Algebra 2 Completing the Square Notes Date:

Multiply: Square Binomials = Perfect Square Trinomials

$(x-3)^2$ $(x+6)^2$ $(y-10)^2$

$(x-3)(x-3)$ $(x+6)(x+6)$ $(y-10)(y-10)$

$x^2-3x-3x+9$ $x^2+6x+6x+36$

x^2-6x+9

SHORT CUT: $(1st\ term)^2 + 1st\ term * 2nd\ term * 2 + (2nd\ term)^2$

Examples:

$(a+5)^2$ $(b-15)^2$ $(c+1)^2$

Completing the Square

To make a perfect square – take half of the *b* term and square it.

	Take half of -8	Square (-4)
x^2-8x+ _____	$\frac{-8}{2}=-4$	$(-4)^2=16$

$x^2-8x+16$ is a perfect square trinomial. It can be written $(x-4)^2$

Examples:

x^2+12x+ _____ a^2-18a+ _____ x^2+7x+ _____

Solve the equation by completing the square:

Example 1: $x^2+12x+36=25$

$(x+6)^2=25$

$x+6=\pm\sqrt{25}$

$x=-6\pm5$

$x=-1$ and $x=-11$

Example 2: $x^2+4x+10=0$

$x^2+4x=-10$

x^2+4x+_____$=-10+$_____

$(x+\ \ )^2=$

Converting the equation of a parabola from Standard Form to Vertex Form

Ex: Write $y = 2x^2 + 10x + 7$ in vertex form.

Find the vertex: $x = -\frac{b}{2a} = -\frac{10}{2 \cdot 2} = -2.5$

$y = f(-2.5) = 2(-2.5)^2 + 10(-2.5) + 7 = -5.5$

The vertex (h, k) is $(-2.5, -5.5)$

The value for *a* is the same as *a* in the standard form equation.

The vertex form of the quadratic function is: $y = a(x - h)^2 + k$

$y = 2\big(x - (-2.5)\big)^2 - 5.5$

$y = 2(x + 2.5)^2 - 5.5$

Ex: Write $y = x^2 + 2x + 5$ in vertex form by completing the square or the method above.

OPTIONAL:

Converting the equation of a parabola from Vertex Form to Standard Form

Ex: Write $y = 2(x - 3)^2 - 5$ in standard form.

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

$y = 2(x^2 - 6x + 9) - 5$

$y = 2x^2 - 12x + 18 - 5$

$y = 2x^2 - 12x + 13$