

Name:

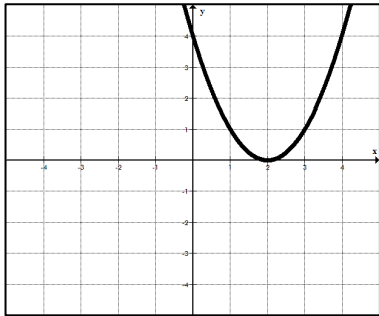
Date:

Period:

Quadratic functions are a type of even power function with an exponent of 2. Quadratic functions of the form $y = a(x - h)^2 + k$ are said to be in **vertex form**, where the point (h, k) is the vertex of the graph.

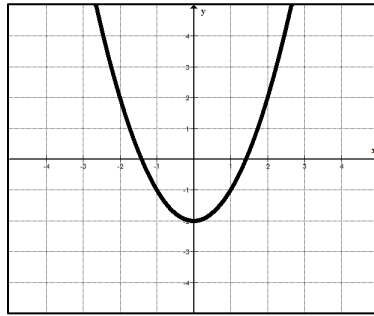
Use what you know about transformations of graphs to write an equation in vertex form for each quadratic function. For examples 1 – 6, assume $a = \pm 1$.

1.



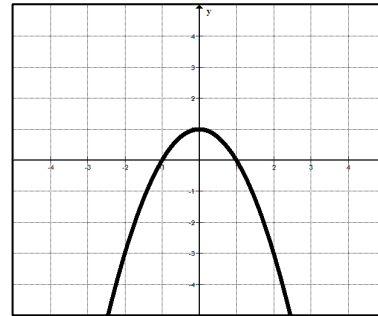
Vertex: _____
Equation: _____

2.



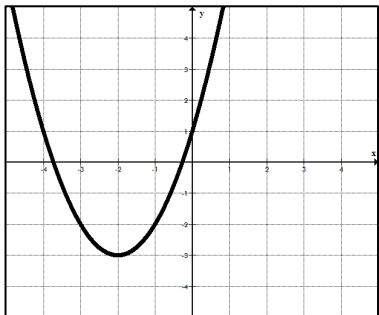
Vertex: _____
Equation: _____

3.



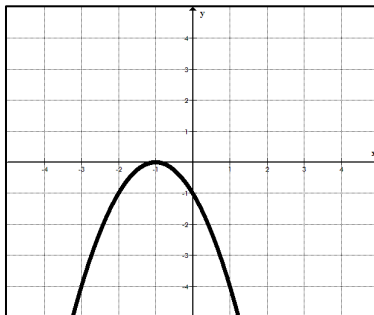
Vertex: _____
Equation: _____

4.



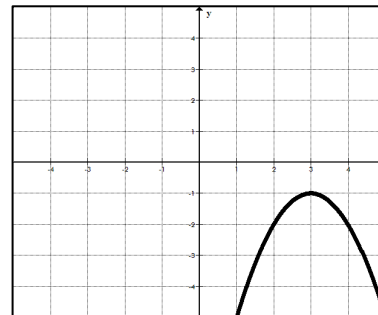
Vertex: _____
Equation: _____

5.



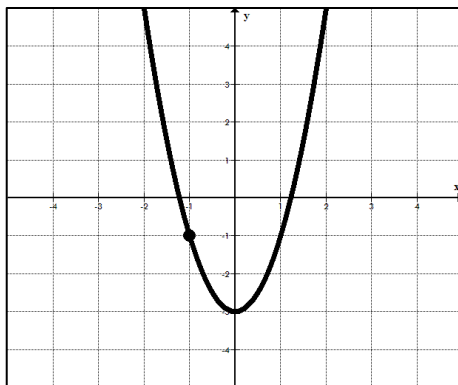
Vertex: _____
Equation: _____

6.



Vertex: _____
Equation: _____

7. Use the given point on the graph to determine the value of a . Then write an equation in vertex form for the quadratic function.



Step 1: Use the vertex to find the values h and k .

$h =$ _____ $k =$ _____

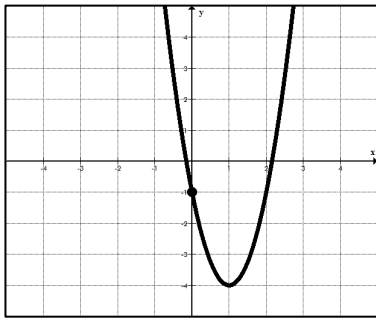
Step 2: Write the coordinates of the given point.

$x =$ _____ $y =$ _____

Step 3: Plug these values into the equation, $y = a(x - h)^2 + k$, and solve for a .

