

Algebra
9.3 & 9.4 Notes
Solving & Graphing Quadratic Functions

Standards:

A1.8.1 Graph quadratic, cubic, and radical equations.

A1.8.7 Use quadratic equations to solve word problems.

9.3 Vocabulary

1. A **quadratic function** is a function that can be written in the **standard form**:

$$y = ax^2 + bx + c, \text{ where } a \neq 0$$

2. Every quadratic function has a U-shaped graph called a _____.
3. If the leading coefficient a is positive, the parabola _____.
4. If the leading coefficient a is negative, the parabola _____.
5. The _____ is the lowest point of a parabola that opens up and the highest point of a parabola that opens down.
6. The line passing through the vertex that divides the parabola into two symmetric parts is called the _____.
7. Solutions of quadratic functions can also be called the _____, _____, or _____.

To find the Vertex and Axis of Symmetry

1. Put the quadratic function in standard form: $y = ax^2 + bx + c$
2. Identify the numeric values of a , b , and c .
3. The vertex has an x -coordinate of $x = \frac{-b}{2a}$. Plug in the values for a and b .
4. Substitute whatever you get for x in step 3 into the quadratic function to find the y -coordinate of the vertex.
5. The axis of symmetry is the vertical line $x = \frac{-b}{2a}$

Algebra
9.3 & 9.4 Notes
Solving & Graphing Quadratic Functions

Example 1 – Find the vertex and Axis of Symmetry for these quadratic functions:

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

$a = \underline{\hspace{1cm}} \quad b = \underline{\hspace{1cm}} \quad c = \underline{\hspace{1cm}}$

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

Axis of Symmetry: $\underline{\hspace{2cm}}$

b.) $y = x^2 - 10$

$a = \underline{\hspace{1cm}} \quad b = \underline{\hspace{1cm}} \quad c = \underline{\hspace{1cm}}$

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

Axis of Symmetry: $\underline{\hspace{2cm}}$

c.) $y = x^2 + 4x - 1$

$a = \underline{\hspace{1cm}} \quad b = \underline{\hspace{1cm}} \quad c = \underline{\hspace{1cm}}$

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

Axis of Symmetry: $\underline{\hspace{2cm}}$

d.) $y = -2x^2 + 8x - 8$

$a = \underline{\hspace{1cm}} \quad b = \underline{\hspace{1cm}} \quad c = \underline{\hspace{1cm}}$

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

Axis of Symmetry: $\underline{\hspace{2cm}}$

Steps for Graphing a Quadratic Function

1. Follow the above steps to find the vertex and axis of symmetry.
2. Plot the vertex and the axis of symmetry on a coordinate plane.
3. Make a table of values, using x -values to the left and right of the vertex.
4. Plot the points and connect them with a smooth curve to form a parabola.

Algebra
9.3 & 9.4 Notes
Solving & Graphing Quadratic Functions

Example 2 – Graphing a Quadratic Function with a Positive a -value

a.) Sketch the graph of $y = x^2 - 1$ $a = \underline{\hspace{1cm}}$ $b = \underline{\hspace{1cm}}$ $c = \underline{\hspace{1cm}}$

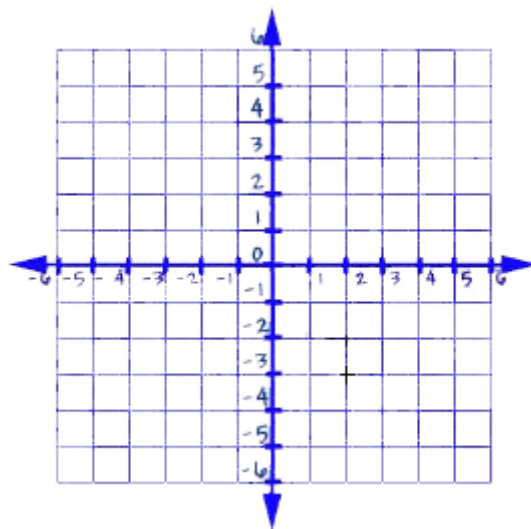
Vertex:

AOS:

Roots:

Opens:

x					
y					



b.) Sketch the graph of $y = -x^2 + 4x - 4$ $a = \underline{\hspace{1cm}}$ $b = \underline{\hspace{1cm}}$ $c = \underline{\hspace{1cm}}$

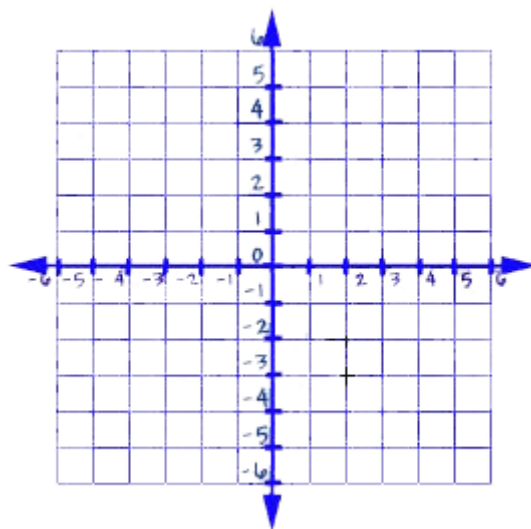
Vertex:

AOS:

Roots:

Opens:

x					
y					



Algebra
9.3 & 9.4 Notes
Solving & Graphing Quadratic Functions

c.) Sketch the graph of $y = x^2 + 3$

$a = \underline{\hspace{2cm}}$ $b = \underline{\hspace{2cm}}$ $c = \underline{\hspace{2cm}}$

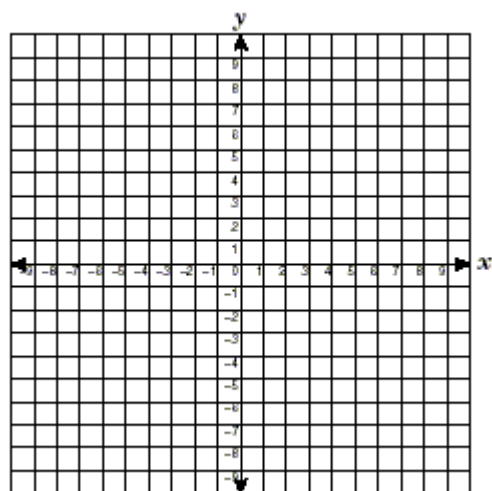
Vertex:

AOS:

Roots:

Opens:

x					
y					



d.) Sketch the graph of $y = 2x^2 + 8x$

$a = \underline{\hspace{2cm}}$ $b = \underline{\hspace{2cm}}$ $c = \underline{\hspace{2cm}}$

Vertex:

AOS:

Roots:

Opens:

x					
y					

