



In this activity you will use mathematical functions to model the number of people suffering from a cold over several weeks.

## Information sheet

At the beginning of term it is noticed that many university students living in a particular hall of residence have a cold. The way the cold spreads is monitored by recording the number of students suffering from colds every five days.

The results are given in the table below, where  $t$  represents the number of days after monitoring began, and  $s$  represents the number of students with a cold.

$t$	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70
$s$	25	31	38	43	47	47	45	41	36	30	24	19	14	11	8

## Think about...

- What shape will this data give on a graph?
- Which type of mathematical functions could give approximately the same shape?

## Try this

Write a report about the rise and fall of the number of cases of colds.

**1** Find:

- a** a trigonometrical function that can be used to model the full data set;
- b** a polynomial function that can be used to model the data for values of  $t$  between 0 and 50.

**2** Compare your models with each other's and with the original data.

In your report you should:

- choose appropriate models;
- explain how you chose the parameters of your functions, referring to how they relate to basic functions of their type;
- show clearly the stages of your working when using algebraic or trigonometric techniques;
- use a graphic calculator or computer software to compare graphs of your functions with a graph of the original data;
- consider the effectiveness of each function as a model;
- use your graphs of functions to predict what will happen in cases for which you have no data.

### Reflect on your work

What types of functions provided good models for the data?

Why does the number of students not start with a low number?

What problems would there be in collecting such data?

How might inaccuracies in the data affect your models?