

Why use this resource?

This task involves modelling an every-day situation and analysing some of the consequences of various different models. It can be used to emphasise issues around the appropriateness of simplifying assumptions and the choice of different models. The task involves some interesting algebra, some data fitting, graphing and thinking about units. One part can optionally involve some calculus. Some of the results of the analysis may seem surprising, which can lead students to examine carefully the way the model has been set up.

Preparation

This task can be undertaken entirely on paper, but you might prefer to give students access to graphing software such as [Desmos](#) which can help with the graph fitting and finding turning points. Students might also find a spreadsheet helpful – processing the numeric data rather than an algebraic representation.

Possible approaches

Students could work on this individually, but will probably benefit from working in pairs or small groups. The task comes in several parts which can be used sequentially or given to students as a whole.

Key questions

Students should be encouraged to think carefully about the modelling process, how valid the assumptions are and how realistic the conclusions are. The task also involves some mixed up units which students must be aware of and treat carefully.

- What are the units of those quantities? Do you need to convert any of them?
- Can you simplify that algebra?
- Does it fit the data in the table?
- Could you sketch the graph?
- How would you find the maximum?
- Imagine you were driving a car. Does this result seem sensible?

Possible extension

Students could be encouraged to think about the assumptions used and to come up with alternative models that might produce different results. They could use the internet to research published information on road traffic modelling.