first segment but a more gently sloping final segment?

- Finally, try position graph 4.

What did the caterpillar have to do to create the curved graphed with a gradually steeper slope?

Part III: Velocity vs. Time Graphs

- Select “Velocity vs. Time #1.” Since you are now working with a velocity vs. time graph, the vertical axis tells you how fast the caterpillar is moving.
- Once again, try to replicate this graph by dragging the caterpillar. On the velocity vs. time graphs, be more willing to accept graphs that are “in the ballpark” since it’s not easy to control the speed precisely with a mouse.

What does it mean when a velocity vs. time graph has a straight horizontal segment?

What did the caterpillar have to do to match the second, higher horizontal segment?

- Now try to create “Velocity vs. Time #2.”

What does it mean when the velocity graph is below the x-axis instead of above it?

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- Now make the third velocity graph.

What did the caterpillar have to do to return to the horizontal axis at the end of its journey?

- Finally, create the fourth velocity graph.

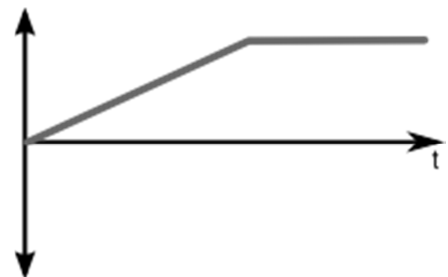
What did the caterpillar have to do for the final segment that sloped downward below the horizontal axis?

Part IV: Review and Apply

Complete the table below to highlight the difference between position vs. time graphs and velocity vs. time graphs.

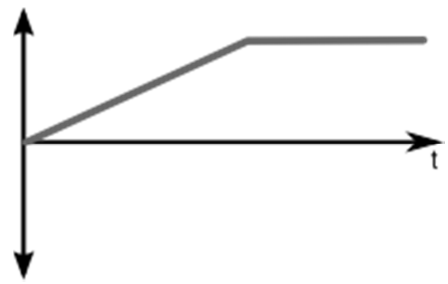
Graph feature	Meaning on a position vs. time graph	Meaning on a velocity vs. time graph
horizontal segment		
at horizontal axis		
below horizontal axis		

Suppose that the graph at the right is a position vs. time graph that describes the motion of a dog. Write a brief description of what the dog is doing in this graph.



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Now suppose that the same graph instead represents the dog's velocity vs. time. Once again, write a brief description of what the dog is doing.



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