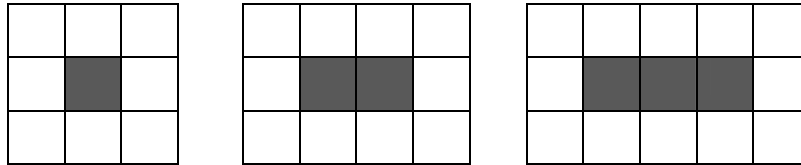


## GARDEN BED PAVERS

This activity is used in year 8 (patterns and algebra) from Maths300. Using TI-Nspire Lists & Spreadsheet and Graphs & Geometry, a rule to predict the number of Pavers around a Garden Bed will be derived.

Pavers are arranged around a garden bed. The garden bed is of a rectangular shape. The garden bed is shaded and the pavers are arranged around the garden bed. The pattern is continued.



For this activity, allow “g” to represent the number of garden beds and “p” to represent the number of pavers that correspond to the garden bed.

Garden Bed	Number of Pavers
1	8
2	10
3	12
4	14
5	16

### Sample questions:

How many pavers would be required for a garden bed of size 12?

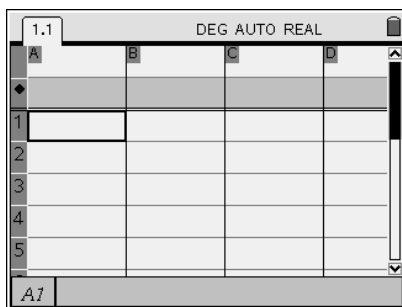
How many pavers would be required for a garden bed of size 29?

Derive a rule to link the number of pavers to the size of the garden bed.

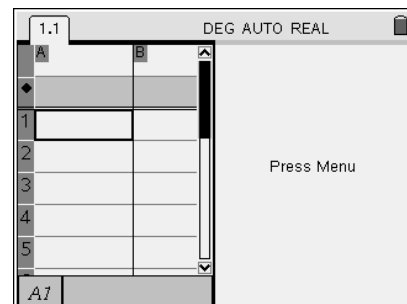
What size garden bed could be made if you had 62 pavers?

### Teacher Notes (or self-pacing activity for students)

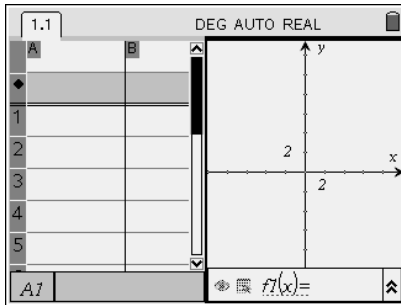
(A) Add Lists & Spreadsheet to your page ( Lists & Spreadsheets).



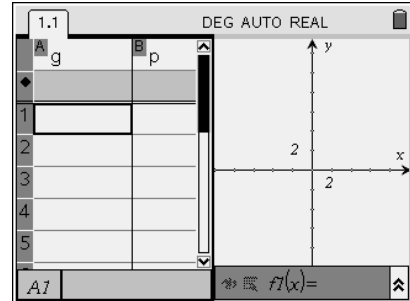
(B) Split page into two panes ( Page Layout, Select Layout, Layout 2) (or have separate pages).



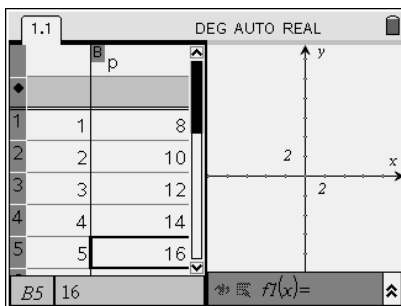
**(C)** Move to the new pane (  $\text{ctrl}$   $\text{tab}$  ). Insert a Graphs & Geometry to the pane (  $\text{ctrl}$   $\text{g}$  ) (Graphs & Geometry).



