

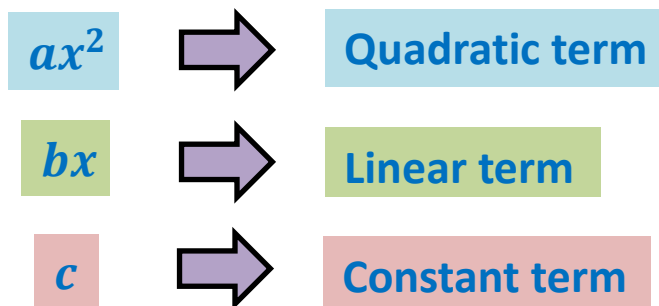
# The Quadratic Formula and the Discriminant

## Guided Notes

A **quadratic equation** is of the form:

$$ax^2 + bx + c = 0$$

Where,  $a \neq 0$ .



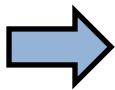
### Quadratic Formula

The quadratic formula can be used to find the solutions of a quadratic equation  $ax^2 + bx + c = 0$ .

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Problem 1:** Find all the solutions of the quadratic equation  $2x^2 + 5x - 4 = 0$ .

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

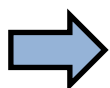


$$x = \frac{-5 \pm \sqrt{5^2 - 4(2)(-4)}}{2(2)}$$

$$x = \frac{-5 \pm \sqrt{25 + 32}}{4}$$

=

$$x = \frac{-5 \pm \sqrt{57}}{4}$$



$$x = \frac{-5 + \sqrt{57}}{4}$$



$$x = \frac{-5 - \sqrt{57}}{4}$$

# The Quadratic Formula and the Discriminant

 Guided Notes

## Discriminant of a Quadratic Equation

The discriminant of a quadratic equation  $ax^2 + bx + c = 0$  is the value of  $b^2 - 4ac$ .

The value of the discriminant can predict the type and the number of solutions of a quadratic equation.

Value of $b^2 - 4ac$	Number of solutions	Type of solutions
Positive	2	Real
Zero	1	Real
Negative	2	Complex

**Problem 2:** Find the discriminant of the quadratic equation  $2x^2 + 5x - 4$  and tell the number and type of solutions this equation has.

Here  $a = 2$ ,  $b = 5$ ,  $c = -4$ ,

$$b^2 - 4ac \quad \Rightarrow \quad 5^2 - 4(2)(-4) \quad = \quad 25 + 32$$

$$\Rightarrow \quad 25 + 32 = 57 \quad > \quad 0$$

Since the discriminant is positive, the quadratic equation has **two real** solutions.