**Completing the Square**

Graph the function $y=x^{2}+6x+9$. What is the vertex? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write the vertex form of the parabola: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If you did not have a calculator to graph, how would you find the vertex from a function in standard form?



**Examples** – Find the vertex for the following functions by completing the square.

1. $y=x^{2}-10x+22$ 2. $y=x^{2}-8x+17$

When there is a leading coefficient (i.e. a number in front of the squared term), completing the square is more complicated. You need to factor that number out of all the terms with x’s in them.



**Examples** – Find the vertex of the following functions by completing the square.

3. $y=3x^{2}+12x-5$ 4. $y=4x^{2}-24x+3$