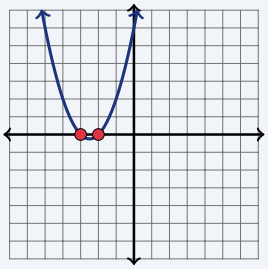
# Solving Quadratic Equations by Factoring

| Name: _____ | Date: _____ | Score: _____ / 18 |
|---|---|---|

## Quick Review and Helpful Hints

Set the equation equal to $0$, factor the quadratic, then use the *zero-product property*: if a product is $0$, at least one factor is $0$. So if $(x - p)(x - q) = 0$, then $x = p$ or $x = q$.

▷ **Example:** Solve $x^2+5x+6=0$. **Work:** Factor: $(x+2)(x+3)=0$. Set each factor to $0$: $x+2=0$ or $x+3=0$. ★ **Answer:** $x=-2$ or $x=-3$



Roots: where the curve meets the $x$-axis.

## Practice Problems

*Solve each equation.*

1. $x^2 + 5x + 6 = 0$ _____
2. $x^2 - 7x + 12 = 0$ _____
3. $x^2 + x - 6 = 0$ _____
4. $x^2 - 9 = 0$ _____
5. $x^2 - 5x = 0$ _____
6. $x^2 + 2x - 8 = 0$ _____
7. $x^2 - 4x + 4 = 0$ _____
8. $x^2 + 6x + 9 = 0$ _____
9. $x^2 - x - 12 = 0$ _____
10. $x^2 - 16 = 0$ _____
11. $x^2 + 7x + 10 = 0$ _____
12. $x^2 - 3x - 10 = 0$ _____
13. $x^2 - 8x + 15 = 0$ _____
14. $x^2 + 4x = 0$ _____

## Word Problems

15. A square sign has area $4$ square feet. If side length is represented by $x$, solve $x^2 - 4 = 0$ for the possible mathematical values of $x$. _____
16. A projectile-height model has zeros found by solving $x^2 + 9x + 20 = 0$. Solve for the two zero values. _____
17. A rectangular area model becomes zero at the boundary values of $x^2 - 6x + 8 = 0$. Solve for those values. _____
18. If $(x - 3)(x + 5) = 0$, find all values of $x$. _____

# Answer Keys

| | | |
|---|---|---|
| **1.** $x = -2, -3$ | **7.** $x = 2$ | **13.** $x = 3, 5$ |
| **2.** $x = 3, 4$ | **8.** $x = -3$ | **14.** $x = 0, -4$ |
| **3.** $x = 2, -3$ | **9.** $x = 4, -3$ | **15.** $x = 2, -2$ |
| **4.** $x = 3, -3$ | **10.** $x = 4, -4$ | **16.** $x = -4, -5$ |
| **5.** $x = 0, 5$ | **11.** $x = -2, -5$ | **17.** $x = 2, 4$ |
| **6.** $x = 2, -4$ | **12.** $x = 5, -2$ | **18.** $x = 3, -5$ |

## Step-by-Step Explanations

**1.** Start by naming the process: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x + 2)(x + 3) = 0$, so $x = -2$ or $-3$. So the final answer is $x = -2, -3$.

**2.** A good way to think about this is: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x - 3)(x - 4) = 0$, so $x = 3$ or $4$. So the final answer is $x = 3, 4$.

**3.** Step by step: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x + 3)(x - 2) = 0$, so $x = 2$ or $-3$. So the final answer is $x = 2, -3$.

**4.** Take it one move at a time: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x-3)(x+3) = 0$, so $x = 3$ or $-3$. So the final answer is $x = 3, -3$.

**5.** Start by naming the process: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $x(x - 5) = 0$, so $x = 0$ or $5$. So the final answer is $x = 0, 5$.

**6.** A good way to think about this is: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x + 4)(x - 2) = 0$, so $x = 2$ or $-4$. So the final answer is $x = 2, -4$.

**7.** Step by step: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x - 2)^2 = 0$, so $x = 2$ (one repeated root). So the final answer is $x = 2$.

**8.** Take it one move at a time: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x + 3)^2 = 0$, so $x = -3$. So the final answer is $x = -3$.

**9.** Start by naming the process: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x - 4)(x + 3) = 0$, so $x = 4$ or $-3$. So the final answer is $x = 4, -3$.

**10.** A good way to think about this is: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x - 4)(x + 4) = 0$, so $x = 4$ or $-4$. So the final answer is $x = 4, -4$.

**11.** Step by step: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x + 2)(x + 5) = 0$, so $x = -2$ or $-5$. So the final answer is $x = -2, -5$.

**12.** Take it one move at a time: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x - 5)(x + 2) = 0$, so $x = 5$ or $-2$. So the final answer is $x = 5, -2$.

**13.** Start by naming the process: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x - 3)(x - 5) = 0$, so $x = 3$ or $5$. So the final answer is $x = 3, 5$.

**14.** A good way to think about this is: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $x(x + 4) = 0$, so $x = 0$ or $-4$. So the final answer is $x = 0, -4$.

**15.** Step by step: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x - 2)(x + 2) = 0$, so $x = 2$ or $-2$. So the final answer is $x = 2, -2$.

**16.** Take it one move at a time: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x + 4)(x + 5) = 0$, so $x = -4$ or $-5$. So the final answer is $x = -4, -5$.

**17.** Start by naming the process: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x - 2)(x - 4) = 0$, so $x = 2$ or $4$. So the final answer is $x = 2, 4$.

**18.** A good way to think about this is: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is Each factor zero: $x = 3$ or $-5$. So the final answer is $x = 3, -5$.

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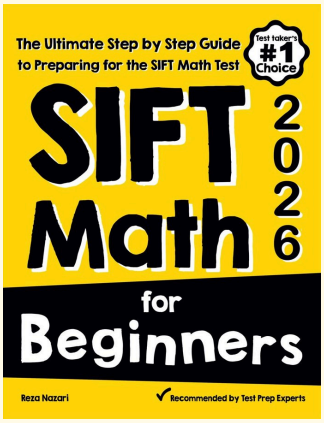


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