Vocabulary

Review
1. Circle the vertex of each absolute value graph.

![Graphs of absolute value functions]

Vocabulary Builder

parabola (noun) puh-RAB uh luh

Related Words: vertex, axis of symmetry, quadratic function

Definition: A parabola is the graph of a quadratic function, a function of the form $y = ax^2 + bx + c$.

Main Idea: A parabola is symmetrical around its axis of symmetry, a line passing through the vertex. A parabola can open upward or downward.

Use Your Vocabulary
2. Circle each function whose graph is a parabola.

$y = -6x + 9$  $y = -2x^2 - 15x - 18$  $y = x^2 + 4x + 4$  $y = 16x - 22$

3. Cross out the function(s) whose graph is NOT a parabola.

$y = 5x^2 - 3x + 6$  $y = x - 3$  $y = 2x^2 + 6x - 7$  $y = 0.2x + 7$
Problem 2  Graphing Translations of \( f(x) = x^2 \)

**Got It?** Graph \( g(x) = x^2 + 3 \). How is it a translation of \( f(x) = x^2 \)?

Use the graphs of \( f(x) = x^2 \) and \( g(x) = x^2 + 3 \) at the right for Exercises 4 and 5.

4. Circle the ordered pairs that are solutions of \( g(x) = x^2 + 3 \).
   Underline the ordered pairs that are solutions of \( f(x) = x^2 \).
   \[
   \begin{array}{ccc}
   (-3, 0) & (-3, 9) & (0, -3) \\
   (0, 0) & (0, 3) & (0, 9) \\
   (3, 0) & (3, 9) & (3, 12)
   \end{array}
   \]

5. Underline the correct word to complete each sentence.
   For each value of \( x \), the value of \( g(x) = x^2 + 3 \) is more / less than the value of \( f(x) = x^2 \).
   The graph of \( g(x) = x^2 + 3 \) is a translation of the graph of \( f(x) = x^2 \). The graph shows \( f(x) = x^2 \) in red / blue and \( g(x) = x^2 + 3 \) in red / blue.

Problem 3  Interpreting Vertex Form

**Got It?** What are the vertex, axis of symmetry, minimum or maximum, and domain and range of the function \( y = -2(x + 1)^2 + 4 \)?

6. Compare \( y = 2(x - 1)^2 + 4 \) with the vertex form \( y = a(x - h)^2 + k \). Identify \( a \), \( h \), and \( k \).
   \[
   a = \underline{\phantom{0}}, \quad h = \underline{\phantom{0}}, \quad k = \underline{\phantom{0}}
   \]

7. The vertex of the parabola is \((h, k) = \left( \underline{\phantom{0}}, \underline{\phantom{0}} \right)\).
8. The axis of symmetry is the line \( x = \underline{\phantom{0}} \).

9. Underline the correct word or symbol to complete each sentence.
   Since \( a \) is \(< / > 0 \), the parabola opens upward / downward.
   The parabola has a maximum / minimum value of \( \underline{\phantom{0}} \) when \( x = \underline{\phantom{0}} \).

10. Circle the domain.
    \[
    \text{all real numbers} \quad x \leq -1 \quad x \leq 4 \quad x \geq 4
    \]

11. Circle the range.
    \[
    \text{all real numbers} \quad x \leq -1 \quad x \leq 4 \quad x \geq 4
    \]
12. Use one of the functions below to label each graph.

\[
\begin{align*}
\text{Got It?} & \quad \text{The graph shows the jump of a dolphin. The axis of symmetry is } x = 2, \text{ and the height is 7. If the path of the jump passes through the point (5, 5), what quadratic function models the path of the jump?}
\end{align*}
\]

13. **Multiple Choice** What steps transform the graph of \( y = x^2 \) to \( y = 2(x - 1)^2 + 5 \)?

- A. Reflect across the x-axis, stretch by the factor 2, and translate 2 units to the left and 5 units up.
- B. Stretch by the factor 2 and translate 2 units to the right and 5 units up.
- C. Stretch by the factor 2 and translate 2 units to the left and 5 units down.
- D. Reflect across the x-axis, stretch by the factor 2, and translate 2 units to the left and 5 units down.

14. Circle the graph of \( f(x) = 2(x - 1)^2 + 5 \).

15. The vertex is \(( , )\).

16. Substitute \( h \) and \( k \) in the vertex form \( f(x) = a(x - h)^2 + k \).
17. Substitute (5, 5) for (x, y) and solve for a.

18. Write the quadratic function that models the path of the water.

Lesson Check  •  Do you UNDERSTAND?

Vocabulary  When does the graph of a quadratic function have a minimum value?

19. Circle the parabola that has a minimum value.

20. The graph of \( y = x^2 \) is a parabola that opens upward / downward.

21. The graph of \( y = 2x^2 \) is a parabola that opens upward / downward.

22. When does the graph of a quadratic function have a minimum value?

Math Success

Check off the vocabulary words that you understand.

☐ parabola  ☐ vertex form  ☐ quadratic function  ☐ axis of symmetry

Rate how well you can graph a quadratic function in vertex form.

Need to review 0 2 4 6 8 10 Now I get it!