



9.1 Quadratic Equations

Need To Know



- Why we need more than one method
- The square root property for equation
- Solve quadratic equations



Quadratic Equations

Solve:

$$x^2 - 25 = 0$$

$$x^2 - 7 = 0$$



The Principle of Square Roots

The Principle of Square Roots

For all positive real numbers b ,

In Words

We use the square root to remove "squared stuff".

Always remember there are two answers,
so use the \pm .



Practice

Solve:

$$5x^2 = 60$$

How to Solve

- 1.
- 2.
- 3.
- 4.



Practice

Solve:

$$(x - 5)^2 = 49$$

How to Solve

1. Isolate the squared stuff
2. Square root both sides
3. Use the \pm
4. Check answer



Practice

Solve:

$$(x - 3)^2 = 5$$

How to Solve

1. Isolate the squared stuff
2. Square root both sides
3. Use the \pm
4. Check answer



Practice

Solve:

$$m^2 - 6m + 9 = 64$$

How to Solve

1. Isolate the squared stuff
2. Square root both sides
3. Use the \pm
4. Check answer



9.1 Conclusion

Ways to Solve Quadratic Equations

1. Factoring method (see 5.6)
(Set up: equation must equal zero)
2. Square root method
(Set up: "squared stuff" by itself)

Rating	Doable
Easy	Not always



9.2 Completing the Square

Need To Know



- The idea of completing the square
- Completing the square as a number skill
- Completing the square to solve quadratics



Completing the Square

Recall how easy it is to solve

$$(x - 2)^2 = 9$$

Consider

$$x^2 - 6x + 1 = 0$$



Completing the Square

Figure out what constant term to add to make the polynomial factor into a perfect square.

$$x^2 + 4x + \underline{\quad} = (\quad)^2$$

$$x^2 - 10x + \underline{\quad} = (\quad)^2$$

$$x^2 - 2x + \underline{\quad} = (\quad)^2$$

$$x^2 + 24x + \underline{\quad} = (\quad)^2$$

$$x^2 + bx + \underline{\quad} = (\quad)^2$$



Practice Completing the Square

Figure out what constant term to add to make the polynomial factor into a perfect square.

$$x^2 - 14x + \underline{\quad} = (\quad)^2$$

$$x^2 + 5x + \underline{\quad} = (\quad)^2$$



Completing the Square

Solve by completing the square:

$$x^2 - 6x - 7 = 0$$



Completing the Square

Solve by completing the square:

$$3y^2 + 12y + 6 = 0$$

How to Solve by Completing the Square

1. Put equation in $ax^2 + bx = c$ form.
2. If a is not 1, divide by a on both sides.
3. Add the complete square number to both sides.
4. Solve the equation by the square root method (see 9.1)

Completing the Square

Solve by completing the square:

$$2x^2 - 2x - 1 = 0$$

How to Solve by Completing the Square

1. Put equation in $ax^2 + bx = c$ form.
2. If a is not 1, divide by a on both sides.
3. Add the complete square number to both sides.
4. Solve the equation by the square root method (see 9.1)

9.2 Conclusion

Ways to Solve Quadratic Equations

1. Factoring method (see 5.6)
(Set up: equation must equal zero)
2. Square root method
(Set up: "squared stuff" by itself)
3. Completing the square method
(Set up: the leading coefficient = 1)

Rating	Doable
Easy	Not always
Easy	Not always

9.3 The Quadratic Formula

Need To Know



- The idea behind the quadratic formula
- How do we obtain the quadratic formula?
- How to use the quadratic formula
- How to memorizing the quadratic formula (9.3.B)

Obtaining the Quadratic Formula

Solve:

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

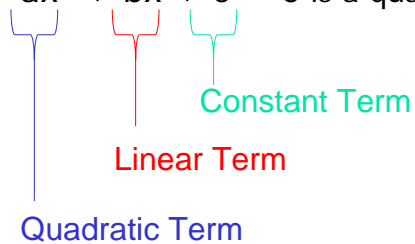
The Quadratic Formula

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

The Quadratic Formula

How to use the formula

$ax^2 + bx + c = 0$ is a quadratic in **standard form**.



a , b , and c are the numerical coefficients.

The formula uses only the coefficients not the x 's.

Example: Find the coefficients.

$$3x^2 - 7x + 11 = 0$$



The Quadratic Formula

Solve:

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

How To Solve

1. Put equation in standard form (it must equal 0).
2. Find a, b, c
3. Plug into the formula & simplify

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



The Quadratic Formula

Solve:

$$4y^2 - 4y - 3 = 0$$

How To Solve

1. Put equation in standard form (it must equal 0).
2. Find a, b, c
3. Plug into the formula & simplify

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



The Quadratic Formula

Solve:

$$x^2 - 4x + 4 = 5$$

How To Solve

1. Put equation in standard form (it must equal 0).
2. Find a, b, c
3. Plug into the formula & simplify

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



The Quadratic Formula

Solve:

$$7x^2 = 6x - 2$$

How To Solve

1. Put equation in standard form (it must equal 0).
2. Find a, b, c
3. Plug into the formula & simplify

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

9.3 Conclusion

Ways to Solve Quadratic Equations

1. Factoring method (see 6.6)
(Set up: equation must = 0)
2. Square root method
(Set up: "squared stuff" by itself)
3. Completing the square method
(Set up: the leading coefficient = 1)
4. Quadratic Formula
(Set up: equation must = 0)

Rating	Doable
Easy	Not always
Easy	Not always
Hard	Always

Memorize the Quadratic Formula

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

THE STORY

A **negative** bee could **not decide** about going to a **radical** party. At the party some **square** bees were playing poker. One of the bees **threw down 4 aces**. The whole thing was **over** at **2 am**.