Graph by Following Five Steps:

Step 1 - Find Axis of Symmetry

Step 2 - Find Vertex

Step 3 - Find y-intercept

Step 4 - Locate another point

Step 5 - Reflect and Connect

Graphing

Task: Graph $y = 3x^2 - 6x + 1$

Step 1: Find the Axis of Symmetry

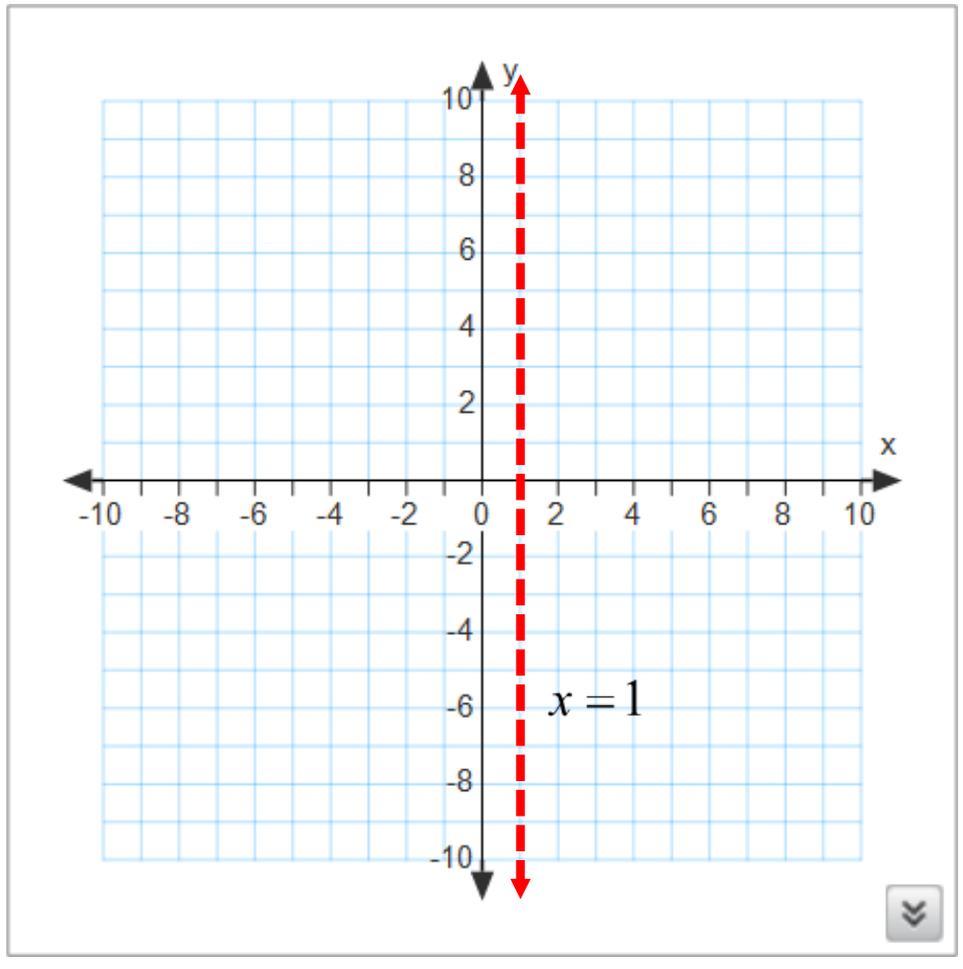
Recall the Formula: $x = \frac{-b}{2a}$

a = 3

b = -6

$x = \frac{-(-6)}{2(3)} = \frac{6}{6} = 1$

Therefore, the axis of symmetry is x = 1.



Graphing

Task: Graph $y = 3x^2 - 6x + 1$

Step 2: To find the vertex, substitute $\frac{-b}{2a}$ for x in the equation and find y.

