Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Physics

Graphing Motion Computer Lab

**Objectives:** To discover the relationships between position, velocity, and time.

**Directions:**

* Go to [phet.colorado.edu](http://www.phet.colorado.edu)
* Click “Play with sims…”
* On the left hand side, click “physics” and find “The Moving Man” simulation (they’re listed alphabetically!)
* Click to open the simulation and hit the “Run Now!” button

**Procedure:**

Part I:

(move the man by dragging him with your mouse)

1. Move the man steadily to the right towards the house.

* Describe his position. (Constant? Changing? Negative? Positive?)

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* Describe his velocity. (Constant? Changing? Negative? Positive?)

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1. Hit the “Reset All” button. Move the man steadily to the left towards the tree.

* Describe his position. (Constant? Changing? Negative? Positive?)

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* Describe his velocity. (Constant? Changing? Negative? Positive?)

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* Compare/contrast the man’s position from #1 to his position from #2.

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* Compare/Contrast the man’s velocity from #1 to his velocity from #2.

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1. Hit the “Reset All” button and click to check the box marked “Velocity Vector”. Move the man to the right, slowly at first and then faster.

* Describe the arrow that represents the velocity vector. (Direction? Size?)

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* Describe his velocity. (Constant? Changing? Negative? Positive?)

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Part II:

1. Click the “Charts” tab in the upper left of the screen. You are now looking at position vs. time, velocity vs. time, and acceleration vs. time graphs. His starting point is called the *origin*.
2. Move the man steadily from the origin to the right towards the house. On the axes below, sketch the position vs. time and the velocity vs. time graphs.

Velocity

Position

Time

Time

1. (Reset All) Move the man from the origin to the left, slowly at first and then faster. On the axes below, sketch the position vs. time and the velocity vs. time graphs.

Velocity

Time

Position

Time

1. BEFORE MOVING THE MAN, ***predict\**** what the position vs. time and the velocity vs. time graphs will look like for the following scenario: the man moves from the origin to the right slowly, stops, and then turns around and moves to the left quickly. Draw your predictions on the axes below.

***\**** *it’s ok if your predictions are wrong! (you will NOT be penalized for incorrect predictions)*

Time

Position

Time

Velocity

1. AFTER DRAWING YOUR PREDICTIONS, (reset all) move the man in the described manner. Were your predictions correct? If not, explain your mistake(s).

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1. BEFORE MOVING THE MAN, ***predict\**** what the position vs. time and the velocity vs. time graphs will look like for the following scenario: the man is sleeping under the tree; when he wakes up he runs towards the house at a constantly increasing pace. Draw your predictions on the axes below.

***\*Remember****,**it’s ok if your predictions are wrong! (you will NOT be penalized for incorrect predictions)*

Time

Position

Time

Velocity

1. AFTER DRAWING YOUR PREDICTIONS, (reset all) move the man in the described manner. Were your predictions correct? If not, explain your mistake(s).

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**Conclusion:**

Answer the following questions in your own words while thinking about the activity you just completed. (You may draw a picture to help explain your answers.)

1. Describe/define position.

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1. Describe/define velocity.

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1. What is a vector?

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1. How are position and velocity related?

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1. Describe how the man could have positive position while having a negative velocity.

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1. Describe how the man could have negative position while having a positive velocity.

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1. Describe how the man could have positive position while having a positive velocity.

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1. Describe how the man could have negative position while having a negative velocity.

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