Solve for a.

8.

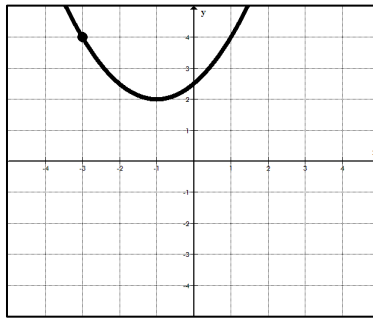


$h = \underline{\hspace{2cm}}$ $k = \underline{\hspace{2cm}}$

$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$

Substitute: $y = a(x - h)^2 + k$

9.

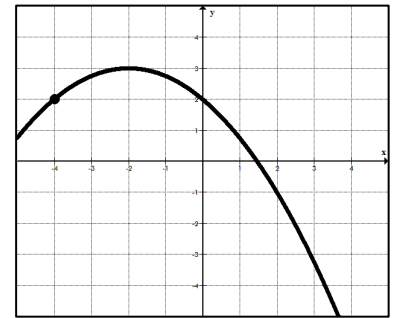


$h = \underline{\hspace{2cm}}$ $k = \underline{\hspace{2cm}}$

$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$

Substitute: $y = a(x - h)^2 + k$

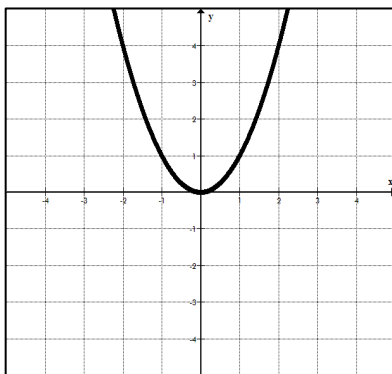
10.



$h = \underline{\hspace{2cm}}$ $k = \underline{\hspace{2cm}}$

$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$

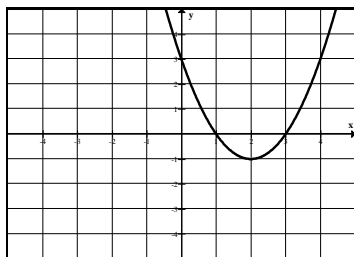
Substitute: $y = a(x - h)^2 + k$



- The graph of a quadratic function is called a **parabola**, and it has a **u**-shape. The **domain**, or set of x-values, is always all real numbers.
- The point where the graph changes direction is called the **vertex**, and it is either the highest point, **maximum**, or the lowest point, **minimum**, on the graph. The **range**, or set of y-values, will be affected by this point.
- The **axis of symmetry** is a vertical line through the **vertex** that splits the graph into two symmetrical sides.
- The point where the graph crosses the y-axis is called the **y-intercept**, and the point(s) where the graph crosses the x-axis is/are called the **x-intercept(s)**.

Identify the vertex and the equation for the axis of symmetry. Then state whether the vertex is the maximum or minimum point on the graph, and identify the domain and range of the function using set notation.

11.



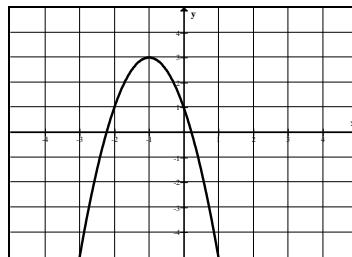
V: $\underline{\hspace{2cm}}$ AOS: $\underline{\hspace{2cm}}$

Maximum or Minimum

D: $\underline{\hspace{2cm}}$

R: $\underline{\hspace{2cm}}$

12.



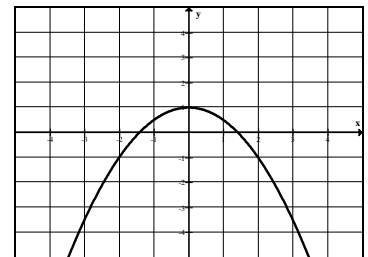
V: $\underline{\hspace{2cm}}$ AOS: $\underline{\hspace{2cm}}$

Maximum or Minimum

D: $\underline{\hspace{2cm}}$

R: $\underline{\hspace{2cm}}$

13.



V: $\underline{\hspace{2cm}}$ AOS: $\underline{\hspace{2cm}}$

Maximum or Minimum

D: $\underline{\hspace{2cm}}$

R: $\underline{\hspace{2cm}}$

The quadratic function can be written in two forms:

Standard Form

$$y = ax^2 + bx + c$$

Vertex Form

$$y = a(x - h)^2 + k$$

To write a quadratic equation in standard form, simply use the order of operations and write terms in decreasing order of degree, or exponent.

