


A quadratic equation is an equation in the form

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

Quadratic Equations can be solved by...

1. Taking the Square Root of both sides
2. Factoring and Using the Zero Product Rule
-  3. Quadratic Formula
4. Completing the Square

If  $b^2 - 4ac > 0$

Two solutions

If  $b^2 - 4ac = 0$

One solution

If  $b^2 - 4ac < 0$

No solutions

Quadratic Formula

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

The Discriminant

The Discriminant tells us how many solution our equation will have.

$$\text{If } b^2 - 4ac > 0$$

Two solutions

$$\text{If } b^2 - 4ac = 0$$

One solution

$$\text{If } b^2 - 4ac < 0$$

No solutions

Find the number of real solutions for the following quadratic equations.

$$0 = x^2 + 4x + 3$$

$$0 = 4x^2 - 12x + 9$$

$$0 = 2x^2 + 3x + 6$$

$$\text{If } b^2 - 4ac > 0$$

Two solutions

$$\text{If } b^2 - 4ac = 0$$

One solution

$$\text{If } b^2 - 4ac < 0$$

No solutions

Find the number of real solutions for the following quadratic equations.

$$0 = x^2 + x + 1$$

$$0 = 3x^2 + 2x - 2$$

$$0 = x^2 + 6x + 9$$

If  $b^2 - 4ac > 0$

Two solutions

$f(x)$  has two  $x$ -intercepts

If  $b^2 - 4ac = 0$

One solution

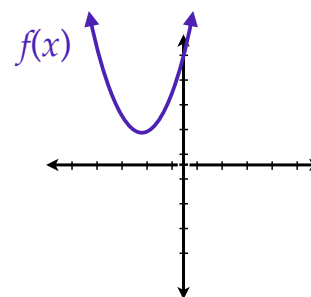
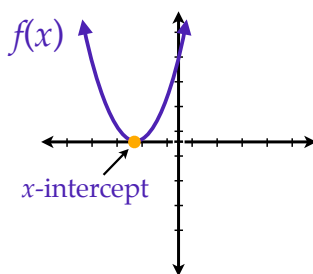
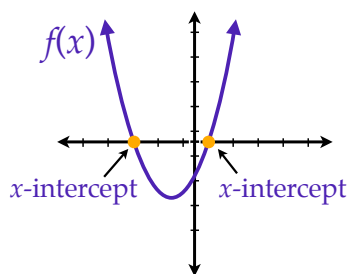
$f(x)$  has one  $x$ -intercept

If  $b^2 - 4ac < 0$

No solutions

$f(x)$  has no  $x$ -intercepts

The Discriminant also tells us how many  $x$ -intercepts the function will have



If  $b^2 - 4ac > 0$

Two solutions

$f(x)$  has two  $x$ -intercepts

If  $b^2 - 4ac = 0$

One solution

$f(x)$  has one  $x$ -intercept

If  $b^2 - 4ac < 0$

No solutions

$f(x)$  has no  $x$ -intercepts

Find the number of  $x$ -intercepts for the following functions.

$y = 2x^2 + 6x - 2$

$y = 9x^2 + 24x + 16$

$y = 3x^2 - 2x + 5$

## Quadratic Formula

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

The Discriminant

If  $b^2 - 4ac > 0$

Two solutions

$f(x)$  has two  $x$ -intercepts

If  $b^2 - 4ac = 0$

One solution

$f(x)$  has one  $x$ -intercept

If  $b^2 - 4ac < 0$

No solution

$f(x)$  has no  $x$ -intercept