

Using Excel, create a position – time graph (scatter plot) of the data. Add a line of best fit (trend line) for each series of data.

Questions

1. How far did the bubble in the green tube travel in 7 seconds? _____
2. How far did the bubble in the red tube travel in 7 seconds? _____
3. How far did the bubble in the blue tube travel in 7 seconds? _____
4. In which tube was the bubble the fastest? _____
5. Which tube had the steepest graph? _____

Equation of a Line and Slope

The equation of a line is given in the form of:

$$y = mx + b$$

Where m = slope of line ($\Delta y / \Delta x$)

b = y-intercept (point at which the line crosses the y-axis)

6. Pick any two points on one of the trend lines and calculate the slope. Hint: Pick (0, 0) as one of the points to make the calculation easier. Don't forget to include units!

$$\Delta y = y_2 - y_1 = \underline{\hspace{2cm}}$$

$$\Delta x = x_2 - x_1 = \underline{\hspace{2cm}}$$

$$m = \Delta y / \Delta x = \underline{\hspace{2cm}}$$

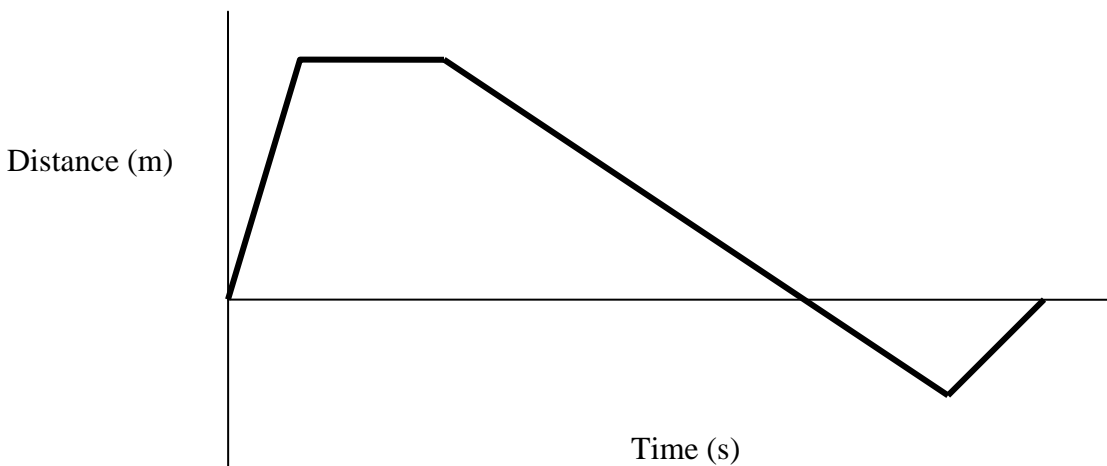
7. How does the slope you calculated compare to the slope in the trend line equation that Excel displayed? _____
8. What are the units of slope for the bubble tube trend lines? _____
9. For a position – time graph, what does the slope represent? _____

Challenge Questions

1. Can the slope of a line be negative? What would that look like? What would it represent?

2. Can the slope of a line be 0? What would that look like? What would it represent?

3. Look at the position – time graph below. Act out the motion represented by the diagram and make up a story to explain the motion.

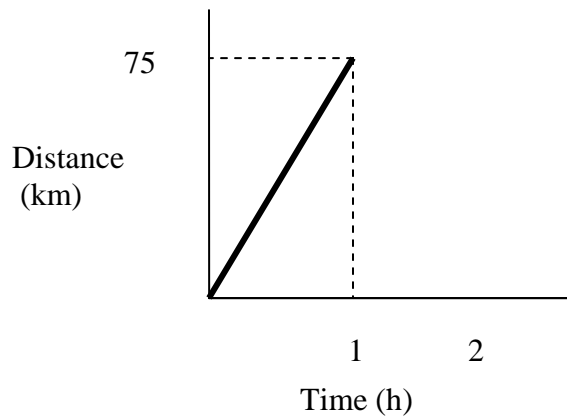


4. **Bonus Question:** Imagine an object that goes faster and faster as it travels. Sketch the shape of its position – time graph.

Exploring Motion Velocity – Time Graphs

Velocity refers to both the **speed** and **direction** of the motion of an object.

What is the velocity of the car traveling as shown in the position – time graph below?

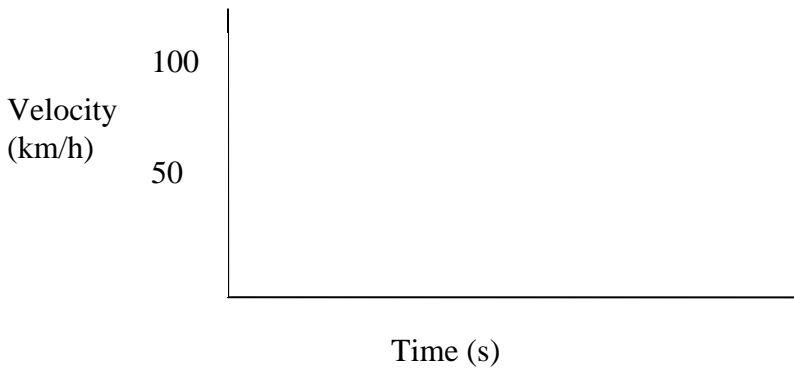


$$\Delta y = y_2 - y_1 = \underline{\hspace{2cm}}$$

$$\Delta x = x_2 - x_1 = \underline{\hspace{2cm}}$$

$$m = \Delta y / \Delta x = \underline{\hspace{2cm}}$$

Draw the car's velocity on the velocity – time graph below.



Challenge Question

1. Look at the velocity – time graph below. Act out the motion represented by the diagram and make up a story to explain the motion.