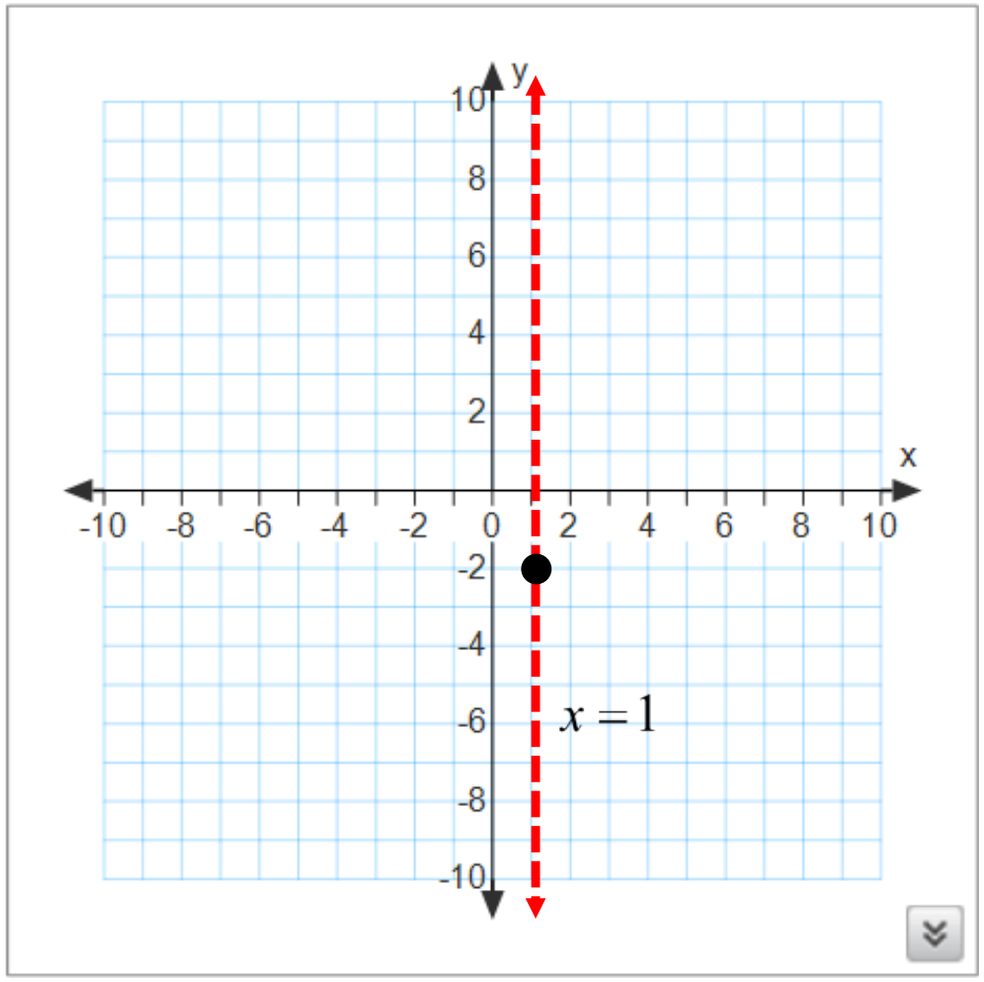
$y = 3x^2 - 6x + 1$

$y = 3(1)^2 + -6(1) + 1$

$y = 3 - 6 + 1$

$y = -2$

Vertex = (1 , -2)



Graphing

Task: Graph $y = 3x^2 - 6x + 1$

Step 3: Find the y-intercept.

The y-intercept occurs when x = 0, so substitute zero for x in the equation.

