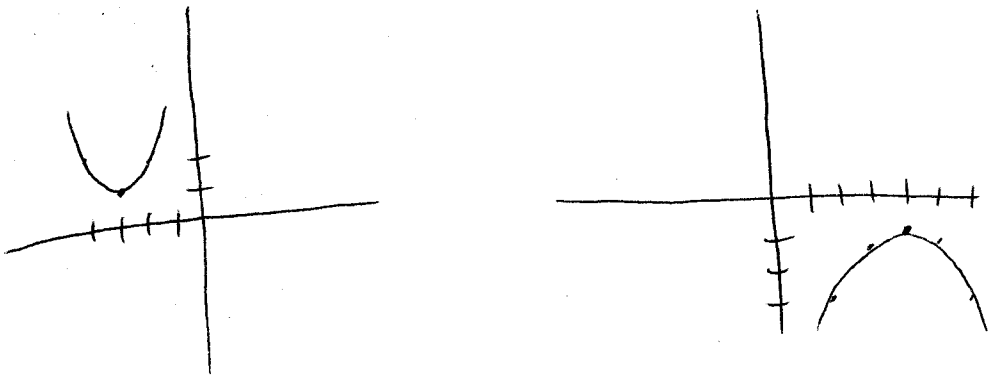
Lesson Notes 6-8 **Graphing $ax^2 + bx + c$**

In lessons 4 and 5, we developed a way to graph quadratic functions of the form $y = a(x - p)^2 + q$ by stating its vertex and developing a pattern for the other points on the graph.

Example 1: Graph the following on the grid provided.

a) $y = (x + 3)^2 + 1$ (b) $y = -1/2(x - 4)^2 - 1$



When an equation has the form $y = ax^2 + bx + c$, the constants used to sketch the graph are not obvious. To obtain these constants, we must complete the square from lesson 7 and then graph the appropriate points.

Example 2: Write $y = 2x^2 - 12x + 11$ in the form $y = a(x - p)^2 + q$, then sketch the graph.

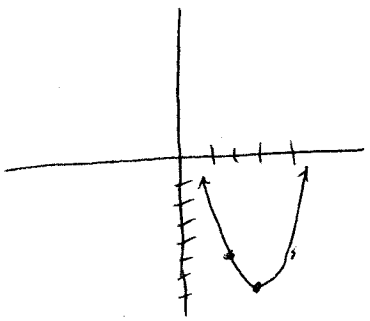
$\frac{-6}{2} = -3^2 = 9$

$y = 2(x^2 - 6x + 9 - 9) + 11$

$y = 2(x^2 - 6x + 9) + 11 - 9(2)$

$y = 2(x^2 - 6x + 9) + 11 - 18$

$y = 2(x - 3)^2 - 7$



Example 3: Consider the function $y = -3x^2 - 12x + 5$.

a) State the maximum or minimum value of y. $\frac{4}{2} = 2^2 = 4$

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

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

$y = -3(x + 2)^2 - 7$

max $y = -7$

b) For what value of x does the maximum or minimum occur?

$x = -2$ (vertex)