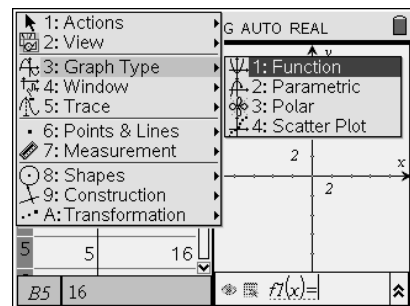
**(D)** Highlight Lists & Spreadsheet (  $\text{ctrl}$   $\text{tab}$  ) and use your navpad (  $\blacktriangle$  ) to place the cursor into the white box near the column heading "A". Type in "g" and press  $\text{enter}$ . Type "p" in column heading B and press  $\text{enter}$ .



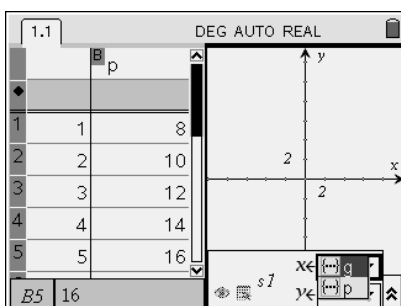
**(E)** Use your navpad and enter the values from your table into your Lists & Spreadsheet.



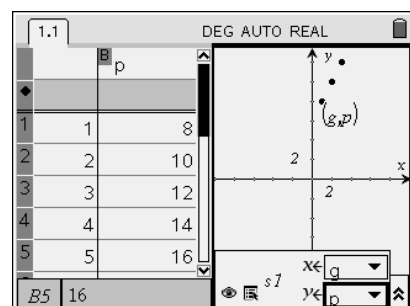
**(F)** Move to the Graphs and Geometry pane (  $\text{ctrl}$   $\text{tab}$  ). Draw a scatterplot (  $\text{menu}$  Graph Type, Scatter Plot ).



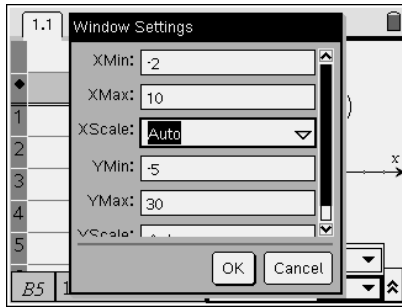
**(G)** Press  $\text{enter}$  and use your navpad to highlight variable "g" for the x-axis and press  $\text{enter}$ . Press  $\text{tab}$   $\text{enter}$  to allow you to allocate the variable "p" to the y-axis and press  $\text{enter}$ .



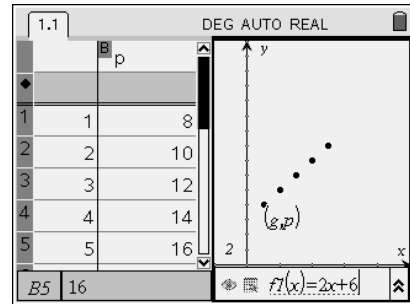
**(H)** Unfortunately the window/axes on the Graphs & Geometry pane are not positioned for optimal viewing. There are a few ways to rectify this.



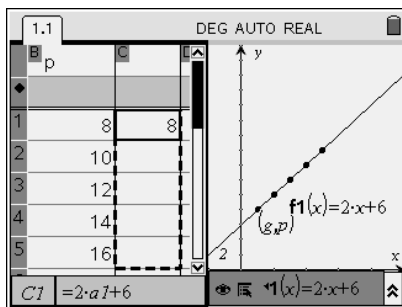
**(I)** Set your preferred viewing window (  $\text{menu}$  Window, Window Settings) . Press  $\text{tab}$  to move to each setting and adjust. Move to OK (  $\text{tab}$  ) and press  $\text{enter}$  .