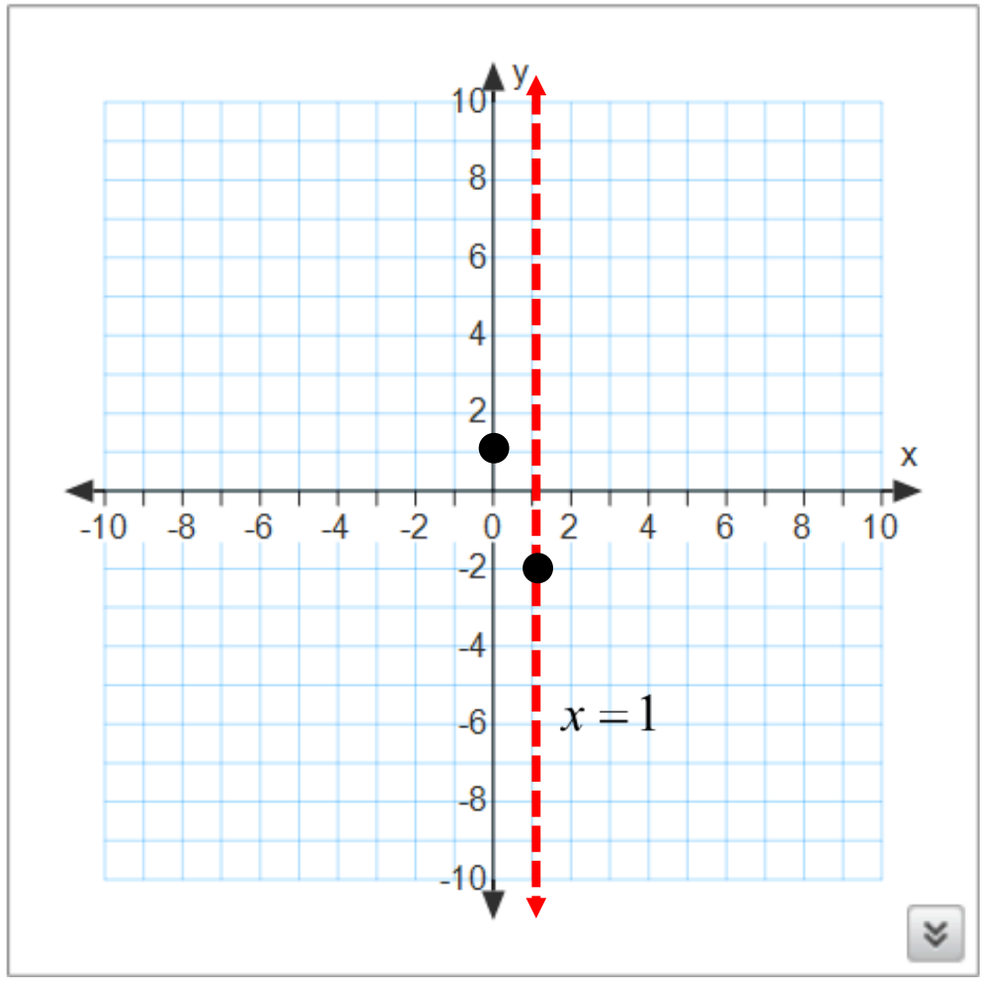
$y = 3x^2 - 6x + 1$

$y = 3(0)^2 + -6(0) + 1$

$y = 0 - 0 + 1$

$y = 1$

y intercept = (0, 1)



Graphing

Task: Graph $y = 3x^2 - 6x + 1$

Step 4: Plot an additional point.

Choose an x-value to substitute into the function.

