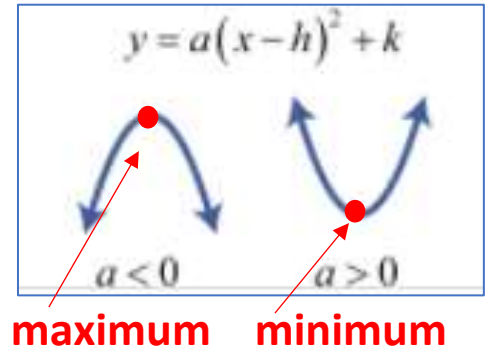


SECTION 4.2

Standard Form of Quadratic Function

VERTEX: $x = \frac{-b}{2a}$ Then plug x into equation to get y

Axis of symmetry is $x = \underline{\hspace{2cm}}$



- 1) Identify the vertex, the axis of symmetry, the maximum or minimum value, and the range of the parabola.

$y = x^2 + 4x + 5$ Find vertex: $x = \frac{-b}{2a} = \frac{-4}{2(1)} = -2$

Then plug -2 into equation to get y : $(-2)^2 + 4(-2) + 5 = 1$

Vertex $(-2, 1)$ axis of symmetry $x = -2$
(the x value in the vertex)

Minimum value: 1 range $y \geq 1$ (opens up)

- 2) Identify the vertex, the axis of symmetry, the maximum or minimum value, and the range of the parabola.

$y = -x^2 + 4x - 8$ Find vertex: $x = \frac{-b}{2a} = \frac{-4}{2(-1)} = 2$

Then plug 2 into equation to get y : $-(2)^2 + 4(2) - 8 = -4$

Vertex $(2, -4)$ axis of symmetry $x = 2$
(the x value in the vertex)

Minimum value -4 range $y \leq -4$ (opens down)

- 3) Identify the vertex, the axis of symmetry, the maximum or minimum value, and the range of the parabola.

$$y = -x^2 - 6x - 8 \quad \text{Find vertex: } x = \frac{-b}{2a} = \frac{6}{2(-1)} = -3$$

Then plug -3 into equation to get y: $-(-3)^2 - 6(-3) - 8 = 1$

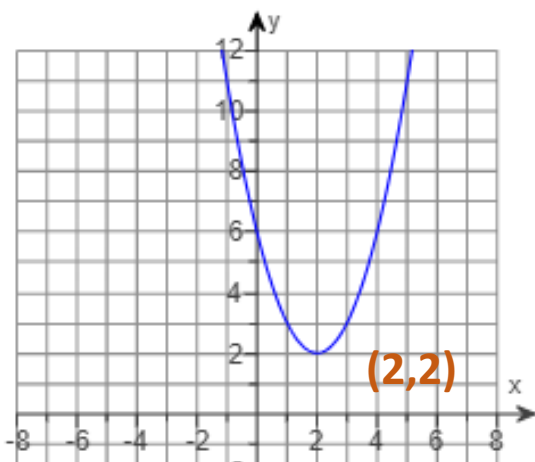
Vertex $(-3, 1)$

axis of symmetry $x = -3$
(the x value in the vertex)

Minimum value 1

range $y \leq 1$ (opens down)

- 4) The graph of a quadratic function is given. Select the function's equation from the choices given. Find the vertex

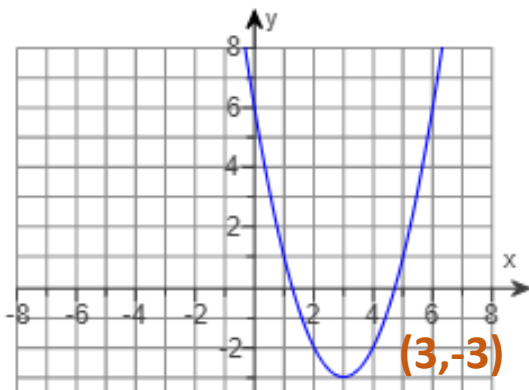


Choose the correct equation below.