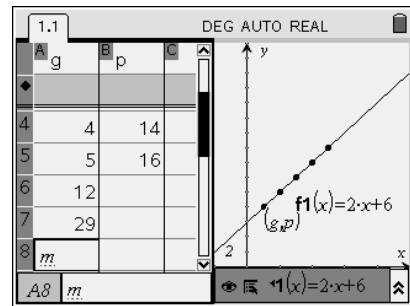
**(J)** Using your knowledge of number patterns, determine a rule to match the data. Enter a rule in the function command line (  $\text{menu}$  Graph Type, Function and enter  $2 \cdot x + 6$  and press  $\text{enter}$  ).



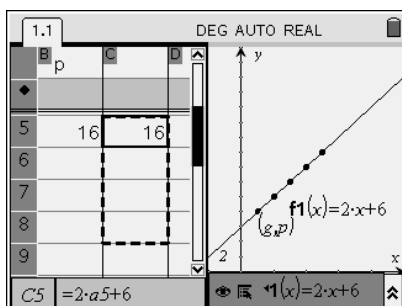
**(K)** Another procedure to check if the derived rule is correct is to press  $\text{ctrl}$   $\text{tab}$  and move to the cell C1. Enter the rule  $p = 2 \cdot b + 6$  (  $\text{=}$   $2$   $\text{A}$   $1$   $+$   $6$   $\text{enter}$  ). Use your navpad to move back to cell C1. Press the centre of the navpad until the box around the cell changes to a dashed box. Press the down arrow of navpad and move to cell C5 and press  $\text{enter}$  .



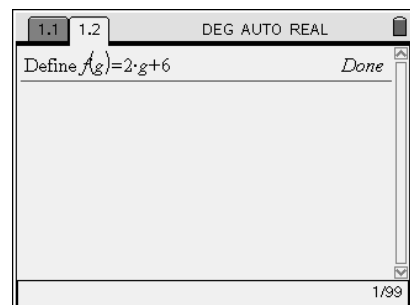
**(L)** You may wish to resize columns (press  $\text{ctrl}$  Actions, Resize, Resize Column Width). To check your answers for how many pavers are required for garden beds of size 12 and 29, move to an empty cell in column A and enter 12 and then press  $\text{enter}$  . Repeat the procedure for 29. To reinforce algebraic understanding, insert "m" under 29.



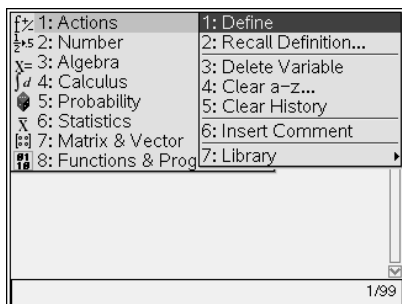
**(M)** Copy the formula in column C from C5 to C8.



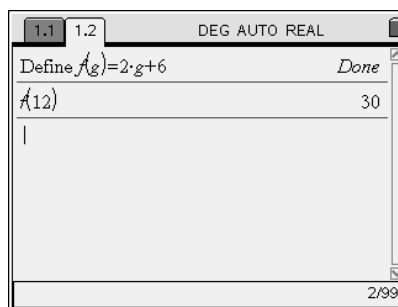
**(N)** Function notation, substitution and solving can be investigated in a new Calculator page (  $\text{ctrl}$   $1$  ). Define the function  $f(g) = 2g + 6$



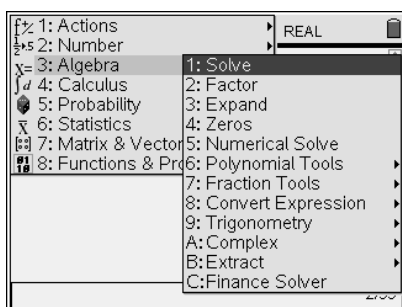
**(O)** You may need to clear variables at times. Another procedure is to clear the variables by pressing  $\text{[menu]}$  Actions, Clear a-z



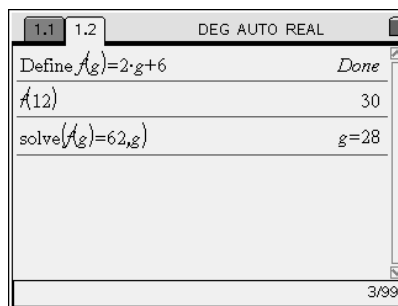
**(P)** Evaluate  $f(12)$  and check to see if it matches your data.