Using x = -1

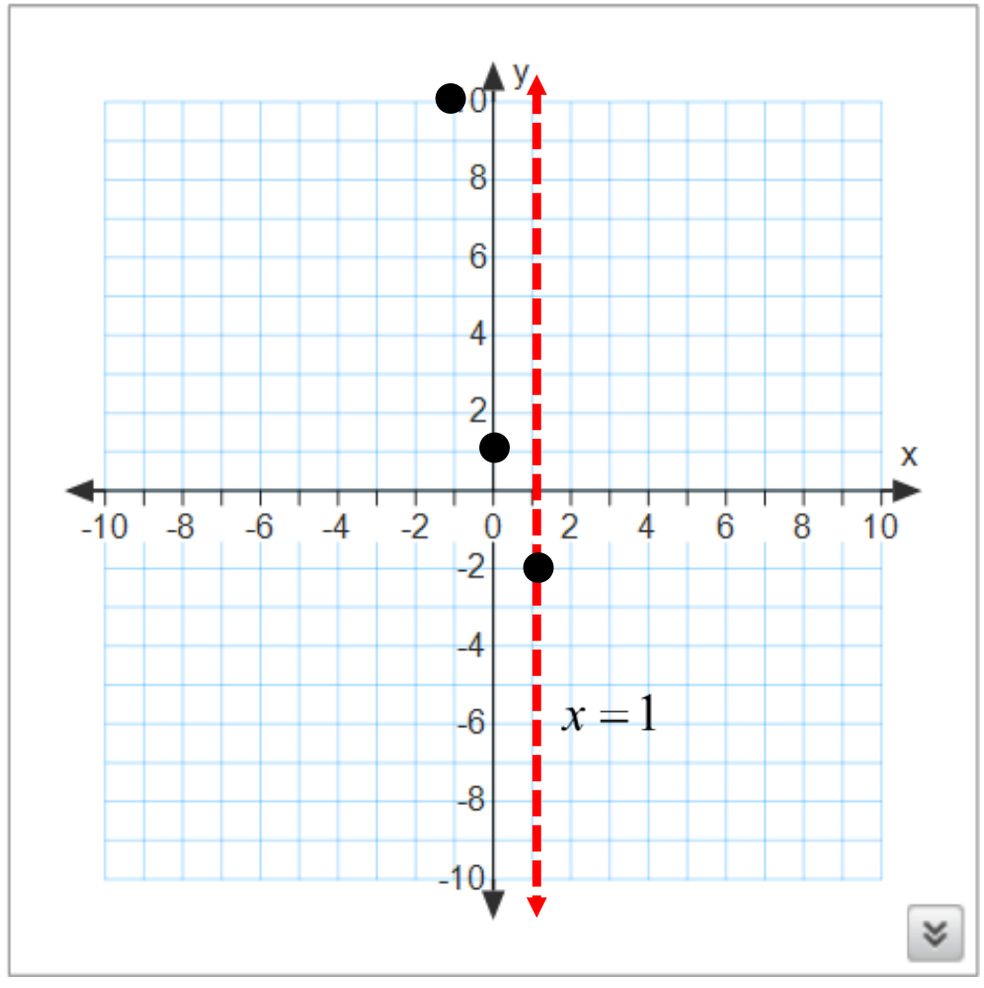
$y = 3x^2 - 6x + 1$

$y = 3(-1)^2 + -6(-1) + 1$

$y = 3 + 6 + 1$

$y = 10$

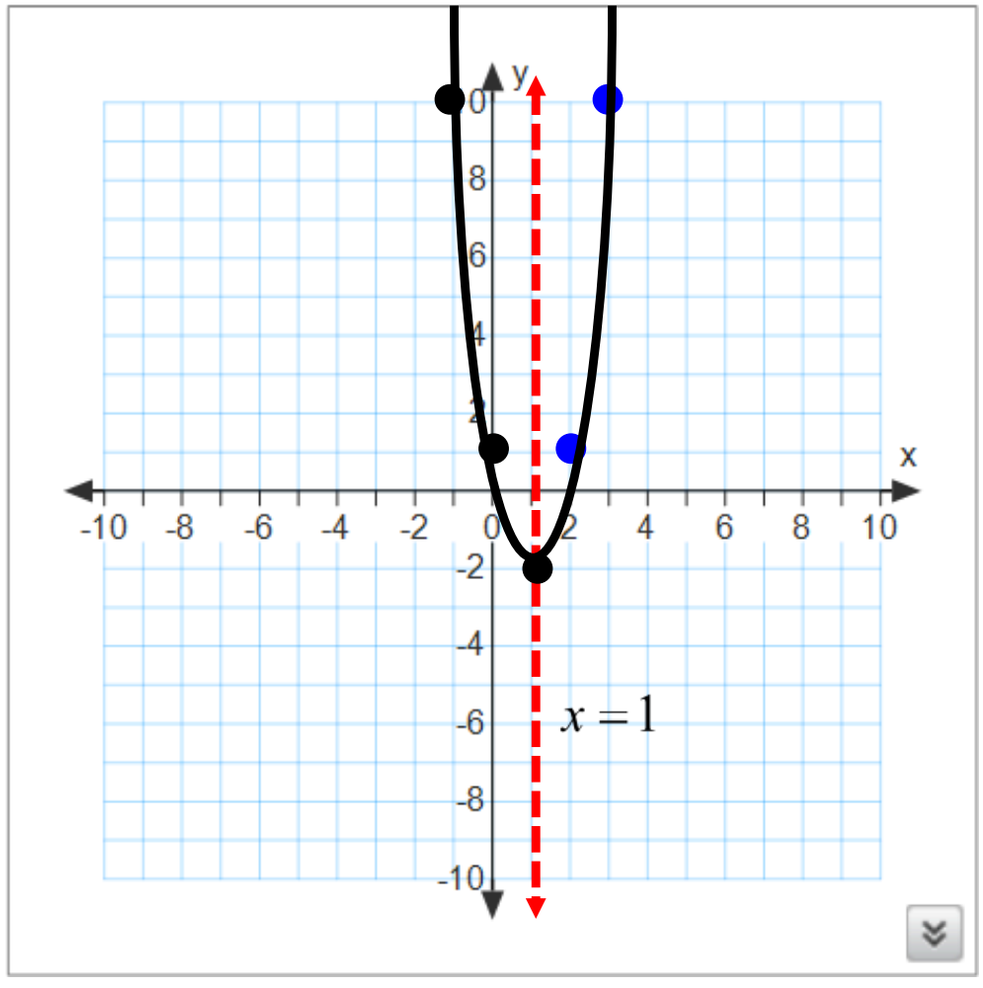
point = (-1, 10)