- A. $f(x) = (x + 2)^2 - 2$
- B. $f(x) = (x - 2)^2 + 2$
- C. $f(x) = (x + 2)^2 + 2$
- D. $f(x) = (x - 2)^2 - 2$

$y = (x-h)^2 + k$ vertex (h, k)
change sign of h

- 5) The graph of a quadratic function is given. Select the function's equation from the choices given. Find the vertex



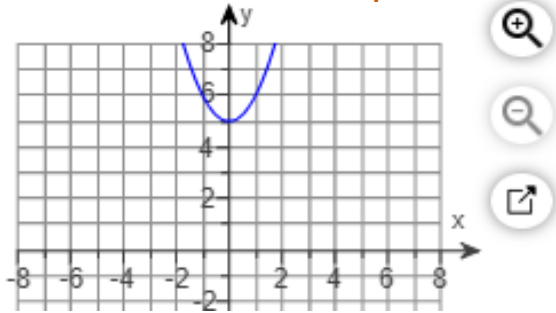
Choose the correct equation below.

- A. $f(x) = (x + 3)^2 - 3$
- B. $f(x) = (x - 3)^2 - 3$
- C. $f(x) = (x - 3)^2 + 3$
- D. $f(x) = (x + 3)^2 + 3$

$y = (x-h)^2 + k$ vertex (h, k)
change sign of h

- 6) The graph of a quadratic function is given. Select the function's equation from the choices given.

Transformation: up 5



Choose the correct equation below.

- A. $f(x) = x^2 - 10x + 25$
- B. $f(x) = x^2 + 5$
- C. $f(x) = x^2 - 5$
- D. $f(x) = -x^2 + 5$

- 7) In the following exercise, find the coordinates of the vertex for the parabola defined by the given quadratic function.

$f(x) = 3x^2 + 12x + 4$ Find vertex: $x = \frac{-b}{2a} = \frac{-12}{2(3)} = -2$

Then plug -2 into equation to get y: $3(-2)^2 + 12(-2) + 4 = -8$

Vertex (-2, -8)

- 8) Find the coordinates of the vertex for the parabola defined by the given quadratic function.

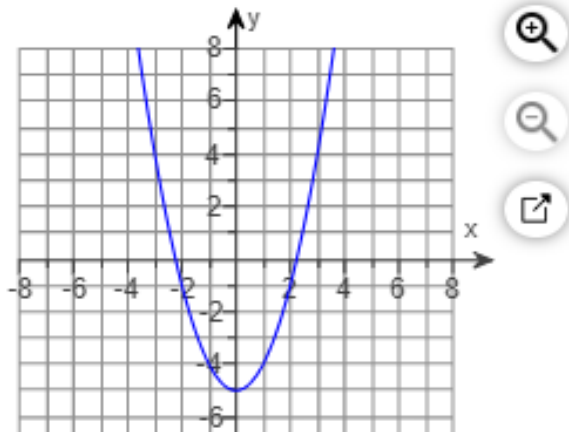
$f(x) = -x^2 + 2x + 2$ Find vertex: $x = \frac{-b}{2a} = \frac{-2}{2(-1)} = 1$

Then plug 1 into equation to get y: $-(1)^2 + 2(1) + 4 = 3$

Vertex (1, 3)

- 9) The graph of a quadratic function is given. Select the function's equation from the choices given.

Transformation: down 5

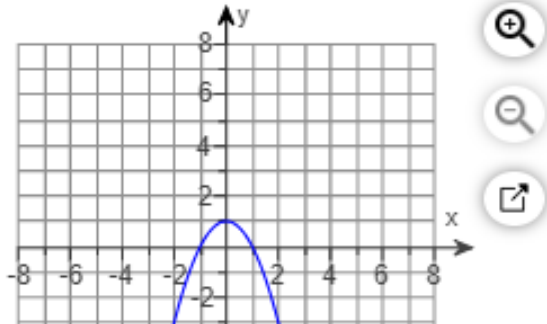


Choose the correct equation below.

- A. $f(x) = x^2 + 5$
- B. $f(x) = x^2 - 10x + 25$
- C. $f(x) = -x^2 - 5$
- D. $f(x) = x^2 - 5$

- 10) The graph of a quadratic function is given. Select the function's equation from the choices given.

Transformation: reflects across x-axis, up 1



Choose the correct equation below.

- A. $f(x) = x^2 - 2x + 1$
- B. $f(x) = x^2 + 1$
- C. $f(x) = -x^2 - 1$
- D. $f(x) = -x^2 + 1$

- 11) In the following exercise, find the coordinates of the vertex for the parabola defined by the given quadratic function.

