# Solving Quadratic Equations

Algebra Worksheet · Grade 8–10

Name: _____ Date: _____

**Learning Objectives**

- Solve quadratic equations by isolating x squared and taking the square root of both sides
- Identify when a quadratic equation yields real, imaginary, or repeated solutions
- Solve quadratic equations in factored form and vertex form

## Problems

**1.** Solve for x:

$x^2 + 9 = 9$

**2.** Solve for x:

$x^2 - 7 = 29$

**3.** Solve for x:

$x^2 + 12 = 61$

**4.** Solve for x:

$4x^2 = 100$

**5.** Solve for x:

$49x^2 = 1$

**6.** Solve for x. Identify whether the solutions are real or imaginary:

$9x^2 + 5 = 2$

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**7.** Solve for x:

$$(x-5)^2 = 16$$

**8.** Solve for x:

$$(x+4)^2 = 7$$

**9.** Solve for x by factoring:

$$x^2 + 3x - 18 = 0$$

**10.** Solve for x by factoring:

$$2x^2 - x - 15 = 0$$

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# Solving Quadratic Equations — Answer Key

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## Answer Key

**1. Answer: x = 0**
- Subtract 9 from both sides: $x^2 = 0$
- Take the square root of both sides: x = 0 (zero is neither positive nor negative, so there is only one solution)

**2. Answer: x = 6 or x = -6**
- Add 7 to both sides: $x^2 = 36$
- Take the square root of both sides: $x = \pm 6$

**3. Answer: x = 7 or x = -7**
- Subtract 12 from both sides: $x^2 = 49$
- Take the square root of both sides: $x = \pm 7$

**4. Answer: x = 5 or x = -5**
- Divide both sides by 4: $x^2 = 25$
- Take the square root of both sides: $x = \pm 5$

**5. Answer: x = 1/7 or x = -1/7**
- Divide both sides by 49: $x^2 = 1/49$
- Take the square root of both sides: $x = \pm\sqrt{(1/49)} = \pm 1/7$

**6. Answer: x = ±i√(3)/3 (imaginary solutions)**
- Subtract 5 from both sides: $9x^2 = -3$
- Divide both sides by 9: $x^2 = -1/3$
- Take the square root of both sides: $x = \pm\sqrt{(-1/3)} = \pm i/\sqrt{3} = \pm i\sqrt{3}/3$ (imaginary)

**7. Answer: x = 9 or x = 1**
- Take the square root of both sides: $x - 5 = \pm 4$
- Add 5 to both sides: $x = 5 + 4 = 9$ or $x = 5 - 4 = 1$

**8. Answer: x = -4 + √7 or x = -4 - √7**
- Take the square root of both sides: $x + 4 = \pm\sqrt{7}$
- Subtract 4 from both sides: $x = -4 \pm \sqrt{7}$

**9. Answer: x = 3 or x = -6**
- Find two numbers that multiply to -18 and add to 3: those are 6 and -3
- Factor: (x + 6)(x - 3) = 0
- Set each factor equal to zero: $x + 6 = 0 \rightarrow x = -6$ or $x - 3 = 0 \rightarrow x = 3$

**10. Answer: x = 3 or x = -5/2**
- Multiply the leading coefficient and constant: $2 \times (-15) = -30$

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- Find two numbers that multiply to -30 and add to -1: those are -6 and 5
- Rewrite the middle term and factor by grouping: $2x^2 - 6x + 5x - 15 = 2x(x - 3) + 5(x - 3) = (2x + 5)(x - 3)$
- Set each factor equal to zero: $x = 3$ or $x = -5/2$



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