Solving Quadratics by Factoring

Algebra 1 •Section 9.3

Name: _____	Date: _____	Score: _____ / 12

Quick Review and Helpful Hints

Quadratic functions can be read through their zeros, vertex, axis of symmetry, and opening direction. Choose factoring, square roots, completing the square, or the quadratic formula based on the form you see.

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

Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

1. Solve $x^2 - 7x + 10 = 0$.

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

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

4. Solve $x^2 - 16 = 0$ by factoring.

5. Solve $x^2 + 10x + 25 = 0$.

6. Solve $3x^2 + 12x = 0$.

7. Solve $x^2 - x - 20 = 0$.

8. Solve $4x^2 - 9 = 0$.

9. Solve $x^2 + 2x = 15$.

10. Solve $2x^2 + 7x + 3 = 0$.

Word Problems

11. A rectangle area is $x^2 + 8x + 12 = 0$ in a zero-product model. Find the zeros.

12. A profit model has break-even equation $-x^2 + 14x - 45 = 0$. Find break-even values.

Answer Keys

1. $\boxed{x = 2, 5}$
2. $\boxed{x = 3, -6}$
3. $\boxed{x = 3, -\frac{1}{2}}$
4. $\boxed{x = \pm 4}$
5. $\boxed{x = -5}$
6. $\boxed{x = 0, -4}$
7. $\boxed{x = 5, -4}$
8. $\boxed{x = \pm\frac{3}{2}}$
9. $\boxed{x = 3, -5}$
10. $\boxed{x = -3, -\frac{1}{2}}$
11. $\boxed{x = -2, -6}$
12. $\boxed{x = 5, 9}$

Step-by-Step Explanations

1. Look for two numbers that multiply to 10 and add to -7: that's -2 and -5, giving $(x - 2)(x - 5) = 0$.

2. You need a pair multiplying to -18 and adding to 3. Once it's $(x+6)(x-3) = 0$, each piece can be zero.

3. With a leading 2, factoring gives $(2x + 1)(x - 3) = 0$ — then just unwrap each parenthesis on its own.

4. Notice $x^2 - 16$ is a perfect square minus a perfect square, so it splits neatly into $(x - 4)(x + 4) = 0$.

5. This trinomial is secretly $(x + 5)^2$, so both factors are the same — you get one solution, not two.

6. Both terms share a $3x$, so pull it out front: $3x(x + 4) = 0$. Don't forget $x = 0$ counts!

7. Hunt for two numbers with product -20 and sum -1 — that's -5 and 4, so $(x - 5)(x + 4) = 0$.

8. Here's another difference of squares: $4x^2 - 9 = (2x - 3)(2x + 3)$, since $2x$ and 3 square to the pieces.

9. First slide everything to one side so it equals zero, then $x^2 + 2x - 15$ factors into $(x + 5)(x - 3)$.

10. Factoring carefully with the leading 2 gives $(2x + 1)(x + 3) = 0$ — now solve each tiny equation.

11. Two numbers that multiply to 12 and add to 8 are 2 and 6, so $(x+2)(x+6) = 0$ does the job.

12. Flipping signs makes it friendlier: $x^2 - 14x + 45 = (x - 5)(x - 9)$, and those zeros are your break-even points.

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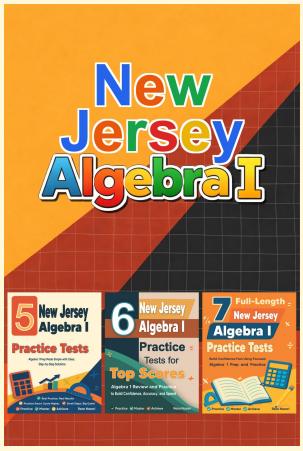

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