**4.6 Completing the Square (if there is time)**

**Completing the Square**: A process that allows you to write x2 + bx as the square of a binomial

Given: x2 + bx

**Goal**: Find value of c so that x2 + bx + c is a perfect square trinomial

* Works for ANY quadratic equation
* Used when you cannot normally factor

**Review Perfect Square Trinomial:**

*Write the expression as the square of a binomial*

x2 – 4x + 4 x2 + 8x + 16

What do you notice about the relationship between b and c?

**Steps to Finding C**;

1) Write x2 + bx + c

2) Substitute ; 

3) Factor: 

*Examples*:

*Find the value of c that makes the expression a perfect square trinomial. Then write the expression as the square of a binomial.*

x2 + 2x + c x2 – 6x + c

x2 + 5x + c x2 – 7x + c

**Steps to Solving by Completing the Square**;

1. Write the equation in the form of x2 + bx = d
2. Find c, , and add to each side of the equation;

x2 + bx += d +

1. Factor: 
2. Solve for x by square rooting
3. Simplify

*Solve the following equations by completing the square.*

x2 + 10x – 3 = 0 x2 + 4x = -1

x2 – 16x + 76 = 0 x2 + 8x + 9 = 0

**Solving when a ≠ 1:**

Same process as when a = 1, but one additional step at very beginning

Given: ax2 + bx + c = 0

* Want to get x2 by itself, so we must ***divide everything by a***

**Steps to Completing the Square when a ≠ 1**;

1. Divide everything by a, in order to get only x2
2. Write the equation in the form of x2 + bx = c
3. Addto each side of the equation; x2 + bx += c +
4. Factor left side of equation:
5. Solve for x by square rooting
6. Simplify

*Examples:*

3x2 - 6x + 12 = 0 2x2 + 12x = 4

3x2 - 12x + 93 = 0 (1/2)x2 – 2x = 4

5x2 – 60x + 40 = 0 (0.6)x2 + 10x + 9 = 0

x2 + 3x + 7 = 8x + 2 3x2 + 4x + 2 = x2 + 6x