

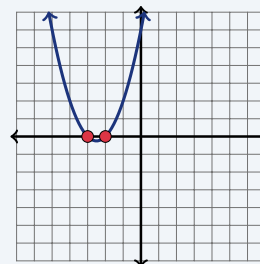
# Solving Quadratic Equations by Factoring

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.

- |  |   |
|--|---|
| <p>1. <math>x^2 + 5x + 6 = 0</math> _____</p> <p>2. <math>x^2 - 7x + 12 = 0</math> _____</p> <p>3. <math>x^2 + x - 6 = 0</math> _____</p> <p>4. <math>x^2 - 9 = 0</math> _____</p> <p>5. <math>x^2 - 5x = 0</math> _____</p> <p>6. <math>x^2 + 2x - 8 = 0</math> _____</p> <p>7. <math>x^2 - 4x + 4 = 0</math> _____</p> | <p>8. <math>x^2 + 6x + 9 = 0</math> _____</p> <p>9. <math>x^2 - x - 12 = 0</math> _____</p> <p>10. <math>x^2 - 16 = 0</math> _____</p> <p>11. <math>x^2 + 7x + 10 = 0</math> _____</p> <p>12. <math>x^2 - 3x - 10 = 0</math> _____</p> <p>13. <math>x^2 - 8x + 15 = 0</math> _____</p> <p>14. <math>x^2 + 4x = 0</math> _____</p> |
|--|---|

### ◆ 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.  $x = -2, -3$

2.  $x = 3, 4$

3.  $x = 2, -3$

4.  $x = 3, -3$

5.  $x = 0, 5$

6.  $x = 2, -4$

7.  $x = 2$

8.  $x = -3$

9.  $x = 4, -3$

10.  $x = 4, -4$

11.  $x = -2, -5$

12.  $x = 5, -2$

13.  $x = 3, 5$

14.  $x = 0, -4$

15.  $x = 2, -2$

16.  $x = -4, -5$

17.  $x = 2, 4$

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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