**Quadratic Equation** (2nd degree polynomial)

**Quadratic Equation:** *ax*2 + *bx* + *c* = 0, *a* ≠ 0, where *a*, *b*, and *c* are real numbers.

**Quadratic Function:**  *f* (*x*) = *ax*2 + *bx* + *c*, *a* ≠ 0, where *a*, *b*, and *c* are real numbers.

Both can have real-number or imaginary-number solutions.

***Zeros:*** *Solutions* of *ax*2 + *bx* + *c* = 0.

**Discriminant**

When you apply the quadratic formula to any quadratic equation, you find the value of *b*2 − 4*ac*, which can be positive, negative, or zero. This expression is called the discriminant.

**For *ax*2 + *bx* + *c* = 0, where *a*, *b*, and *c* are real numbers:**

 ***b*2 − 4*ac* = 0 One real-number solution;**

 ***b*2 − 4*ac* > 0Two different real-number solutions;**

 ***b*2 − 4*ac* < 0Two different imaginary-number solutions, complex conjugates.**

**Example 1:** Find the discriminant, and then determine whether one real –number solution, two different real-number solutions, or two different imaginary number solution exists.

1. $x^{2}+3x + 5 = 0$
2. $\frac{2}{3}x^{2} – 2\sqrt{2} x + 3 = 0$
3. $x^{2}– x -0.75 = 0$

**Quadratic Formula: The** solutions of *ax*2 + *bx* + *c* = 0, *a* ≠ 0, are given by $\frac{-b\pm \sqrt{b^{2}-4ac}}{2a}$**.** This formula can be used to solve any quadratic equation.

**Example 2-6:** **Find the Discriminant, Type of solutions, and solve using the Quadratic Formula.**

**Example 2:** $ 4x^{2}+2x-6=0$

**Example 3:** $x^{2}+10x+25=0$

**Example 4:** $2x^{2}+10x+11=0$

**Example 5:** $5x^{2}+2x+4=0$

**Example 6:** **2*x*2 + 5 = 3x**