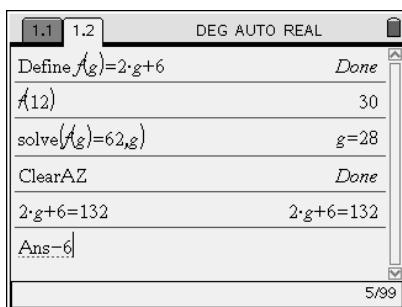
**(Q)** Solve the question “What size garden bed could be made if you had 62 pavers?”  
 (  $\text{[menu]}$  Algebra, Solve  $\text{[enter]}$  ).



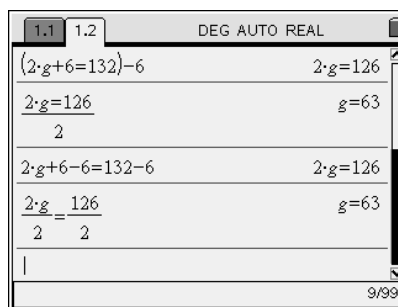
**(R)** Enter the equation ensuring that the correct syntax has been used. After pressing  $\text{[enter]}$ , the solution of  $g = 28$  will be identified.



**(S)** Use your TI-Nspire to calculate via algebraic procedures the solution to  $2g + 6 = 132$ . Enter the equation using the keypads and press  $\text{[enter]}$  and then press  $\text{[6]}$   $\text{[enter]}$ .

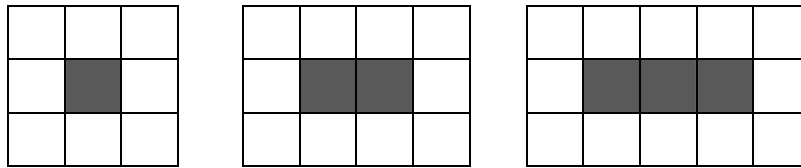


**(T)** Press  $\text{[2]}$   $\text{[*]}$   $\text{[6]}$   $\text{[=]}$   $\text{[132]}$   $\text{[-]}$   $\text{[6]}$   $\text{[enter]}$ . The solution  $g = 63$  is shown. You can solve the equation by copying the equation and inserting  $\text{[2]}$   $\text{[6]}$  on each side and then copying the answer and then inserting divide 2.



# GARDEN BED PAVERS

Pavers are arranged around a garden bed. The garden bed is of a rectangular shape. The garden bed is shaded and the pavers are arranged around the garden bed. The pattern is continued.



**Question 1**

Draw the next two sized garden beds.

**Question 2**

Complete the table.

Garden Bed	Number of Pavers
1	
2	
3	
4	
5	

**Question 3**

How many pavers would be required for a garden bed of size 12?

**Question 4**

How many pavers would be required for a garden bed of size 29?

**Question 5**

Derive a rule to link the number of pavers to the size of the garden bed.

**Question 6**

What size garden bed could be made if you had 62 pavers?

**TI-Nspire**

Use your TI-Nspire enter the data into Lists & Spreadsheets.

Draw a scatterplot of the data.

Verify your answers using your spreadsheet and also verify your answers in the Calculator page. Show your teacher your final screens. You may wish to split the screen into two panes and have the Lists & Spreadsheet and Graphs & Geometry pages being viewed at the same time.

**Extra**

Each figure is made from matchsticks. Apply the questions above to the pattern below (i.e. How many matchsticks are required for each figure?).

