MODULE: *Marvellous Motion*
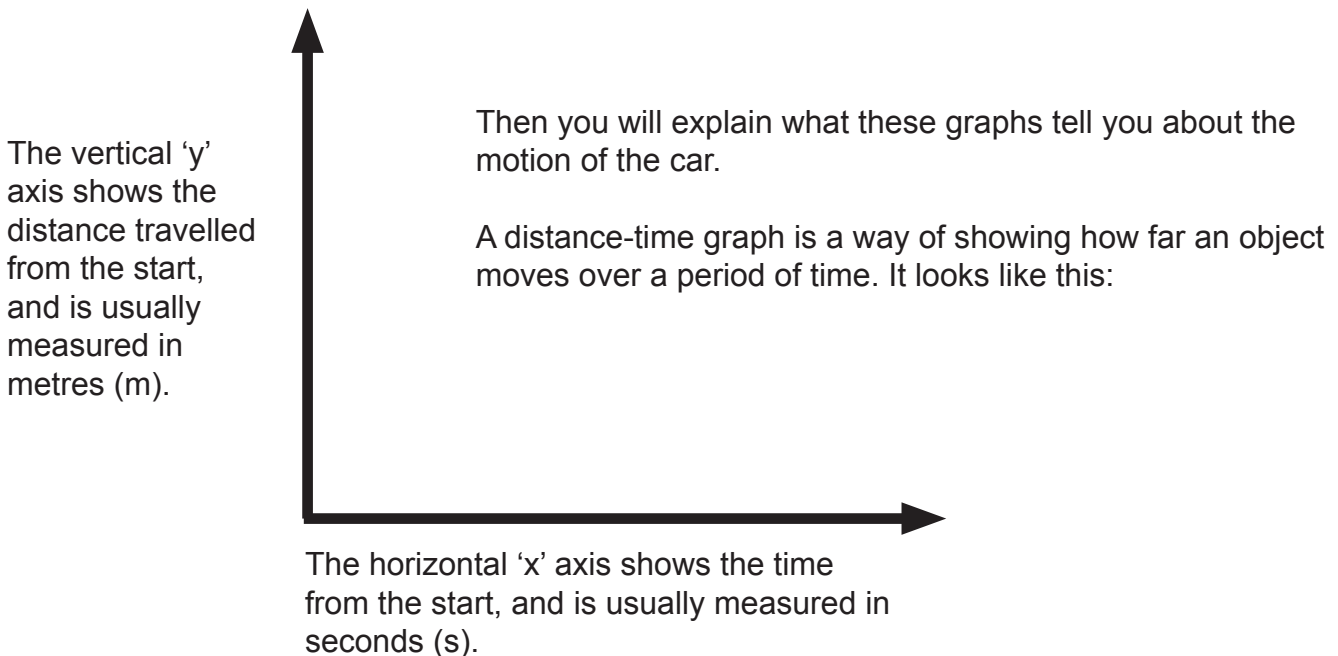
Episode 1: How Fast?

Activity Sheet 1.2 Distance- Time Graphs

You are going to plot two sets of data to create two distance-time graphs.

You will also calculate the average speed for each of the cars using the equation.

$$\textbf{Speed (m/s)} = \frac{\textbf{Distance (m)}}{\textbf{Time (s)}}$$

The vertical 'y' axis shows the distance travelled from the start, and is usually measured in metres (m).

Then you will explain what these graphs tell you about the motion of the car.

A distance-time graph is a way of showing how far an object moves over a period of time. It looks like this:

The horizontal 'x' axis shows the time from the start, and is usually measured in seconds (s).

Data for you to plot
The data below was gathered for two cars passing between two points 50 metres apart.

Data Set 1

Time (s)	0	1	2	3	4	5
Distance (m)	0	10	20	30	40	50

Data Set 2

Time (s)	0	1	2	3	4	5
Distance (m)	0	4	12	22	34	50

1. Draw a line across the graph paper (the x axis, for Time), and make 7 small marks evenly spaced along it. Label them: 0 at the left-hand of the axis line, then 1, 2, 3, 4, 5 and 6 at the righ-hand end.

2. From the left-hand end of the x axis, draw a line going up the paper (the y axis, for Distance). Make 11 marks evenly spaced up it, and label them: 0 at the bottom of the axis line, then 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 at the top.

3. Plot the two sets of data on the same graph.

4. Using the equation near the top of this sheet, calculate the average speed for each car. What do you notice about the average speeds?

5. Explain what each of the lines tells you about the motion of that car.

6. Discuss your results with a classmate. What information is available to you by looking at the distance-time graph?

Speed-Time graphs
These may look similar to distance-time graphs- but they are different!

1. Draw up a new graph, with:
   • the x-axis showing time up to 120 seconds in 10 second divisions, and
   • the y-axis showing the speed up to 100 m/s in 10 m/s divisions.

2. Using the data from the video clip in Period 1, plot the car's journey around the Sepang circuit.

3. Discuss with your partner: What does the steepness of the line tell you? What does a horizontal line mean? What is the car's highest speed? Where are acceleration and deceleration taking place?