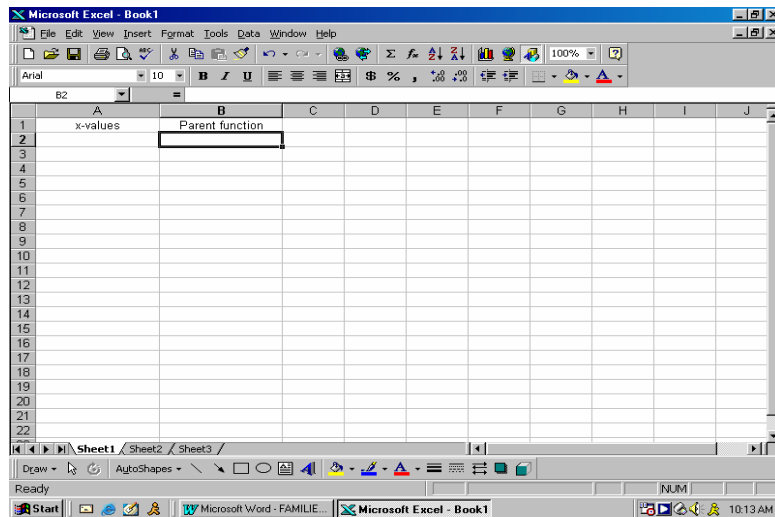
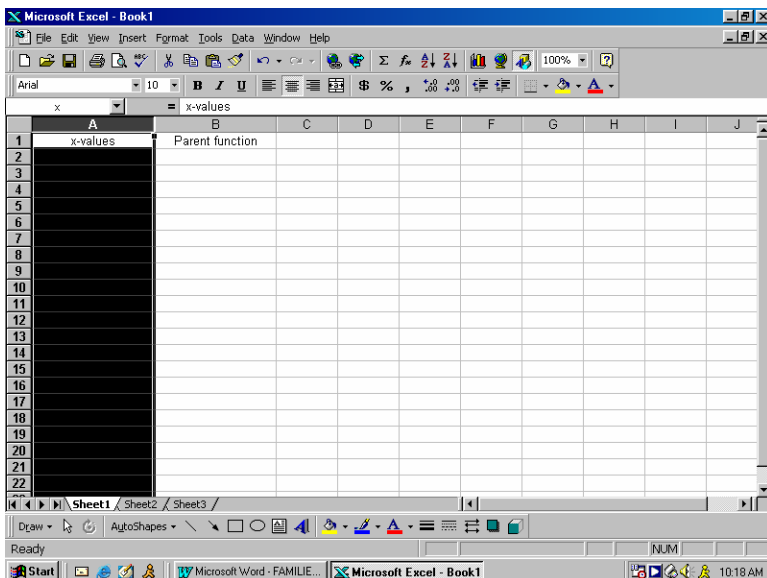


Graphing a Parabola in Vertex form

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



3. Select (click) the 'A' at the top of the column to select column A.
4. In the text box where it says A1, type over it x.



5. In column A input the numbers -10, -9, -8 ... up to 10
6. Go back up to Cell B2 and input the formula = x^2 (To input ^ press shift 6).
7. Drag the formula down to $x = -10$. Highlight cell B2 "grab" the box in the bottom right hand corner and turn it into a + sign
8. Select columns A and B with the labels.
8. Select the *Chart Wizard*
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 x^2 graph.

Before selecting finish make sure the NEW SHEET bubble is selected.

8. Go back to sheet 1 (click the tab at the bottom of the screen)
9. Now in **CELL C1** input the formula $=x^2 + 3$. ($f(x) = x^2 + 3$). **Drag** this formula down to $x = 10$.
10. *Select columns A, B and C.* Use the chart wizard to graph columns A, B, C. Compare the parent graph to the new graph.
11. How does the +3 change the x^2 graph?

12. What do you think would happen if the formula was $f(x) = x^2 - 5$?

13. Change the formula in **Column C** to $=(x + 3)^2$. (**NOTICE:** The value is now **INSIDE** the parentheses) and graph columns A, B, C using the *Chart Wizard*.
14. What happened when the value was put 'with' x in the parentheses?

15. What would the graph look like if the equation was $=(x - 5)^2$?
16. 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?

17. 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*.

18. What effect did multiplying the expression by 3 have?

19. In **Column C** change the formula to $=-3*x^2$. ($f(x) = -3x^2$) and graph columns *A, B, C* using the *Chart Wizard*.

20. What effect did making the expression negative have?

21. 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*.

22. What effect did multiplying by a value smaller than one have?

23. The above changes are called dilations, what is meant by a dilation?

24. Change column C to be $= 5*(x-4)^2 + 2$

25. Describe how this graph is different than the x^2 graph.

26. The following expression is called the general form of a quadratic

$$f(x) = a(x-h)^2 + k$$

Explain how each of the constants a , h , and k affect the parent graph. Discuss why this form is also called the vertex form of a quadratic.

27. Apply what you have learned to sketch the following parabolas without using EXCEL:

a) $y = 3(x - 4)^2 + 5$

b) $y = -\frac{1}{2}(x+6)^2 - 2$