$f(x) = 3x^2 + 6x + 5$ Find vertex: $x = \frac{-b}{2a} = \frac{-6}{2(3)} = -1$

Then plug - 1 into equation to get y: $3(-1)^2 + 6(-1) + 5 = 2$

Vertex (-1, 2)

- 12) Find the coordinates of the vertex for the parabola defined by the given quadratic function.

$$f(x) = -x^2 - 2x + 5 \quad \text{Find vertex: } x = \frac{-b}{2a} = \frac{2}{2(-1)} = -1$$

Then plug -1 into equation to get $y: -(-1)^2 - 2(-1) + 5 = 6$

Vertex $(-1, 6)$

- 13) Find the equation of the axis of symmetry and the coordinates of the vertex of the graph of the following function.

$$y = x^2 - 8x - 5 \quad \text{Find vertex: } x = \frac{-b}{2a} = \frac{8}{2(1)} = 4$$

axis of symmetry $x = 4$

Then plug 4 into equation to get $y: (4)^2 - 8(4) - 5 = -21$

Vertex $(4, -21)$

- 14) Find the equation of the axis of symmetry and the coordinates of the vertex of the graph of the following function.

$$y = -4x^2 - 24x - 31 \quad \text{Find vertex: } x = \frac{-b}{2a} = \frac{24}{2(-4)} = \frac{24}{-8} = -3$$

axis of symmetry $x = -3$

Then plug -3 into equation to get $y: -4(-3)^2 - 24(-3) - 31 = 5$

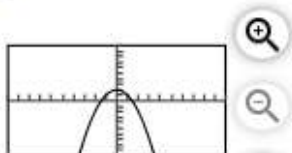
Vertex $(-3, 5)$

Sketch the graph of the function.

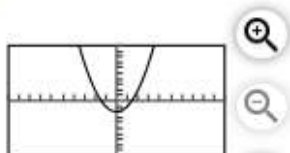
- 15) $y = x^2 - 2$ transformation: down 2

Choose the correct graph below.

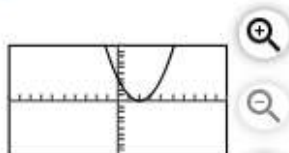
A.



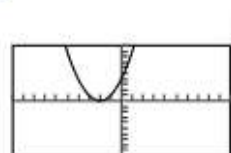
B.



C.



D.

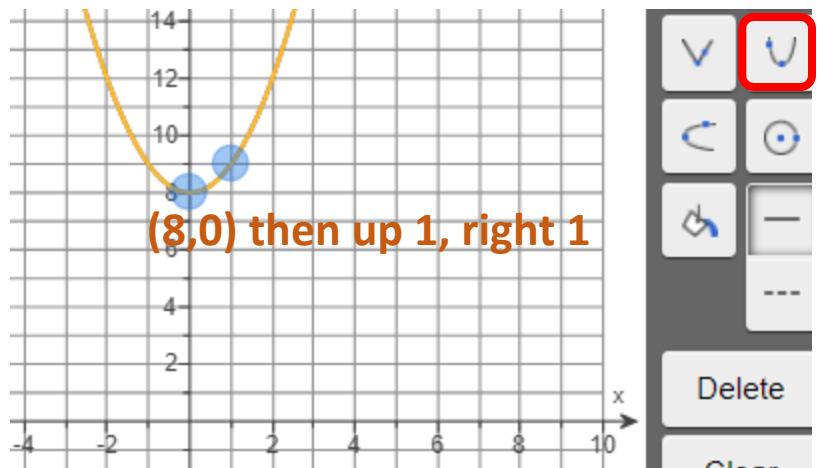


- 16) Graph the quadratic equation and determine the x-intercepts, if they exist.

