Algebra 1 Unit 5 - Quadratic Equations Notes

Day 5 – Solving by Completing the Square

Some trinomials form special patterns that can easily allow you to factor the quadratic equation. We will look at two special cases:

Review: Factor the following trinomials.

1. $x^2 - 6x + 9$	2. $x^2 + 10x + 25$	3. $x^2 - 16x + 64$
$(x-3)(x-3)$ $(x-3)^2$	$(x+5)(x+5)$ $(x+5)^2$	$(x-8)(x-8)$ $(x-8)^2$

$\frac{-6}{2} = -3$ $\frac{10}{2} = 5$ $\frac{-16}{2} = -8$

(a) How does the constant term in the binomial relate to the b term in the trinomial?

constant + constant = b

2(constant) = b

constant $= \frac{b}{2}$

(b) How does the constant term in the binomial relate to the c term in the trinomial?

$(\text{constant})^2 = c$

Problems 1-3 are called **Perfect Square Trinomials**. These trinomials are called perfect square trinomials because when they are in their factored form, they are a binomial squared. An example would be $x^2 + 12x + 36$. Its factored form is $(x + 6)^2$, which is a binomial squared.

But what if you were not given the c term of a trinomial? Let's see if you can find the missing c term!

Directions: Complete the square for the following expressions. Then factor your expression.

a. $x^2 + 4x + \underline{4} = (x+2)^2$ $\frac{4}{2} = 2$ $(2)^2 = 4$

b. $x^2 + 8x + \underline{16} = (x+4)^2$ $\frac{8}{2} = 4$ $(4)^2 = 16$

c. $x^2 + 6x + \_\_\_\_ = (\quad)^2$

d. $x^2 + 14x + \_\_\_\_ = (\quad)^2$

e. $x^2 - 2x + \underline{1} = (x-1)^2$ $\frac{-2}{2} = -1$ $(-1)^2 = 1$

f. $x^2 - 18x + \underline{81} = (x-9)^2$ $\frac{-18}{2} = -9$ $(-9)^2 = 81$

g. $x^2 - 12x + \_\_\_\_ = (\quad)^2$

h. $x^2 - 20x + \_\_\_\_ = (\quad)^2$

i. $x^2 + 5x + \underline{\frac{25}{4}} = (\quad)^2$ $\frac{5}{2}$ $\frac{5}{2}$ $\left(\frac{5}{2}\right)^2 = \frac{25}{4}$

j. $x^2 - 3x + \_\_\_\_ = (\quad)^2$

k. $x^2 - 7x + \_\_\_\_ = (\quad)^2$

l. $x^2 + 9x + \_\_\_\_ = (\quad)^2$