

Solving Quadratic Equations by Factoring

Name: _____

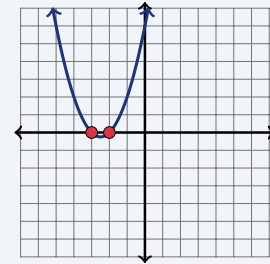
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Quick Review and Helpful Hints

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. $x^2 + 5x + 6 = 0$ _____

8. $x^2 + 6x + 9 = 0$ _____

2. $x^2 - 7x + 12 = 0$ _____

9. $x^2 - x - 12 = 0$ _____

3. $x^2 + x - 6 = 0$ _____

10. $x^2 - 16 = 0$ _____

4. $x^2 - 9 = 0$ _____

11. $x^2 + 7x + 10 = 0$ _____

5. $x^2 - 5x = 0$ _____

12. $x^2 - 3x - 10 = 0$ _____

6. $x^2 + 2x - 8 = 0$ _____

13. $x^2 - 8x + 15 = 0$ _____

7. $x^2 - 4x + 4 = 0$ _____

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 .

17. A rectangular area model becomes zero at the boundary values of $x^2 - 6x + 8 = 0$. Solve for those values.

16. A projectile-height model has zeros found by solving $x^2 + 9x + 20 = 0$. Solve for the two zero 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 $x = -4, -5$.

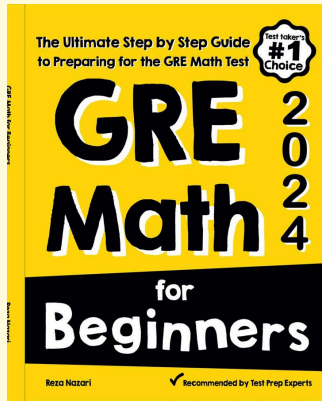
17. Start by naming the process: Factor the quadratic, then use the zero-product property by setting each factor equal to zero. The setup/work is $(x - 2)(x - 4) = 0$, so $x = 2$ or 4 . So the final answer is $x = 2, 4$.

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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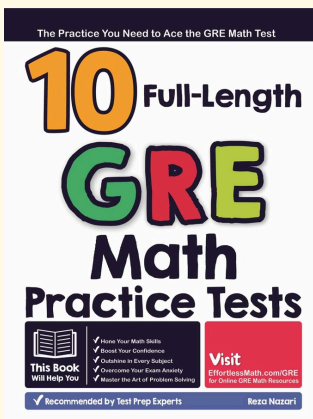
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