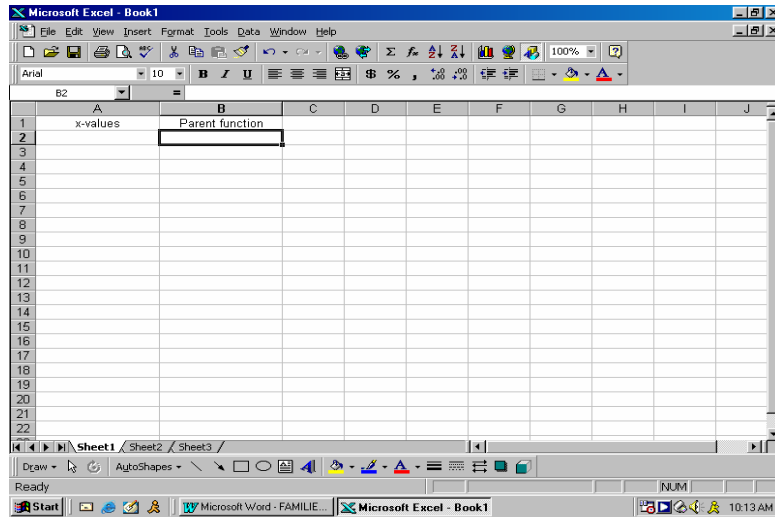
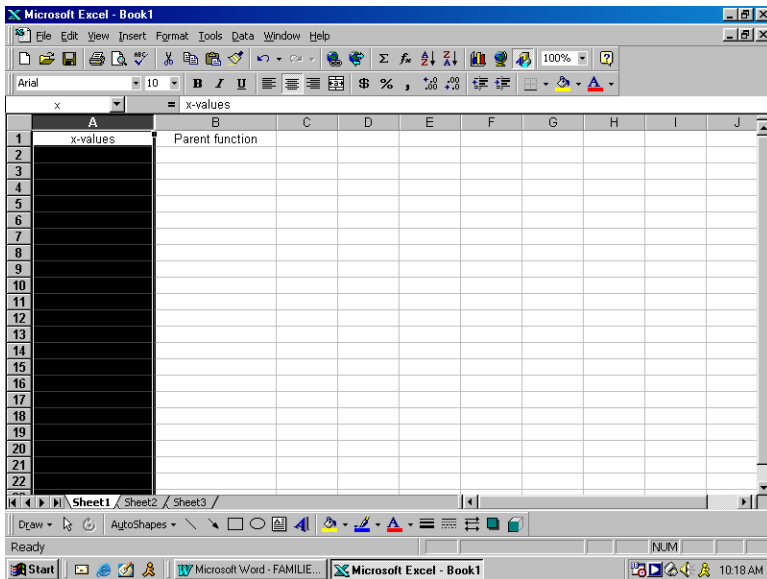


FAMILIES OF FUNCTIONS

1. Open a new spreadsheet on Excel.
2. Label Column A in cell A1, 'x – values', label column B, in Cell B1, 'parent function'.



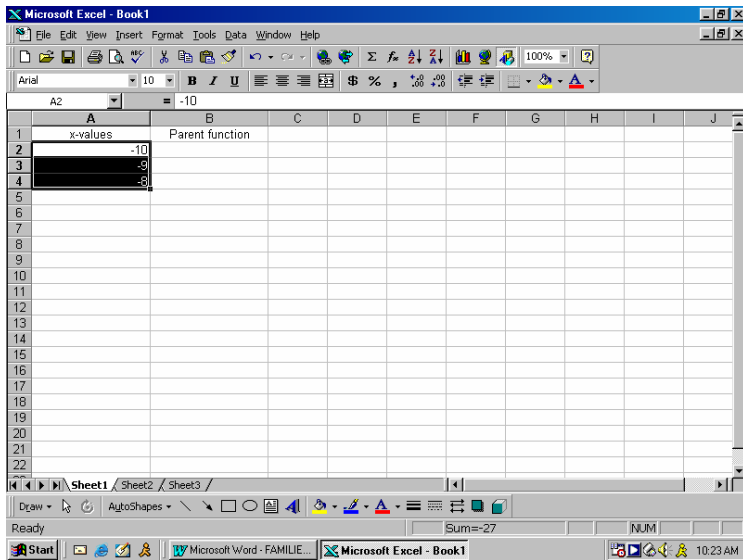
3. Rather than referring to the values in *column A* as A1, A2...we are going re-name column A so that EXCEL reads *Column A as the variable 'x'*.
4. Select (click) the 'A' at the top of the column to select column A.
5. In the text box where it says A1, type over it x.



