Day 9: Finding The Vertex of a Parabola DATE:_____

Sometimes we are given the quadratic function in the form $y = ax^2 + bx + c$. This is called standard form . We need to convert it to the form $y = a(x - h)^2 + k$ to identify the vertex . The method we use is completing the square.

Find the value of "c" that will make each expression a perfect square trinomial. Remember a perfect square trinomial is in the form _____ or _____.

$x^2 + 8x + c$ $c = 16$ $\left(\frac{8}{2}\right)^2$

$x^2 + 8x + 16$

$(x+4)^2$

$x^2 - 2x + c$

$x^2 - 2x + 1$

$(x-1)(x-1)$

$(x-1)^2$

$x^2 - 12x + c$

$x^2 - 12x + 36$

$(x-6)^2$

$\left(\text{half of } -12\right)^2$

Steps	Example #1 $y = x^2 - 6x + 5$	Example #2 $y = x^2 - 2x + 1$
Common factor the coefficient of the x^2 term from the first two terms. Do not factor out the x.	$y = (x^2 - 6x) + 5$	$y = (x^2 - 2x) + 1$
Divide the coefficient of x by 2, then square it.	$y = (x^2 - 6x + 9 - 9) + 5$	$y = (x^2 - 2x + 1 - 1) + 1$
Add and subtract that value inside the bracket of the equation two steps above.	$\left(\frac{-6}{2}\right)^2 = 9$	$\left(\frac{-2}{2}\right)^2 = 1$
Move the last term in the bracket to the outside of the bracket and multiply it with the number in front of the bracket. Add the two constants together.	$y = (x^2 - 6x + 9) - 9 + 5$	$y = (x^2 - 2x + 1) - 1 + 1$
Factor the perfect square trinomial inside the bracket.	$y = (x-3)^2 - 4$	$y = (x-1)^2$

1. Convert $y = x^2 + 2x + 5$ to the form $y = a(x - h)^2 + k$ and state its vertex.

$y = (x^2 + 2x + 1 - 1) + 5$ $\quad \left(\frac{2}{2}\right)^2$

$= (x+1)^2 + 4$

$V(-1, 4)$

2. Convert $y = x^2 - 6x - 4$ to the form $y = a(x - h)^2 + k$ and state its vertex

$y = (x^2 - 6x + 9 - 9) - 4$

$= (x-3)^2 - 13$

$V(3, -13)$

3. Convert $y = x^2 + 4x + 3$ to the form $y = a(x - h)^2 + k$ and state its vertex

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

$= (x+2)^2 - 1$

4) $y = x^2 - 14x + 1$

$= (x-7)^2 - 48$

Homework: p. 270 #3beg, 4ac, 6a, 7ace, 8bc, 19