$$y = x^2 + 8$$

transformation: up 8

x-intercepts: none

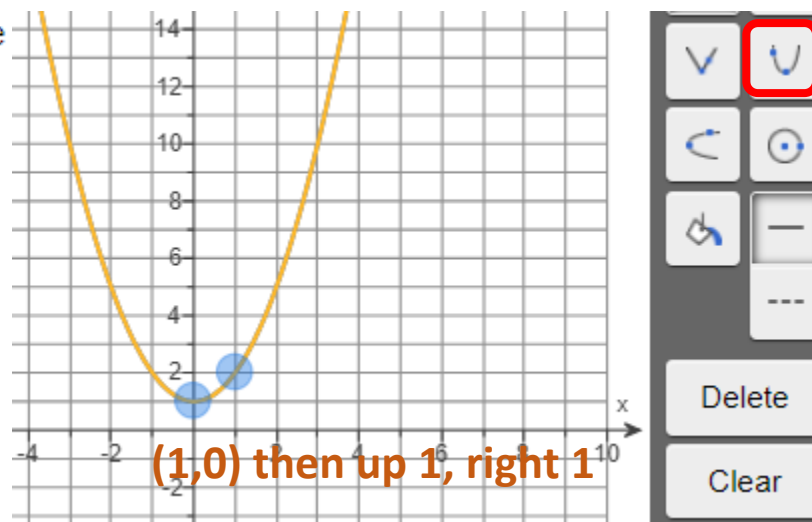


- 17) Graph the quadratic equation and determine the x-intercepts, if they exist.

$$y = x^2 + 1$$

transformation: up 1

x-intercepts: none



- 18) Graph the function. Identify the axis of symmetry and the vertex.

$$f(x) = x^2 - 4x + 6$$

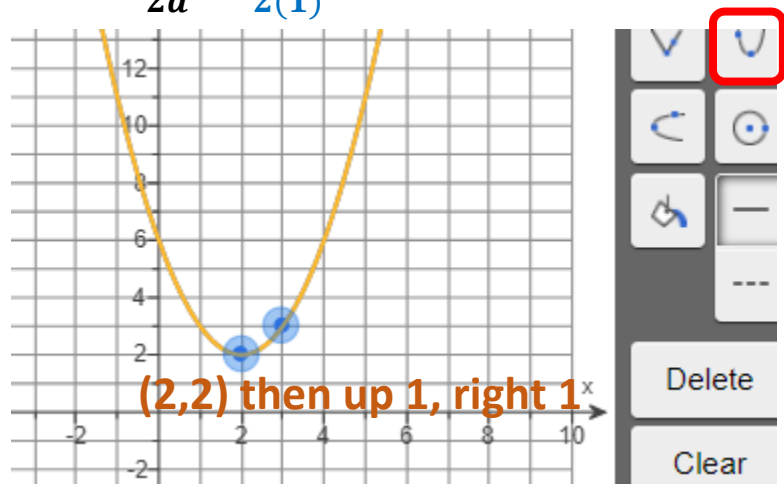
Find vertex: $x = \frac{-b}{2a} = \frac{4}{2(1)} = 2$

axis of symmetry $x = 2$

Then plug 2 into equation to get y:

$$(2)^2 - 4(2) + 6 = 2$$

Vertex $(2, 2)$



- 19) Graph the function. Identify the axis of symmetry and the vertex.

$$f(x) = x^2 - 2x + 10$$

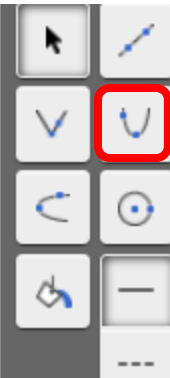
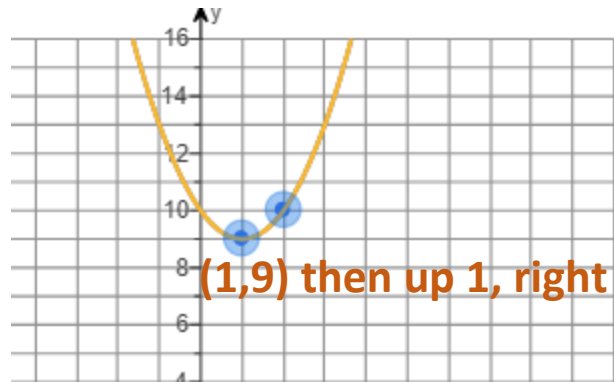
Find vertex: $x = \frac{-b}{2a} = \frac{2}{2(1)} = 1$

axis of symmetry $x = 1$

Then plug 1 into equation to get y:

$$(1)^2 - 2(1) + 10 = 9$$

Vertex $(1, 9)$



- 20) Graph the function. Identify the axis of symmetry and the vertex.

$$f(x) = x^2 - 2x + 6$$

Find vertex: $x = \frac{-b}{2a} = \frac{2}{2(1)} = 1$

axis of symmetry $x = 1$

Then plug 1 into equation to get y:

$$(1)^2 - 2(1) + 6 = 5$$

Vertex $(1, 5)$

