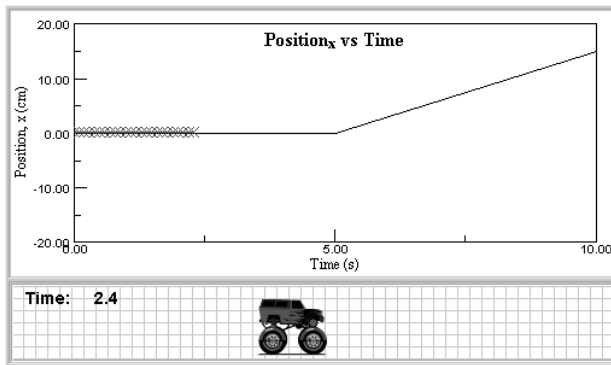


Graphing and Motion Tutorial

The purpose of this tutorial is for you to explore and then understand different ways of representing motion: seeing the motion, describing the motion, and then graphing the motion. As you open each page, you may need to click on a link to load an animation and then push the "play" button to start the animation. You can click on graphs to read values off of them and if you get a good graph, you can right-click on the graph and then re-size it to look at it more closely.

Part I - Graph Matching

A. Match the Position Graph

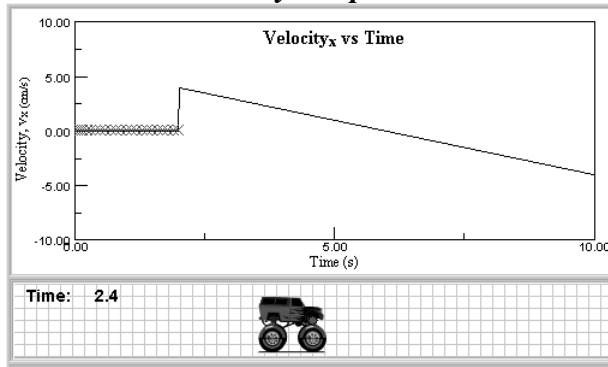


Use the mouse to drag the toy monster truck (drag at the red ball). The goal of this exercise is to match the position vs. time graphs as shown in the animation (position is given in centimeters and time is given in seconds).

After you have successfully matched the three position graphs answer the following questions.

1. Describe, in words, the motion required to replicate Position Graph 1.
2. How does the motion required to replicate Position Graph 2 differ from the motion for Position Graph 1?
3. Now consider Position Graph 3. There are essentially three segments to this graph. In the first segment you must remain stationary. In the second segment the graph is down and steep and in the third segment the graph is upward and less steep. How does the motion differ in the last two segments in terms of direction and speed?

B. Match the Velocity Graph



Use the mouse to drag the toy monster truck (drag at the red ball). The goal of this exercise is to match the velocity vs. time graphs as shown in the animation (position is given in centimeters and time is given in seconds).

After you have successfully matched the three velocity graphs answer the following questions.

1. Were you surprised by anything while you were matching the velocity graphs? Explain.
2. Describe the motion you need to match the first graph.
3. Describe the motion you need to match the second graph. Did you always move the mouse in same direction? If not, at what point did you change the direction of motion.
4. Describe the motion you need to match the third graph. Did you always move the mouse in same direction? If not, at what point did you change the direction of motion.

