

Section Overview

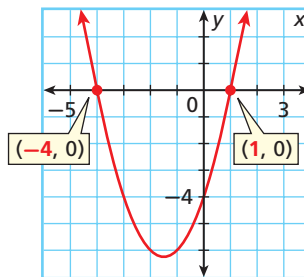
Solving Quadratic Equations by Graphing

Lesson 9-5

Why? You can use a graph to get a reasonable approximation of the solutions of an equation. The x-intercepts of the graph are the solutions of the quadratic equation.

Solve $x^2 + 3x - 4 = 0$.

Graph the related function $y = x^2 + 3x - 4$.



The solutions are **-4** and **1**.

Solving Quadratic Equations Algebraically

Lessons 9-6, 9-7, 9-8, 9-9

Why? Sometimes graphs can only give estimates. Solving quadratic equations algebraically allows students to find exact solutions.

Factoring

Solve $x^2 + 2x - 15 = 0$.

$(x + 5)(x - 3) = 0$ *Factor the left side.*

$x + 5 = 0$ or $x - 3 = 0$ *Set each factor equal to 0 and solve.*
 $x = -5$ or $x = 3$

The solutions are -5 and 3.

Square Roots

Solve $x^2 = 36$.

$x^2 = 36$

$\sqrt{x^2} = \pm\sqrt{36}$ *Take square root of both sides.*

$x = \pm 6$ *Show both roots.*

The solutions are 6 and -6.

Completing the Square

Solve $x^2 + 10x = 24$.

$x^2 + 10x = 24$ *Identify b.*

$\left(\frac{10}{2}\right)^2 = 5^2 = 25$ *Find $\left(\frac{b}{2}\right)^2$.*

$x^2 + 10x + 25 = 24 + 25$ *Add $\left(\frac{b}{2}\right)^2$ to both sides.*

$(x + 5)^2 = 49$ *Factor the trinomial.*

$\sqrt{(x + 5)^2} = \pm\sqrt{49}$ *Take square root of both sides. Use the \pm symbol.*
 $(x + 5) = \pm 7$

$x + 5 = 7$ or $x + 5 = -7$ *Write two equations and solve.*
 $x = 2$ or $x = -12$

The solutions are 2 and -12.

Quadratic Formula

Solve $x^2 + 6x + 8 = 0$.

$a = 1, b = 6, c = 8$ *Identify a, b, and c.*

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ *Substitute values for a, b, and c into the Quadratic Formula.*

$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(8)}}{2(1)}$

$x = \frac{-6 \pm \sqrt{4}}{2}$ *Simplify.*

$x = \frac{-6 + 2}{2}$ or $x = \frac{-6 - 2}{2}$

$x = -2$ or $x = -4$

The solutions are -2 and -4.