The Quadratic Formula

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

For $ax^2 + bx + c = 0$, the solutions are $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. Identify a, b, c, then substitute carefully. The *discriminant* $b^2 - 4ac$ tells how many real solutions: positive gives two, zero gives one, negative gives none.

▷ **Example:** Solve $x^2+5x+6 = 0$ with the formula. **Work:** $a = 1, b = 5, c = 6$. Discriminant $= 25 - 24 = 1$. $x = \dfrac{-5 \pm 1}{2}$. ★ **Answer:** $x = -2$ or $x = -3$

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

Identify a, b, c, then substitute.

Practice Problems

Solve, or find the discriminant, as directed.

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

2. $x^2 - 3x - 4 = 0$ _____

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

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

5. $x^2 - 2x - 3 = 0$ _____

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

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

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

9. $x^2 + 2x - 15 = 0$ _____

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

11. $x^2 + 4x + 3 = 0$ _____

12. $x^2 - x - 20 = 0$ _____

13. Discriminant of $x^2 + 3x + 2$ _____

14. Discriminant of $x^2 - 4x + 4$ _____

Word Problems

15. A quadratic revenue model is set equal to zero: $x^2 + 6x + 8 = 0$. Use the formula to find the break-even x-values. _____

16. Before graphing $x^2 + 5x + 6$, a student checks the discriminant. Find it and use it to decide how many real solutions there are. _____

17. A walkway model leads to $x^2 - 8x + 12 = 0$. Use the quadratic formula to solve for x. _____

18. How many real solutions are there if the discriminant equals 0? _____

Answer Keys

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

Step-by-Step Explanations

1. Start by naming the process: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $b^2 - 4ac = 25 - 24 = 1$; $x = \frac{-5 \pm 1}{2} = -2, -3$. So the final answer is $x = -2, -3$.

2. A good way to think about this is: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $9 + 16 = 25$; $x = \frac{3 \pm 5}{2} = 4, -1$. So the final answer is $x = 4, -1$.

3. Step by step: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $1 + 48 = 49$; $x = \frac{-1 \pm 7}{2} = 3, -4$. So the final answer is $x = 3, -4$.

4. Take it one move at a time: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $25 - 24 = 1$; $x = \frac{5 \pm 1}{2} = 3, 2$. So the final answer is $x = 2, 3$.

5. Start by naming the process: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $4 + 12 = 16$; $x = \frac{2 \pm 4}{2} = 3, -1$. So the final answer is $x = 3, -1$.

6. A good way to think about this is: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $49 - 48 = 1$; $x = \frac{-7 \pm 1}{2} = -3, -4$. So the final answer is $x = -3, -4$.

7. Step by step: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $a = 1, b = 0, c = -9$; $x = \frac{\pm 6}{2} = 3, -3$. So the final answer is $x = 3, -3$.

8. Take it one move at a time: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $36 - 20 = 16$; $x = \frac{6 \pm 4}{2} = 5, 1$. So the final answer is $x = 1, 5$.

9. Start by naming the process: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $4 + 60 = 64$; $x = \frac{-2 \pm 8}{2} = 3, -5$. So the final answer is $x = 3, -5$.

10. A good way to think about this is: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $49 - 40 = 9$; $x = \frac{7 \pm 3}{2} = 5, 2$. So the final answer is $x = 2, 5$.

11. Step by step: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $16 - 12 = 4$; $x = \frac{-4 \pm 2}{2} = -1, -3$. So the final answer is $x = -1, -3$.

12. Take it one move at a time: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $1 + 80 = 81$; $x = \frac{1 \pm 9}{2} = 5, -4$. So the final answer is $x = 5, -4$.

13. Start by naming the process: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $b^2 - 4ac = 9 - 8 = 1$. So the final answer is 1.

14. A good way to think about this is: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $b^2 - 4ac = 16 - 16 = 0$. So the final answer is 0.

15. Step by step: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $36 - 32 = 4$; $x = \frac{-6 \pm 2}{2} = -2, -4$. So the final answer is $x = -2, -4$.

16. Take it one move at a time: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $25 - 24 = 1$. So the final answer is 1.

17. Start by naming the process: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is $64 - 48 = 16$; $x = \frac{8 \pm 4}{2} = 6, 2$. So the final answer is $x = 2, 6$.

18. A good way to think about this is: Use the quadratic formula step by step: identify a, b, and c, compute the discriminant, then simplify. The setup/work is A discriminant of 0 gives exactly one real solution. So the final answer is one.

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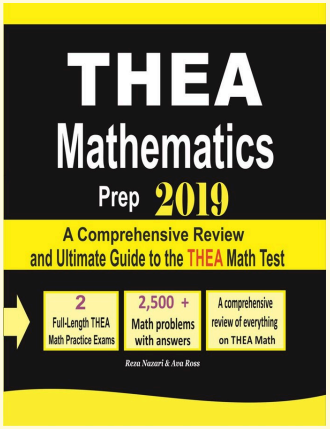

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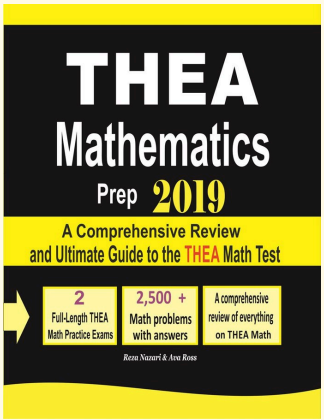

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