Examples:

Write each equation in standard form.

14. $y = -2x + 1 + x^2$

15. $y = 3x - 2x^2 + 3$

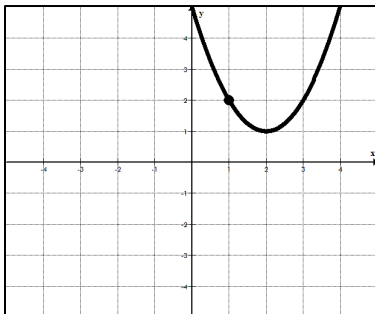
16. $y = -3x(x + 2)$

17. $y = (x + 3)(x + 4)$

18. $y = (x + 1)^2 + 3$

Write an equation in vertex form for each quadratic function graphed below. Use the given point to determine the value of a .

19.

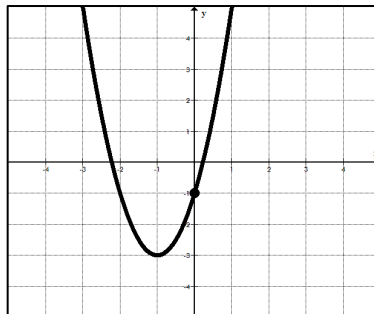


$h = \underline{\hspace{2cm}}$ $k = \underline{\hspace{2cm}}$

$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$

Substitute: $y = a(x - h)^2 + k$

20.

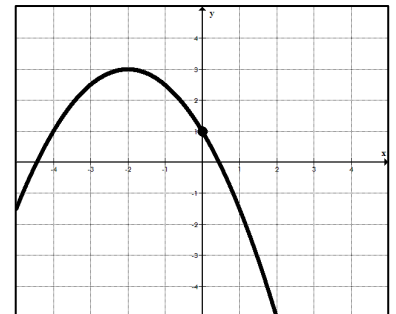


$h = \underline{\hspace{2cm}}$ $k = \underline{\hspace{2cm}}$

$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$

Substitute: $y = a(x - h)^2 + k$

21.



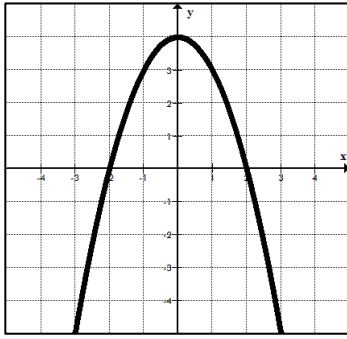
$h = \underline{\hspace{2cm}}$ $k = \underline{\hspace{2cm}}$

$x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$

Substitute: $y = a(x - h)^2 + k$

Consider the graph of each function. Identify the vertex, the domain & range using set notation, the axis of symmetry, and the intercepts by completing the table below.

22.



V: _____ AOS: _____

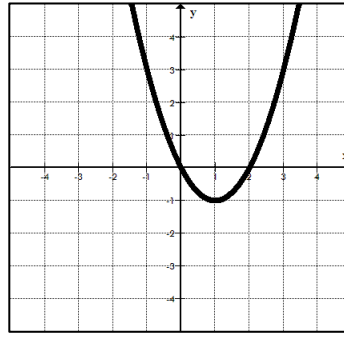
x-intercept(s): _____

y-intercept: _____

D: _____

R: _____

23.



V: _____ AOS: _____

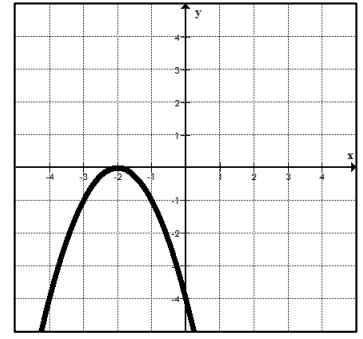
x-intercept(s): _____

y-intercept: _____

D: _____

R: _____

24.



V: _____ AOS: _____

x-intercept(s): _____

y-intercept: _____

D: _____

R: _____

Rewrite each equation into standard form and vertex form. Identify the vertex and AOS.

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

Standard Form:

Vertex Form:

Vertex: _____ AOS: _____

27. $y = -3x(x + 6)$

Standard Form:

Vertex Form:

Vertex: _____ AOS: _____

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

Standard Form:

Vertex Form:

Vertex: _____ AOS: _____

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

Standard Form:

Vertex Form:

Vertex: _____ AOS: _____

28. $y = 2(x - 4)(x - 2)$

Standard Form:

Vertex Form:

Vertex: _____ AOS: _____