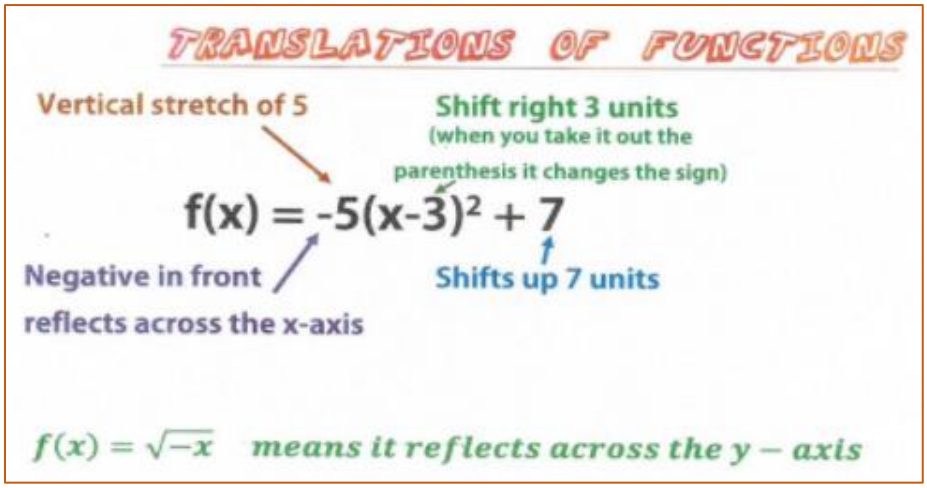
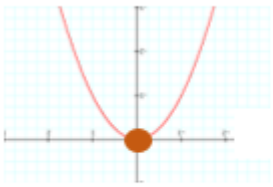
SECTION 4.1 **ALGEBA 2** **THOMPSON**

Quadratic Functions and Transformations



****EXTREMELY IMPORTANT TO FIND DOMAIN AND RANGE ACCORDING TO THE DIRECTION OF THE GRAPH**

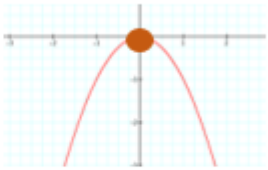
$y = x^2$



Domain: all real numbers

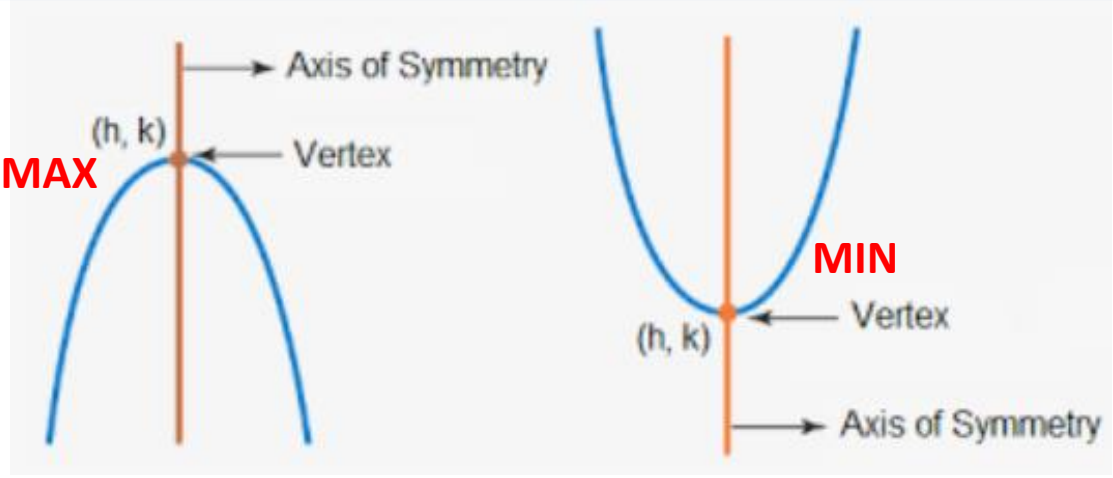
Range: y ≥

$y = -x^2$



Domain: all real numbers

Range y ≤

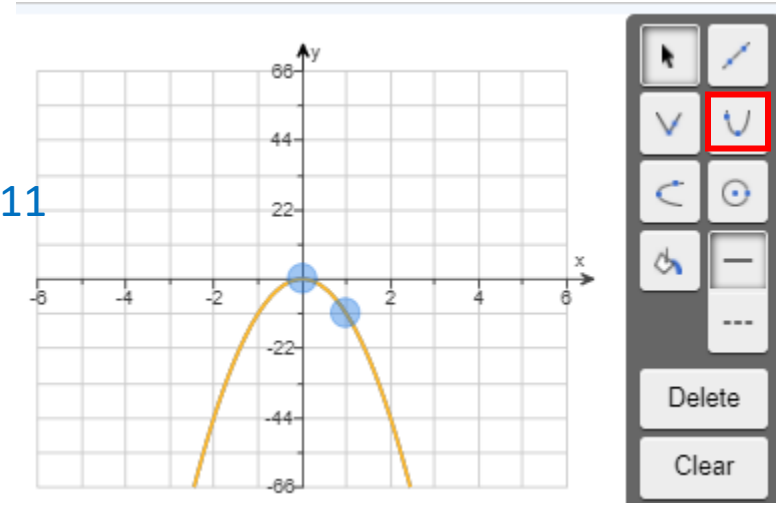


1) Graph the function $f(x) = -11x^2$.

