



The aim of a road test is to assess car performance by finding out how quickly the car can accelerate to reach different speeds, and how well the brakes work. Information in car magazines is often given in tables or graphs. These can be used to compare the acceleration and braking performance of new cars or models with those of earlier models.

In this activity you will study data collected from a road test.

Information sheet

The time taken by a car to reach the true speed of 30 mph was recorded, as well as the speed indicated by the speedometer (Indicated speed) at that time. This was repeated at intervals of 10 mph up to a maximum speed of 90 mph. The results of this test are given in the table below.

Acceleration from rest

Time t (seconds)	True speed v (miles per hour)	Indicated speed u (miles per hour)
2.3	30	34
3.5	40	45
5.0	50	55
6.8	60	66
9.4	70	78
13.1	80	89
20.5	90	99

The brakes were also tested by measuring the distance travelled by the car in coming to rest from different speeds. The track surface was dry and maximum braking was used. The results of this test are given below.

Brakes	
True speed v (miles per hour)	Distance d (metres)
30	9.5
50	27.5
70	52.4
85	98.7

Think about...

What comments can you make on these data?

Why are only dry surfaces used for the tests?

How might the results be different if wet surfaces were included?

Try these

Graphs can be drawn by hand or by using a computer or graphic calculator.

- 1 Use the **Acceleration from Rest** data from the Information Sheet.
 - a Use this data to plot points on a graph of indicated speed against true speed.
 - b Is it correct to join these data points with a line?
 - c Should it be a straight line?
 - d Should it pass through the origin?
 - e What does it mean if the line passes through the origin?
 - f If the line does not pass through the origin, what does this tell you about the speedometer?
 - g Draw a line on your graph.
 - h What does the graph as a whole tell you about the speedometer?

Think about...

What advice would you give to a motorist using this car?

- 2 Use the **Acceleration from Rest** data from the Information Sheet.
 - a Use the data to plot points on a graph of true speed against time.
 - b Explain why it is appropriate to use the origin as an extra data point.
 - c Draw a curve through the origin and the data points.
 - d Where is the graph at its steepest? Where is it least steep?
What does this tell you about the acceleration of the car?
 - e How do you think the graph would continue if it were extended to show later times?

Think about...

Is this what you would expect in the real situation?

- 3 Use the **Acceleration from Rest** data from the Information Sheet.
 - a Use the data to plot points on a graph of indicated speed against time.
 - b Is it appropriate in this case to use the origin as a data point?
What would it mean if the line was not drawn through the origin?
 - c Draw a curve through the data points.

- d** Use your graph to predict the indicated speed after:
- (i)** 10 seconds **(ii)** 15 seconds
- e** Use your graph to estimate how long it takes the car to reach an indicated speed of
- (i)** 40 mph **(ii)** 85 mph.
- f** Compare your graph with that drawn for question 2.

4 Use the **Brakes** data from the Information Sheet.

a Use this data to plot points on a graph of distance against true speed.

b Is it appropriate in this case to use the origin as a data point?

What does this indicate about the real situation?

c Draw a curve through the origin and the data points.

d Use your graph to predict the distance required to come to rest from a speed of:

(i) 20 mph **(ii)** 80 mph

Think about...

Do you think it is reasonable to extend the graph to predict what would happen at higher speeds?

Reflect on your work

What does each graph tell you about the car's performance during the test drive?

Write a brief summary.