Graphing

Task: Graph $y = 3x^2 - 6x + 1$

Step 5: Using the axis of symmetry, reflect the points to get the other half of the parabola. Connect with a smooth curve.



9 What is the axis of symmetry for $y = x^2 + 2x - 3$ (Step 1)?

A $x = 1$

B $x = -1$

C $x = 2$

D $x = -3$

Answer

10 What is the vertex for $y = x^2 + 2x - 3$ (Step 2)?

A (-1, -4)

B (1, -4)

C (-1, -6)

D (1, -6)

Answer

11 What is the y-intercept for $y = x^2 + 2x - 3$ (Step 3)?

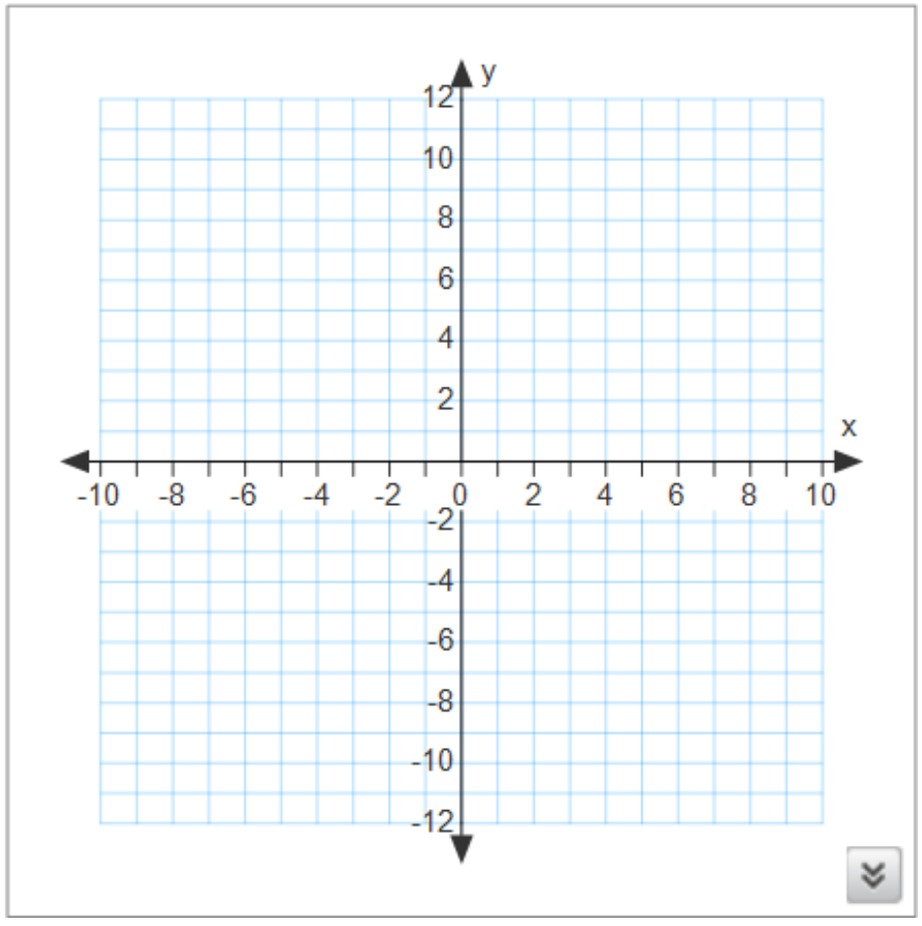
A (0 , -3)

