

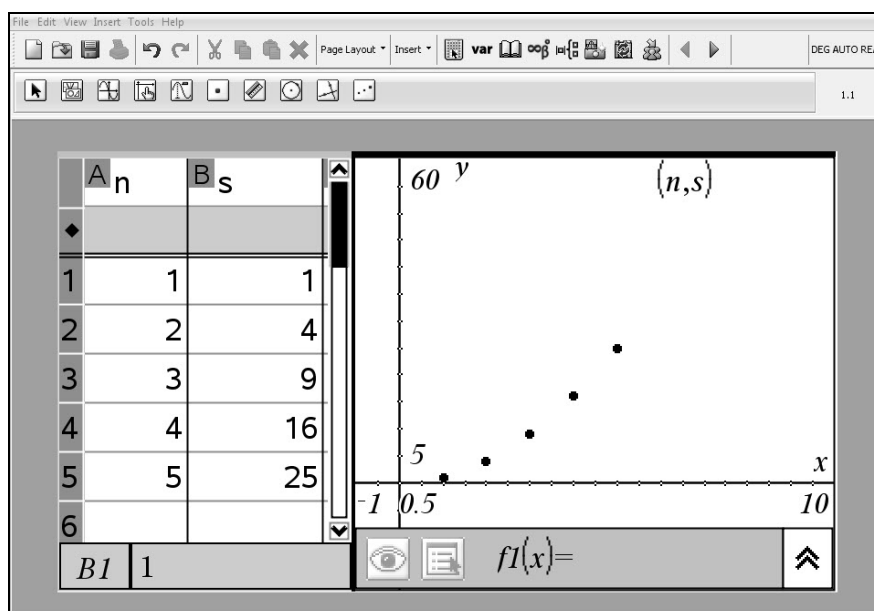
## Cathy

Cathy is an advanced skills teacher of mathematics with a particular interest in using technology and was introduced to a range of resources (Coypu, Cabri-geometry and graphics calculators) whilst on her initial teachers education course. Over the years she had developed many ICT activities for mathematics schemes of work years and she generally embraces new technologies, always looking to see how she can adapt old approaches and develop new ones. She sees ICT as providing an ideal opportunity for the students to explore the mathematical ideas for themselves and prefers them to have hands-on personal access rather than only watch demonstrations in whole class sessions. Consequently, although she has worked in a number of schools with varying access to computer suites, she has always used graphical calculators, which are a resource that the mathematics department can manage for itself.

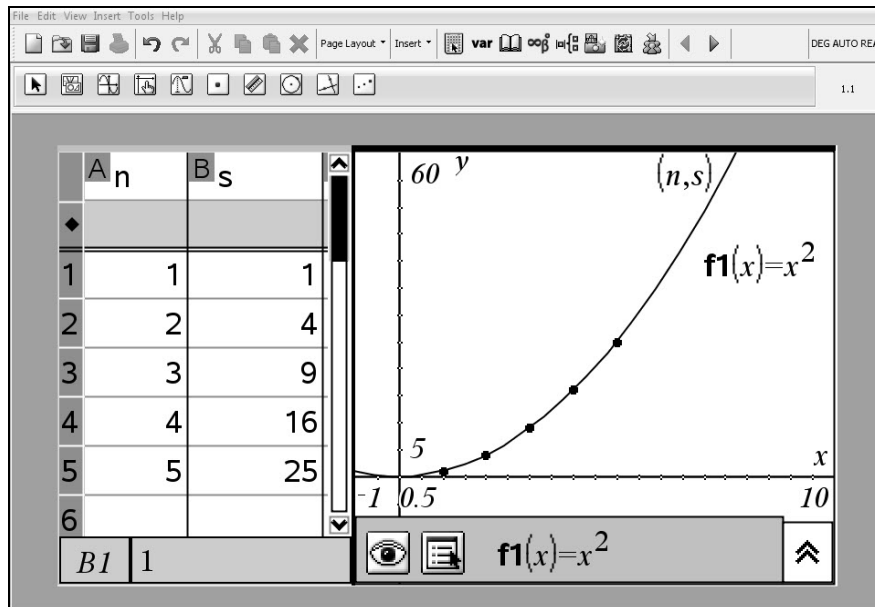
### Familiar territory – Introducing quadratic functions

In her early TI-Nspire lessons, Cathy began by taking an approach she had used many times using graphing calculators in which students explore a physical growing pattern and attempt to model it mathematically by entering equations to “fit the data”.

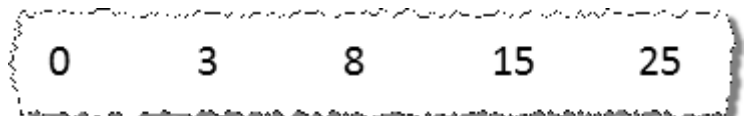
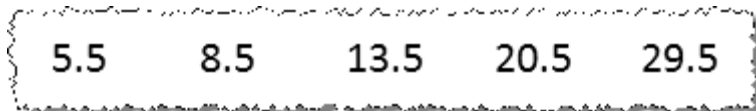
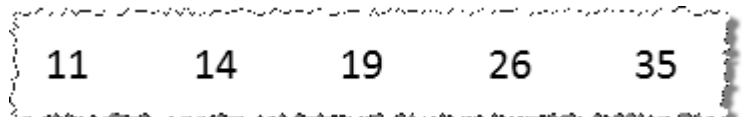
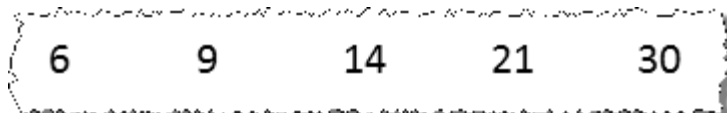
She started by displaying the pattern of square numbers on the board, 1, 4, 9, 16 and asked her year 8 middle ability class what they noticed about the pattern – How was it growing? Could they predict the next number? and so on. She then displayed a page from a TI-Nspire file that she had prepared before the lesson (and also pre-loaded onto the class set of handhelds). She had chosen a split page with a Spreadsheet on one side and a Graphs and geometry page on the other. Cathy had set up a Scatter plot so that, as the data was entered into the columns defined as “n” and “s”, so the coordinate points were plotted on the graph.



Cathy then asked the students to suggest different “rules” (in terms of  $x$  and  $y$ ) to enter as a function to try to fit through the points. Initially the students made suggestion like  $f(x) = 1$  and  $f(x) = 4$ , which produced horizontal lines which the class discussed. After a few minutes to explore this for themselves, the class arrived at  $f(x) = x^2$  which seemed to make sense.



Cathy then gave the students a set of cards, each with a different number sequences. Of course Cathy had chosen these because they were of the type  $y = x^2 \pm a$ , but this was not obvious to the students!



The students were then asked to choose a sequence and, using their TI-Nspire handheld, open the file that Cathy had preloaded and input the data into the Spreadsheet and try to work out the equation that would fit exactly through the coordinate points that had appeared on the graph.

Cathy had given the students a set of card squares and she asked the students to think about how the original square number pattern has been transformed to produce the new sequence.

This is probably easiest to see with the sequence 0, 3, 8, 15, 24... where each "square number" has been reduced by one.

Finally, the students were asked to produce a large poster that displayed their physical pattern of squares, their sequence of numbers, a screen shot of their graph and, most importantly their explanation of why their rule fitted their sequence. Cathy concluded that the use of TI-Nspire has supported the students to make important connections between the different representations of the situation in addition to being the first time they had met curved graphs!