6. In *column A (now the x-values)* input the numbers –10, –9, –8 in the first 3 cells. Use this pattern to continue the series down to positive 10
Highlight those 3 cells together.

Pass the cursor over the bottom right hand corner of the selected region and watch for the cursor to change from an arrow to a + sign. (This should occur as you pass over the corner)

With the + sign showing drag the cursor down to 10. Press enter. Pictured on next page.



7. Go back up to Cell B2 and input the formula = x^2 (To input ^ press *shift 6*).
(This means the parent function will be $f(x) = x^2$. **REMEMBER** the 'x' now refers to the value in that row of column A).
For example: The x-value used in cell B3 will be $x = -9$ and cell B3 will be 81.
8. Highlight cell B2 “grab” the box in the bottom right hand corner and turn it into a + sign. Drag the formula down to $x = -10$.
9. Select columns A and B with the labels.
10. Select the *Chart Wizard*, which is the little histogram icon on the tool bar
Select the *Scatter Plot* option and within the choices select the last one with the line drawn in
Follow the prompts of the wizard.
Put in the title *Parent Graph* and headings.
Before selecting finish Make sure the NEW SHEET bubble is selected.
9. Copy this graph into your **notebook** and label it “**PARENT GRAPH**”.
10. Now in **CELL C1** input the formula = $x^2 + 3$. ($f(x) = x^2 + 3$). **Drag** this formula down to $x = -10$.
11. *Select columns A, B and C*. Use the chart wizard to graph columns A, B, C. Compare the parent graph to the new graph.
12. How does the +3 change the graph? Write the equation and sketch the new graph into your **notebook** and label it by its translation.
13. What would happen if the formula was $f(x) = x^2 - 5$? Write the equation and Sketch what the graph would look like in your **notebook**. Label the graph by its translation
14. Change the formula in **Column C** to = $(x + 5)^2$. ($f(x) = (x + 5)^2$) (**NOTICE:** The value is now **INSIDE** the parentheses) and graph columns A, B, C using the *Chart Wizard*.
15. What happened when the value was put ‘with’ x in the parentheses?
16. Copy the graph and the equation into your notebook. Label it.

17. What would the graph look like if the function was $f(x) = (x - 5)^2$?
18. Copy the equation and sketch the graph into your notebook and label it by its translation
19. The above transformations are called Horizontal and Vertical Translations. What is meant by horizontal and vertical? When did the graph shift up, down, left, right? **Answer** in your **NOTEBOOK**.
20. Now in **Column C** put in the formula $=3*x^2$. ($f(x) = 3x^2$) and graph columns A, B, C using the *Chart Wizard*.
21. Write the equation and sketch the graph into your notebook
22. In **Column C** change the formula to $=-3*x^2$. ($f(x) = -3x^2$) and graph columns A, B, C using the *Chart Wizard*.
23. Write the equation and sketch the graph into you NOTEBOOK
24. Change **Column C** to be $\frac{1}{4} * x^2$. ($f(x) = \frac{1}{4}x^2$). Graph columns A, B, C using the *Chart Wizard*.
25. Copy the equation and sketch the graph into you notes
26. Label the last two graphs as *Dilations of the Parent*
27. The above changes are called dilations, what is meant by a dilation? How does a scaling value of a coefficient affect the graph? (Use $|a|$ notation to describe the changes that the coefficient creates)
28. Sketch in your notebook the graph of $f(x) = 5(x-4)^2 + 2$
29. Put the equation of the above graph into Column C and graph on EXCEL to check you answer.
28. If the parent of a quadratic function is $f(x) = x^2$ and the standard form of the quadratic is
- $$f(x) = a(x-h)^2 + k$$
29. In Your Notebooks describe how each of the constants a, h, and k affect the parent graph.
29. In your notebooks explain why the vertex of the parabola is said to be at (h,k).