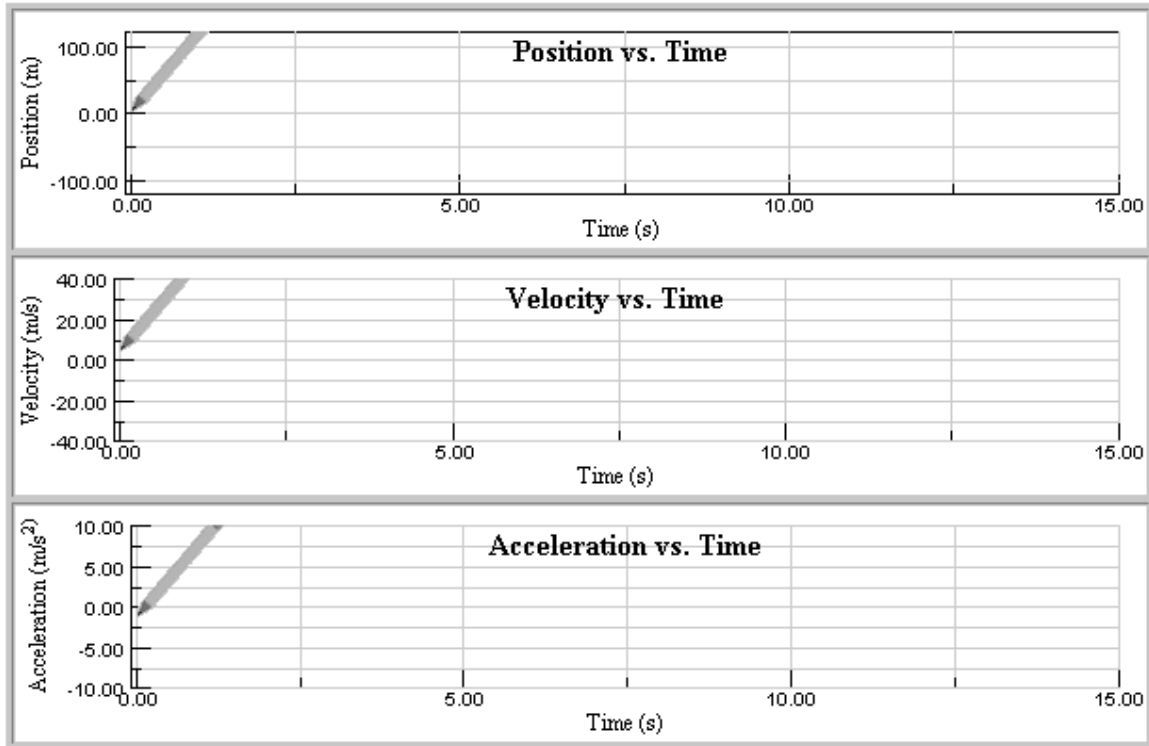
Part II. Graph Predicting

A. Given a Motion...

You are shown the motion of an object over time. After viewing the motion (push “play”),

- Drag the pencil to sketch a graph for position vs. time.
- Drag the pencil to sketch a graph for velocity vs. time.
- Drag the pencil to sketch a graph for acceleration vs. time.

Also sketch your predictions below:



Now discuss your graphs with your partners. Do your predictions match?

Once you feel confident in your responses check using the link below. DO NOT click the link below until you have WRITTEN down and DISCUSSED your predictions.

[Show All](#)

Were you correct? If not, explain (and sketch the correct plots on the graphs above).

B. Given a Position Graph...

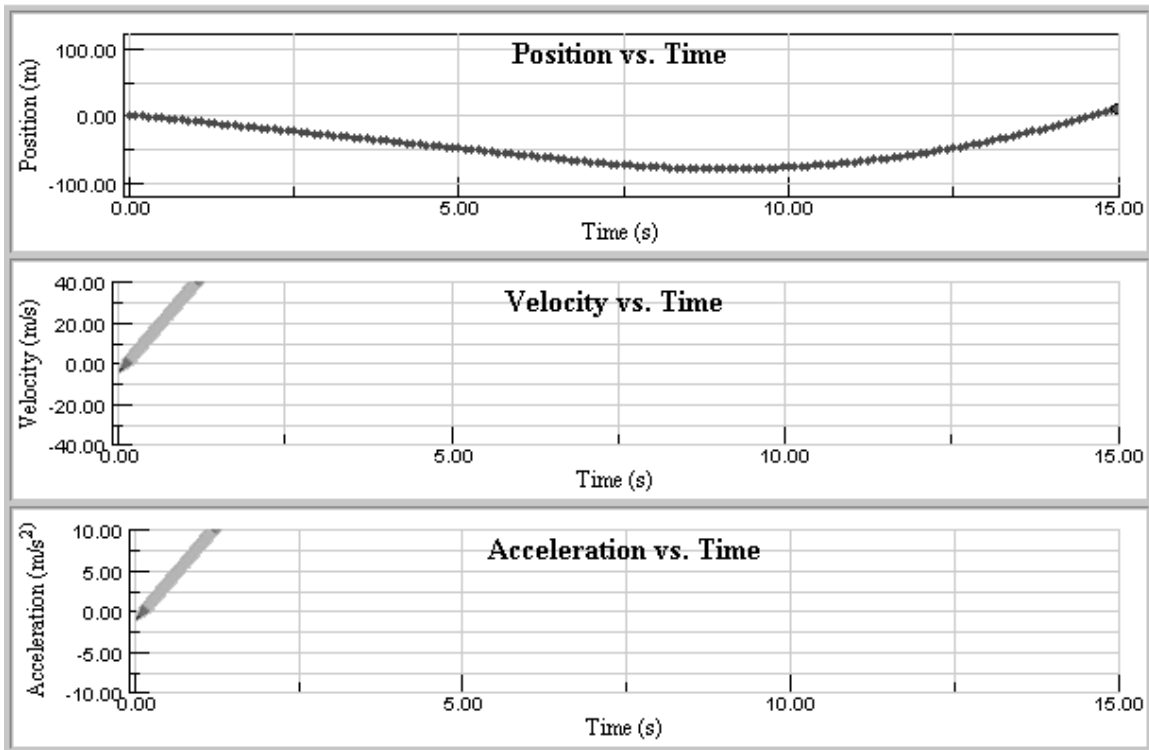
You are shown the position of an object over time. After viewing the graph (push “play”),