B (0 , 3)

Answer

Graph

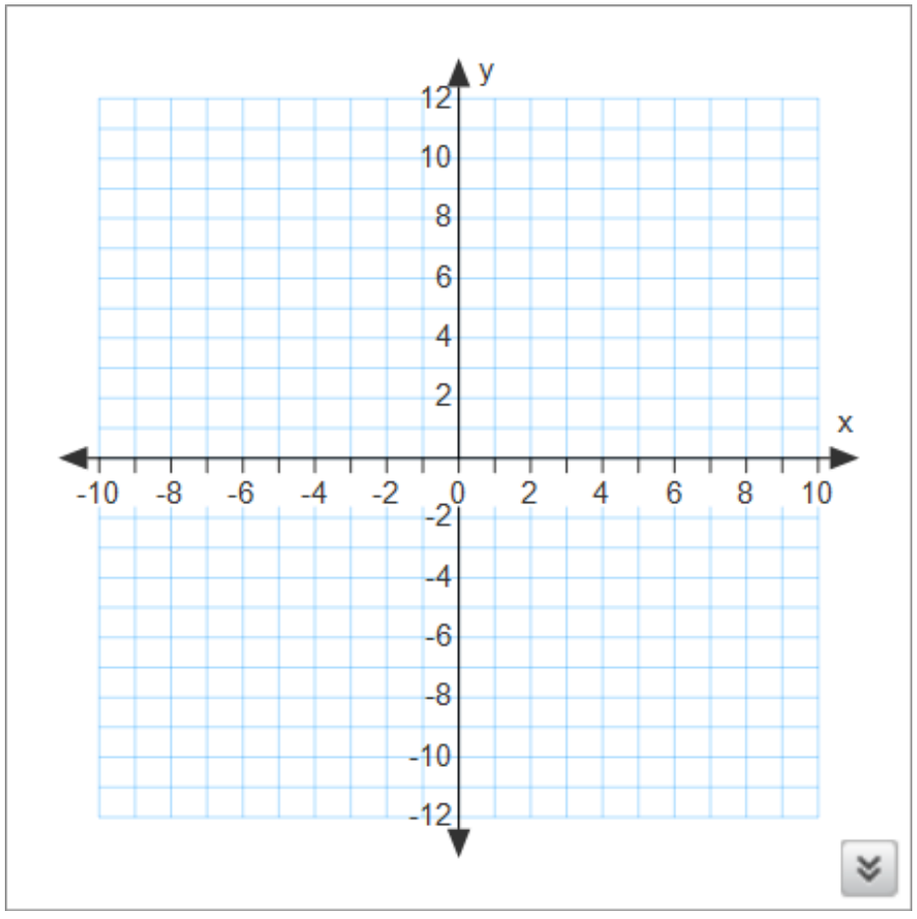
Practice: Graph $y = 2x^2 - 6x + 4$



Answer

Graph

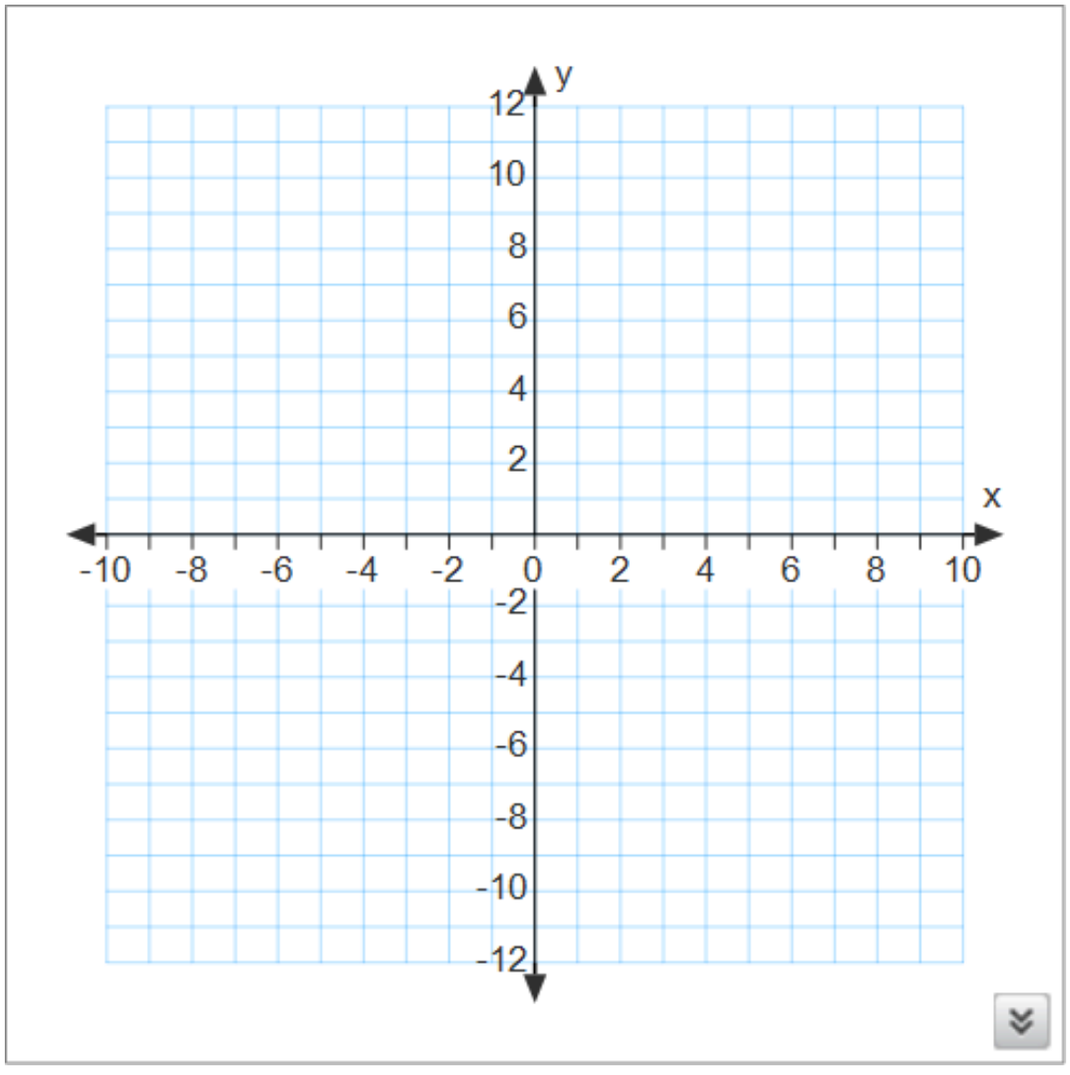
Practice: Graph $y = -x^2 - 4x + 5$



Answer

Graph

Practice: Graph $y = 3x^2 - 7$



Answer

Solve Quadratic Equations by Graphing

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Solve by Graphing

When asked to solve a quadratic equation, there are several ways to do so.

