Factored Form → General Form

Convert between quadratic forms and explain what each representation reveals.

For each quadratic function:

a) Identify its zeros and predict the axis of symmetry using their midpoint.
b) Expand and simplify into general form; identify the y-intercept.
c) Sketch the function using the intercepts and the axis of symmetry.

Mild — Monic Quadratics

Integer zeros and integer axes of symmetry.

1. $y = (x - 1)(x - 3)$

2. $y = (x + 1)(x + 5)$

3. $y = (x + 2)(x - 4)$

4. $y = (x - 2)(x + 6)$

5. In #3, a learner places the axis at x=0 because 0 lies between the zeros. Explain the mistake and find the correct axis.

Medium — Leading Coefficients

Positive and negative integer multipliers; integer zeros and axes.

6. $y = 2(x - 1)(x - 3)$

7. $y = 3(x + 1)(x - 3)$

8. $y = -(x - 2)(x - 8)$

9. $y = -2(x + 2)(x - 4)$

10. Compare #1 and #5. Both have the same zeros and axis. Why are their y-intercepts and shapes different?

Spicy — Fractional Axes and Zeros

Fractional zeros and axes from nonmonic factors.

11. $y = (2x - 3)(x + 1)$

12. $y = -(2x + 1)(x - 3)$

13. $y = 2(2x - 1)(x + 2)$

14. $y = -(3x + 1)(x - 2)$

15. In #12, a learner claims the zeros are −1 and 2. Explain their mistake, find the correct axis, and describe how general form could verify your answer.

Extra Spicy — Fractional Coefficients

Fractions in factors and multipliers; keep your values exact.

16. $y = (x - \frac{1}{2})(2x + 3)$

17. $y = -2(x + \frac{3}{4})(x - 2)$

18. $y = (\frac{3}{2}x - 2)(2x + 1)$

19. $y = -\frac{2}{3}(3x - 2)(2x + 3)$

20. A learner expands #16 and claims its y-intercept is 2.5. Use the factored form to explain why this must be incorrect, and how it would affect their sketch.