# Graphing Motion
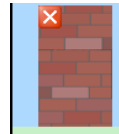## (Using PhET Simulation "The Moving Man")

Name: _____

## Setup

1.  Open the simulation: https://phet.colorado.edu/sims/cheerpj/moving-man/latest/moving-man.html?simulation=moving-man
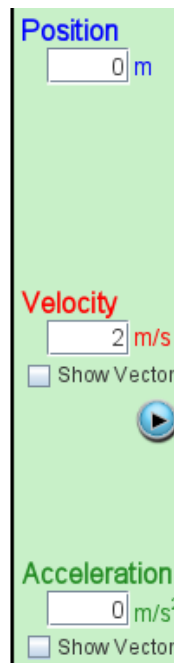
2.  Select the "Charts" tab at the top of the window.

3.  Click the "X" on one of the walls to remove the walls.

## Part A - Graphing Motion with Constant Velocity

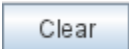1.  Set "Position" to 0, "Velocity" to 2, and "Acceleration" to 0.

2. Click the play button ▶ in the center at the bottom of the simulation.

3. As the man moves, graphs of position vs time and velocity vs time are drawn.

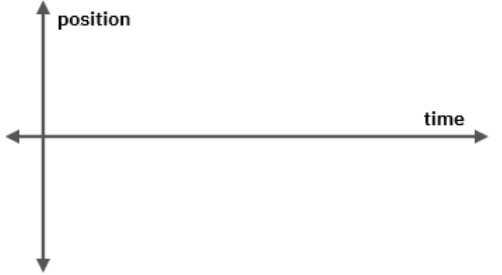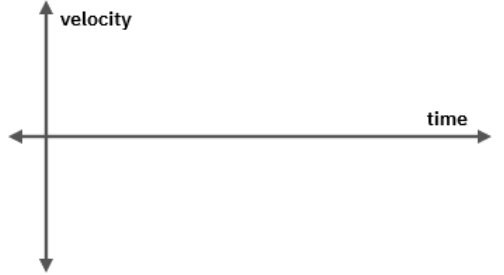   After the timer has run for approximately 5 seconds press the pause button. ⏸
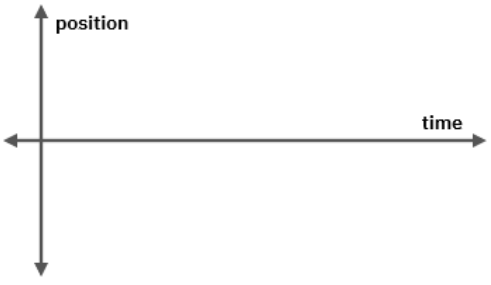
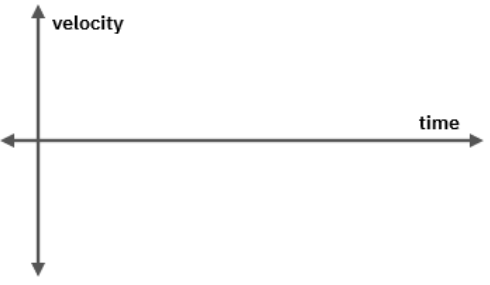   Did the man move to the right or the left? _____
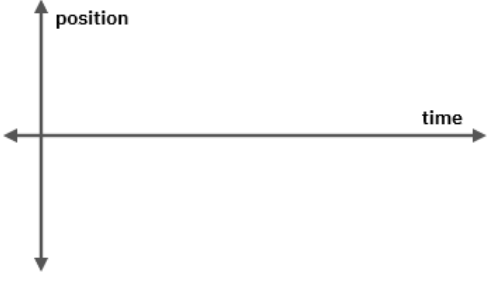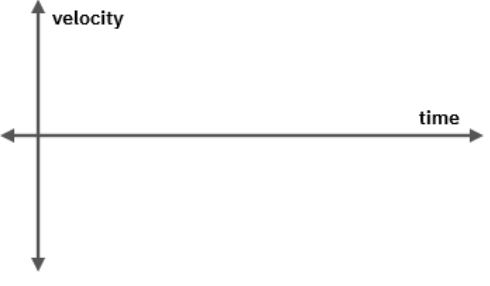
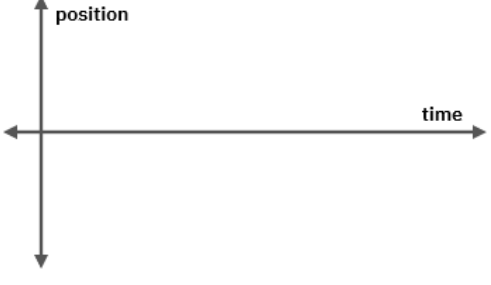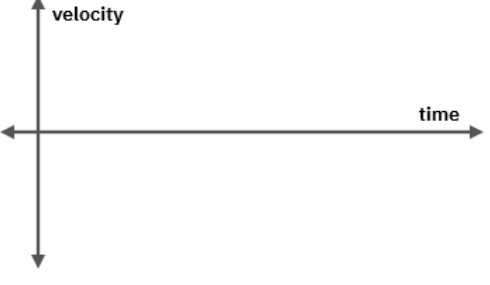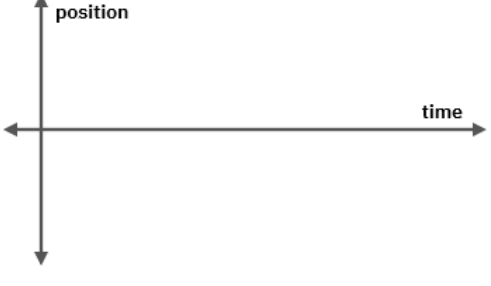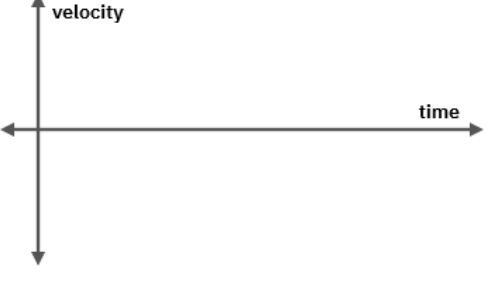4. Sketch the shape of the graphs on the following axes.

