

Graphing Quadratic Functions in Vertex Form

For each function:

- Identify the vertex.
- Calculate the y-intercept by substituting $x = 0$.
- Determine the reflection of the y-intercept across the axis of symmetry.
- Construct and label axes and plot the three points and sketch the parabola.
- State the opening direction, maximum or minimum, domain, and range.

MILD

Identify the vertex and calculate the y-intercept. Construct a simple coordinate system for each graph.

1. $y = (x - 1)^2$

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

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

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

5. $y = (x - 4)^2 + 2$

MEDIUM

Include stretches and reflections. Place and scale the axes so all three points fit.

6. $y = 2(x - 2)^2 + 1$

7. $y = -(x + 3)^2 + 2$

8. $y = 3(x - 3)^2 - 2$

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

10. $y = 2(x - 5)^2 - 4$

SPICY

Work with fractional coefficients. Choose appropriate horizontal and vertical scales independently.

$$11. y = \frac{1}{2}(x - 4)^2 - 2$$

$$12. y = \frac{-1}{2}(x + 5)^2 + 3$$

$$13. y = \frac{3}{2}(x - 4)^2 - 5$$

$$14. y = \frac{-2}{3}(x + 6)^2 + 4$$

$$15. y = \frac{1}{4}(x - 8)^2 - 3$$

EXTRA SPICY

Calculate the three key points before constructing your coordinate system. Make deliberate choices about axis placement and scaling.

$$16. y = \frac{-3}{4}(x + 6)^2 + 5$$

$$17. y = \frac{3}{2}(x - 6)^2 - 4$$

$$18. y = \frac{-5}{4}(x + 8)^2 + 6$$

$$19. y = \frac{2}{3}(x - 9)^2 - 5$$

$$20. y = \frac{-3}{8}(x + 12)^2 + 7$$