





Lab 3-2: Velocity Vectors 1

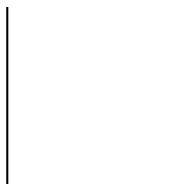
- Purpose:**
1. To learn how to use Logger Pro to analyze a movie.
 2. To determine the velocity of a toy car through video analysis.
 3. To become more comfortable relating the magnitude and direction of a velocity with its components.

Procedure:

1. Make sure there are no probes attached to the Lab Quest and start up Logger Pro.
2. Insert the movie to be analyzed as follows: under "Insert" choose "Movie..." and pick the correct movie. (Look on the board if you are part of the lab group in which no one paid attention.)
3.  Enable video analysis by clicking on the box on the bottom right of the movie that looks like the button to the left.
4.  Set the scale of the movie by clicking on the "Set Scale" button (upper right corner), then clicking and dragging between the vertical black lines in the movie. The vertical black lines are 0.305 meters apart.
5.  Set the origin by clicking on the "Set Origin" button (upper right corner), and then clicking on the first position of the car. Click on the small yellow dot in the passenger seat.
6. Now that the scale and origin is entered, you don't need to see it (and in fact they both get in the way) so click on the buttons labeled "Show Origin" and "Show Scale" to turn them off.
7.  Now to record the actual position of the car for each frame of the movie, click on the "Add Point" button (upper right corner.) Carefully center the mouse on the yellow dot in the passenger seat, and click. Logger Pro will record the x and y coordinates of the mouse click, and the movie will automatically go the next frame. Do this until the car gets past the vertical black line.
8. To clean up the window, under **Page**, choose **Auto Arrange**. You should now see the position vs. time graphs on the main screen.
9. To add the velocity vs. time graphs, under **Insert**, choose **Graph**. A floating window will appear with a new graph in it. Again, under **Page**, choose **Auto Arrange**.
10. To add the second velocity graph, click on the axis label (probably "Y Velocity") and then choose **More...** in the pop-up window that appears. Make sure both "X Velocity" and "Y Velocity" are checked off and then click **OK**. Also, double-click on the middle of the velocity graph. In the left half of the "Axes Options" window that pops up, you will see a menu item labeled "Autoscale." Make it "Autoscale From 0."
11. Sketch what the graphs look like in the space below. Make sure you label each graph. As always, determine the slopes of any non-horizontal lines by highlighting the middle half of the graph.
12. To do another trial, clear out the existing data by choosing "Clear All Data" under the "Data" menu. Then get to the start of the next trial and record the positions of the yellow dot. The graphs will remake themselves, but you will have to redo the slopes of the position graphs. Keep going until you are done. You don't have to sketch the graphs after trial 2 - just record the velocity components.

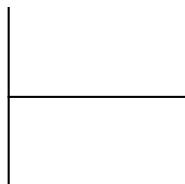
Data:

Trial 1: Pure Horizontal



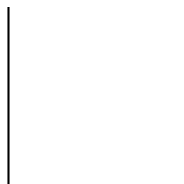
slope = _____

intercept = _____



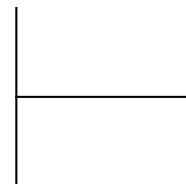
slope = _____

intercept = _____



slope = _____

intercept = _____

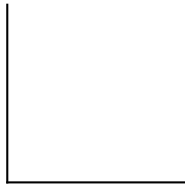


slope = _____

intercept = _____

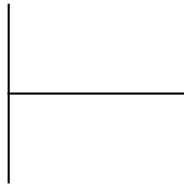
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Trial 2: Small Angle



slope = _____

intercept = _____



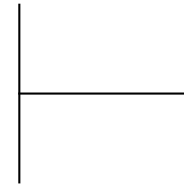
slope = _____

intercept = _____



slope = _____

intercept = _____



slope = _____

intercept = _____

Components of Velocity for each Trial

Trial 1	Trial 2	Trial 3	Trial 4
$v_x =$	$v_x =$	$v_x =$	$v_x =$
$v_y =$	$v_y =$	$v_y =$	$v_y =$

Question:

- For the first three trials, write the equation that relates the data.

Trial 1	Trial 2	Trial 3
$x =$	$x =$	$x =$
$v_x =$	$v_x =$	$v_x =$
$y =$	$y =$	$y =$
$v_y =$	$v_y =$	$v_y =$

- For each trial, calculate how fast the car was moving. (In other words, calculate the magnitude of the velocity from the two components of the velocity.)

- Did you get the same speed from each trial? Does that make sense?

- Did the car have the same velocity each trial? Explain.

- Why didn't we make you sketch the graphs for every trial?