Name: Date: Period:

A Quadratic Equation in standard form for graphing is written as

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

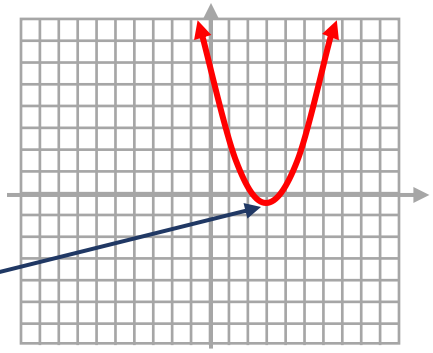
where a, b, and c are real numbers and $a \neq 0$

The graph of a quadratic equation is called a **parabola.** A **parabola** is drawn as a smooth curve that opens:

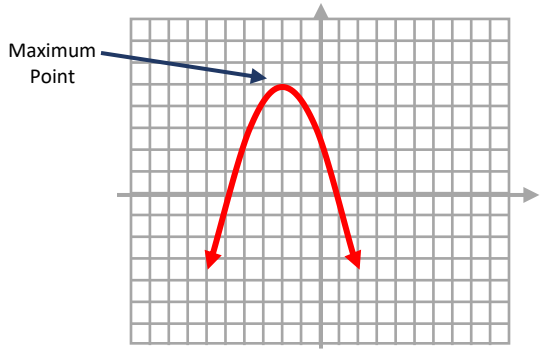
UP, like a Smile (+)

DOWN, like a Frown (-)

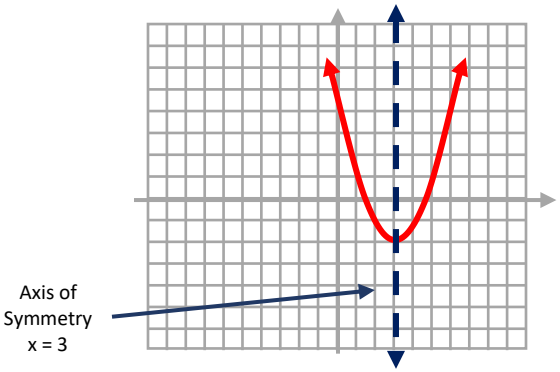
If the "a" value is **positive**, the parabola opens **upward** and has a **minimum** turning point.

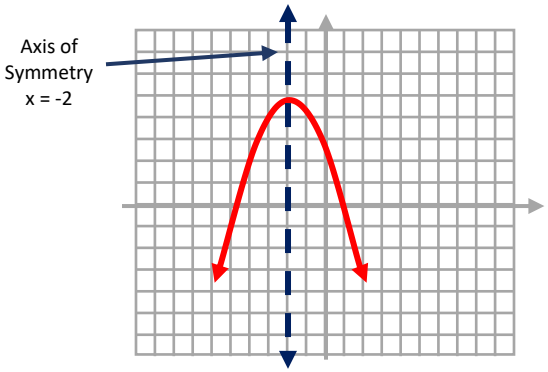


If the "a" value is **negative**, the parabola opens **downward** and has a **maximum** turning point.



A parabola has an A**xis of Symmetry**, which is the **vertical line** drawn through the vertex (turning point) that splits the parabola in half. Every point on one side of the AOS matches a point on the other side.
The ONLY point that does not match up with another point is the vertex.





Make sure each equation is in standard form, $y = ax^2 + bx + c$. Identify a, b and c.

1. $x^2 - 8x + 15 = 0$
   a = _____
   b = _____
   c = _____

2. $9x^2 - 6x = -1$
   a = _____
   b = _____
   c = _____

3. $x^2 - 8 = 0$
   a = _____
   b = _____
   c = _____

4. $3x^2 = -4x$
   a = _____
   b = _____
   c = _____

5. $4x - 5 = -x^2$
   a = _____
   b = _____
   c = _____

6. $2x^2 = 8$
   a = _____
   b = _____
   c = _____

The **Axis of Symmetry (AOS)** can be found algebraically or graphically (using a graphing calculator). Today we will practice finding the AOS algebraically using the formula, $x = \frac{-b}{2a}$.

Steps to find the axis of symmetry algebraically:

1. Identify a, b, and c
2. Substitute into the formula.
3. Remember: The answer is a vertical line which is **always** in the format of x = a number.

Find the axis of symmetry algebraically for the following quadratic equations.

1. $y = 2x^2 + 4x - 3$

The equation of the axis of symmetry is _____.

2. $y = 3x^2 - 6x + 2$

The equation of the axis of symmetry is _____.

3. $y = 4x^2 - 16x - 5$

The equation of the axis of symmetry is _____.

Note: The axis of symmetry ONLY provides the x-value of the vertex of the parabola. To find the corresponding y-value algebraically, you must substitute your x-value from the axis of symmetry into the original quadratic. The vertex of the parabola is the (x, y) ordered pair.

Find the vertex of each of the above parabolas by substituting the x-value from the Axis of Symmetry into original quadratic to find the corresponding y-value. The first one has been done for you.

In Example #1, the x-value of the turning point is -1. Substitute into

$y = 2x^2 + 4x - 3$

$y = 2(-1)^2 + 4(-1) - 3$

$y = 2(1) - 4 - 3$

$y = 2 - 4 - 3$

$y = -5$

The vertex of the graph is (-1, -5)

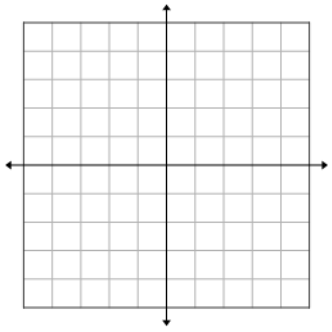
Find the vertex of Example 2:

The vertex of the graph is _____

Find the vertex of Example 3:

The vertex of the graph is _____

1. Draw the graph the equation x = 4.



2. Write the equation of the following graph