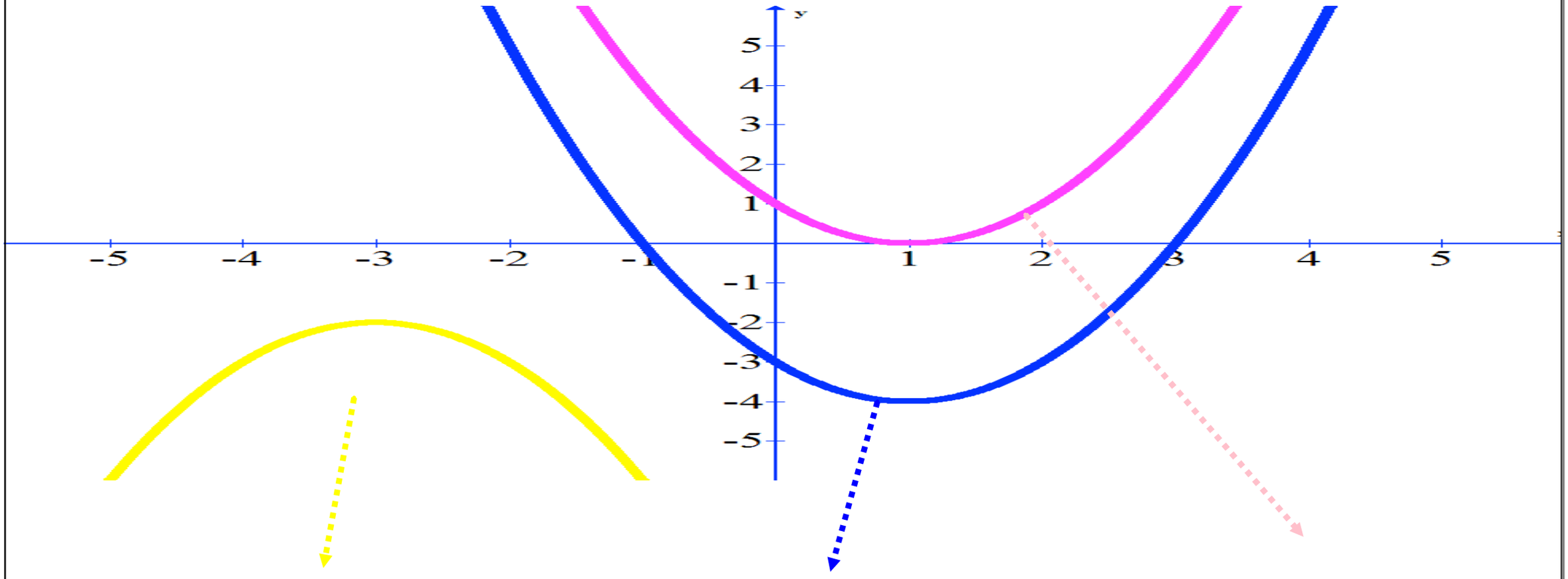
One way to solve a quadratic equation in standard form is to find the zeros of the related function by graphing.

A zero is the point at which the parabola intersects the x-axis.

A quadratic function may have one, two or no zeros.

Solve by Graphing

How many zeros do the parabolas have? What are the values of the zeros?



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Vocabulary

Every quadratic function has a related quadratic equation.

A quadratic equation is used to find the zeroes of a quadratic function. When a function intersects the x-axis its y-value is zero.

When writing a quadratic function as its related quadratic equation, you replace y with 0.
So y = 0.

$y = ax^2 + bx + c$ ⟶ Quadratic Function

$0 = ax^2 + bx + c$

$ax^2 + bx + c = 0$ ⟶ Quadratic Equation

Solve by Graphing

One way to solve a quadratic equation in standard form is to find the zeros or x-intercepts of the related function.

Solve a quadratic equation by graphing:

Step 1 - Write the related function.

Step 2 - Graph the related function.

Step 3 - Find the zeros (or x-intercepts) of the related function.

Solve by Graphing

Step 1 - Write the Related Function

$2x^2 - 18 = 0$

$2x^2 - 18 = y$

$y = 2x^2 + 0x - 18$

Solve by Graphing

Step 2 - Graph the Function

$$y = 2x^2 + 0x - 18$$

Use the same five-step process for graphing

The axis of symmetry is x = 0.

The vertex is (0, -18).

The y-intercept is (0, -18).

Since the vertex is the y-intercept, locate two other points by substituting values for x. We'll use (2,-10) and (3,0)

Graph these points and use reflection across the axis of symmetry. Connect all points with a smooth curve.

Hint