What's it worth?

In this activity you will solve differential equations, and consider which of a range of suggestions gives the best model for a car's value in terms of its age.

Information sheet

Most cars depreciate in value as they get older.

There are a variety of ways in which this situation can be modelled mathematically.

Here are some suggestions.

Model A The value of the car depreciates at a constant rate.

Model B The rate of depreciation is proportional to the age of the car.

Model C The rate of depreciation is proportional to the value of the car.

Model D The rate of depreciation is inversely proportional to the age of the car.

Model E The rate of depreciation is inversely proportional to the square root of the age of the car.

Model F The rate of depreciation is inversely proportional to the value of the car.

Model G The rate of depreciation is proportional to the square of the value of the car.

Model H The rate of depreciation is proportional to the square root of the value of the car.

Think about…

- how the rate of depreciation appears on a graph of value against time
- whether the gradient is positive or negative
- which of the suggested models are likely to be good models of the situation
- how you could use calculus to find a function to model a car's value in terms of its age.

Try these

Investigate one or more of the suggested models in depth.
As part of your investigation:

- Collect some real data about the value of a car at different ages.
- Find the value of a car as a function of age for the model(s) you have chosen.
- Compare predictions from the model(s) with the real data you have collected.
- Make use of the key features of functions and their graphs (such as gradients and intercepts) in reaching your conclusions.

Reflect on your work

Which model(s) do you prefer?

Explain your preference by comparing the features of these model(s) with those of models you have rejected.