a) In words, describe the motion.

b) Drag the pencil to sketch a graph for velocity vs. time.

c) Drag the pencil to sketch a graph for acceleration vs. time.

Also include a sketch of your prediction on the graphs below:



Now discuss your graphs with your partners. Do your predictions match?

Once you feel confident in your responses check using the link below. DO NOT click the link below until you have WRITTEN down and DISCUSSED your predictions.

[Show All](#)

Were you correct? If not, explain (and sketch the correct plots on the graphs above).

C. Given a Velocity Graph...

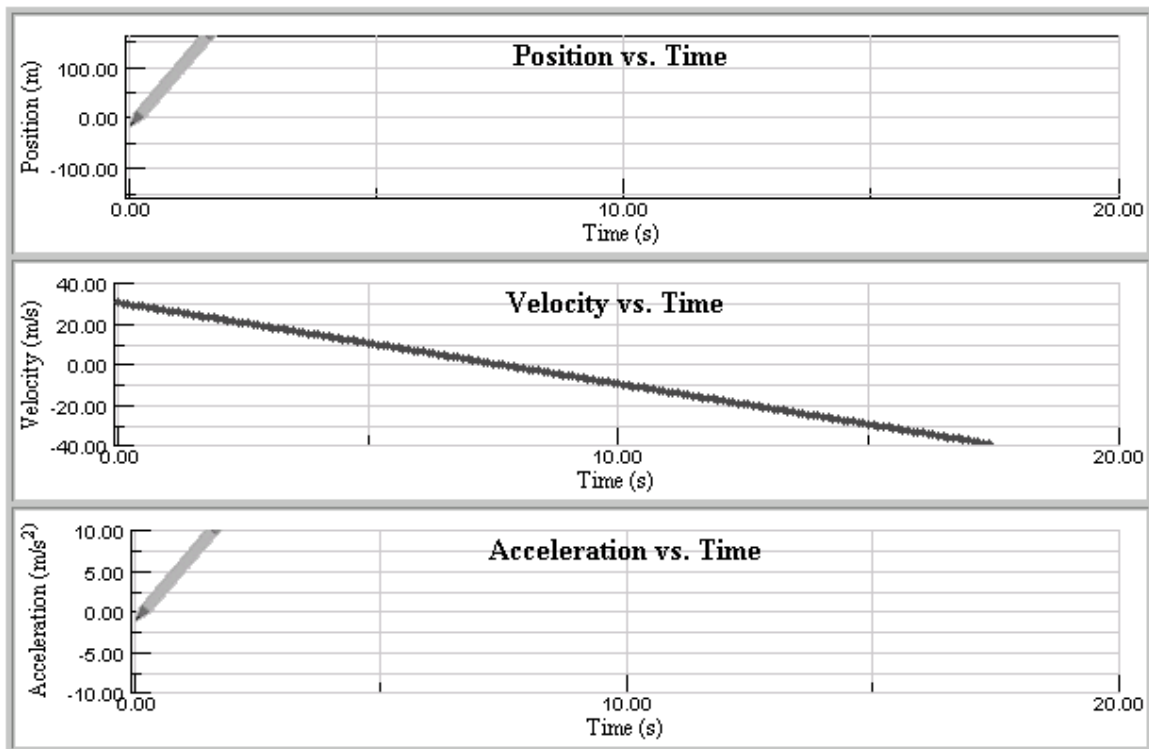
You are shown the graph of the velocity of an object over time. After viewing the graph (push “play”),

a) In words, describe the motion.

b) Drag the pencil to sketch a graph for position vs. time.

c) Drag the pencil to sketch a graph for acceleration vs. time.