| position | velocity |
|---|---|
| (axes: position vs time) | (axes: velocity vs time) |
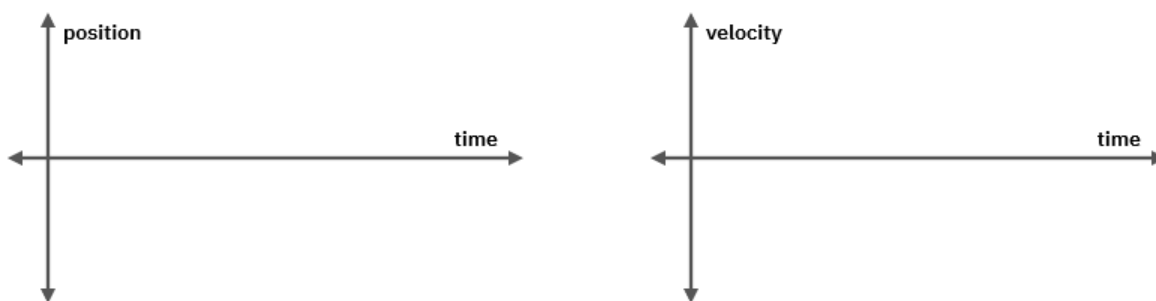
5. Click "Clear."  | Clear |

6. Set the position and velocity to the values in the table (acceleration should be set to 0) and run the simulation for approximately 5 seconds. Record the direction of motion (left or right) and sketch the shape of the graphs on the axes. "Clear" the simulation after each run.

| Settings | Graphs | |
|---|---|---|
| Position = 0 Velocity = -2  Direction:  _____ | (axes: position vs time) | (axes: velocity vs time) |

| | | |
|---|---|---|
| Position = -10<br>Velocity = 2<br><br>Direction:<br><br>_____ | position<br><br>time | velocity<br><br>time |
| Position = 10<br>Velocity = -2<br><br>Direction:<br><br>_____ | position<br><br>time | velocity<br><br>time |
| Position = 0<br>Velocity = -2<br><br>Direction:<br><br>_____ | position<br><br>time | velocity<br><br>time |
| Position = 0<br>Velocity = 6<br><br>Direction:<br><br>_____ | position<br><br>time | velocity<br><br>time |

## Part B - Graphing Motion with Constant Non-Zero Acceleration

1.  Set the position, velocity, and acceleration to the values in the table. Run the simulation for approximately 5 seconds. Record the direction of motion and sketch the shape of the graphs on the axes. "Clear" the simulation after each run.

| Settings | Graphs | |
|---|---|---|
| Position = -10<br>Velocity = 0<br>Acceleration = 1<br><br>Direction:<br>_____ | position ↑    time → | velocity ↑    time → |
| Position = 10<br>Velocity = 0<br>Acceleration = -1<br><br>Direction:<br>_____ | position ↑    time → | velocity ↑    time → |
| Position = 0<br>Velocity = 5<br>Acceleration = -1<br><br>Direction:<br>_____ | position ↑    time → | velocity ↑    time → |
| Position = 0<br>Velocity = -5<br>Acceleration = 1<br><br>Direction:<br>_____ | position ↑    time → | velocity ↑    time → |

# Part C - Application

1. Sketch a position-time graph for an object moving with a constant velocity?
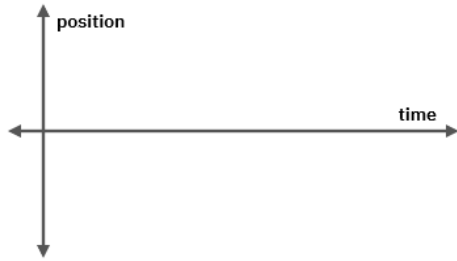
    position

    time

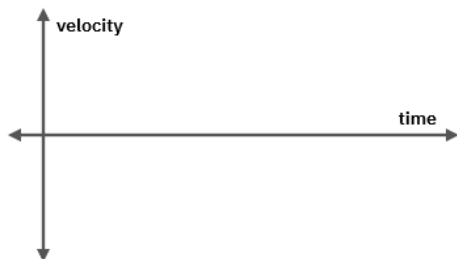2. Sketch a position-time graph for an object moving with a constant non-zero acceleration?

    position
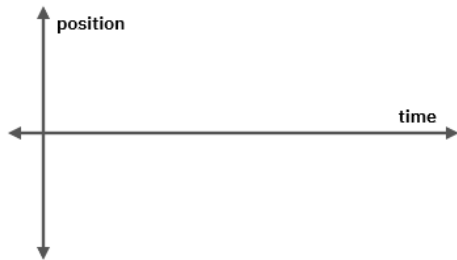
    time

3. Sketch a velocity-time graph for an object moving with constant velocity.

    velocity

    time

4. Sketch a velocity-time graph for an object moving with a constant non-zero acceleration.

    velocity

    time

5. Describe the motion shown in each of the following graphs by stating the direction of the motion AND whether the object is speeding up, slowing down, or traveling with constant speed.

(a) position

time

(b) position

time

(c) velocity

time

(d) velocity

time