Also include a sketch of your prediction on the graphs below:



Now discuss your graphs with your partners. Do your predictions match?

Once you feel confident in your responses check using the link below. DO NOT click the link below until you have WRITTEN down and DISCUSSED your predictions.

Show All

Were you correct? If not, explain (and sketch the correct plots on the graphs above).

D. Given an Acceleration Graph...

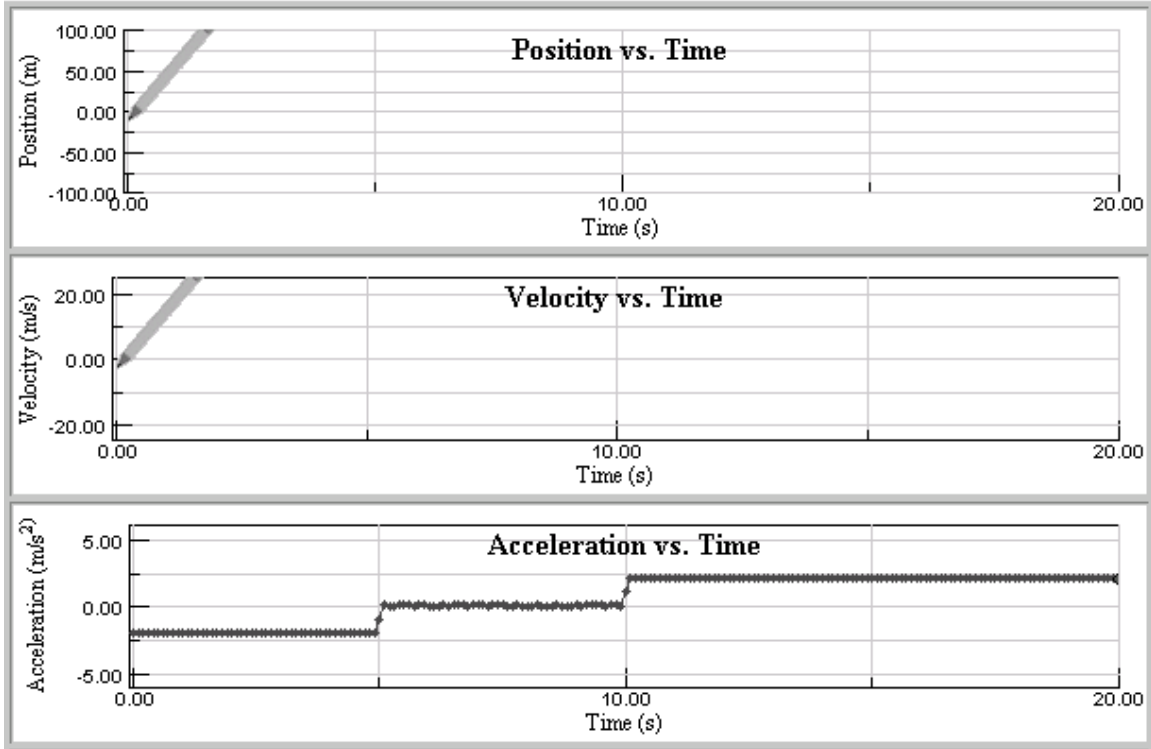
You are shown the acceleration of an object over time. After viewing the graph (push “play”),

a) In words, describe the motion.

b) Drag the pencil to sketch a graph for position vs. time.

c) Drag the pencil to sketch a graph for velocity vs. time.

Also include a sketch of your prediction on the graphs below:



Now discuss your graphs with your partners. Do your predictions match?

Once you feel confident in your responses check using the link below. DO NOT click the link below until you have WRITTEN down and DISCUSSED your predictions.

Show All

Were you correct? If not, explain (and sketch the correct plots on the graphs above).

Now view this [set of graphs](#). Notice that the acceleration graph is identical to the one above. The velocity graph is shifted and the position graph is completely different. What is going on? Are these graphs also correct? Explain.