Plot vertex (0,0) FIRST

Then plug in x=1 $y= -11(1)^2 - 11$

plot (1,-11)



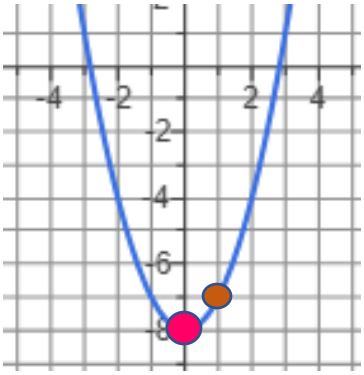
2) Graph the function. Decsribe how it was translated from $f(x) = x^2$.

Down 8 units

$f(x) = x^2 - 8$

Plot vertex (0,-8) FIRST

Then plug in shift up 1 and right 1



C. The graph of $f(x) = x^2$ was translated 8 units down.

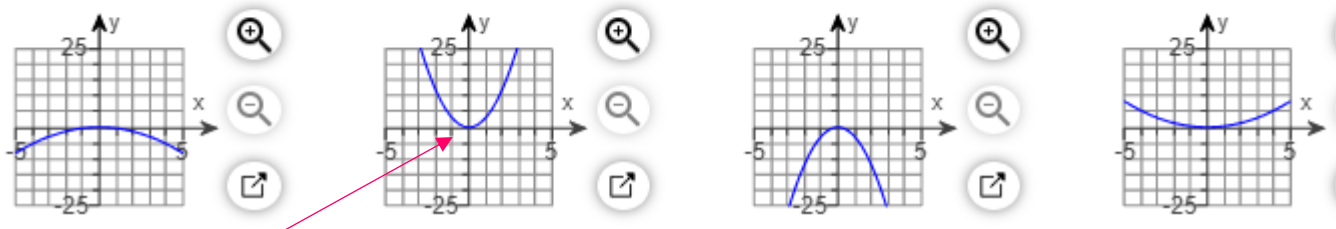
3) Graph the parabola. Identify the vertex.

$y = 3x^2$

Vertical stretch of 3, gets more narrow

Choose the correct graph below.

A. B. C. D.



What is the vertex?

(0,0) (Type an ordered pair.)

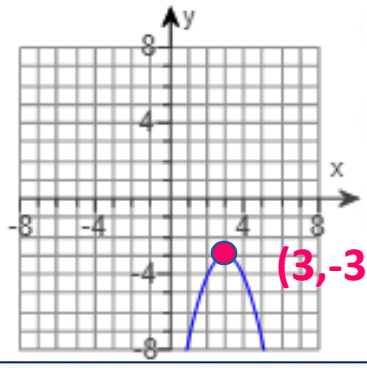
4) Identify the vertex of the graph. Tell whether it is a minimum or a maximum.

What is the vertex of the graph?

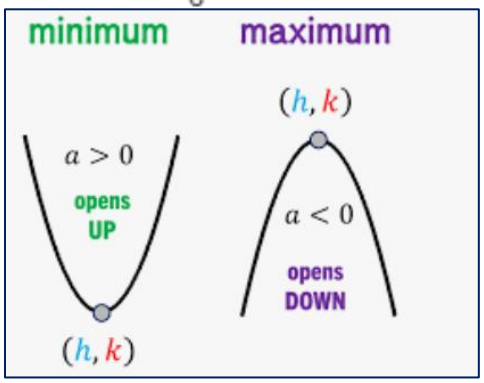
(3, – 3) (Type an ordered pair.)

Is the vertex a minimum or a maximum?

- Minimum
- Maximum ✔



(3,-3) high point

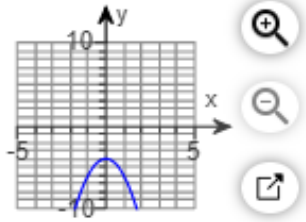


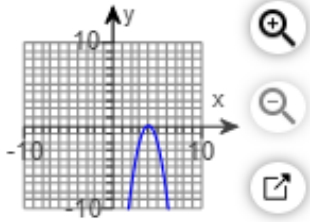
5) Graph the function.

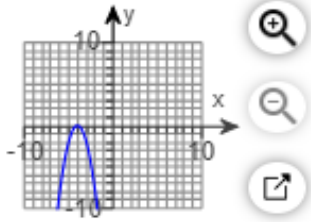
$f(x) = -2x^2 + 4$

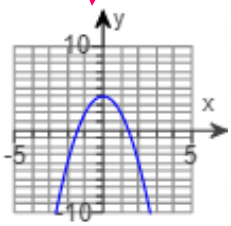
Reflects across the x-axis, vertical stretch of 2, up 4

Choose the correct graph below.

A. 

B. 

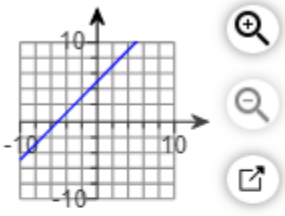
C. 

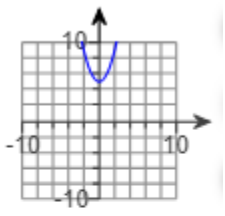
D. 

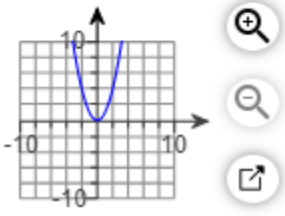
6) Sketch the graph of the parabola.

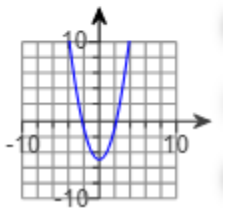
$f(x) = x^2 - 5$

Down 5 units

A. 

B. 

C. 

D. 

7) Identify the vertex and the axis of symmetry of the quadratic function. Then, graph the quadratic function.

$f(x) = (x - 15)^2$

$y = (x - h)^2 + k$ vertex is (h,k)

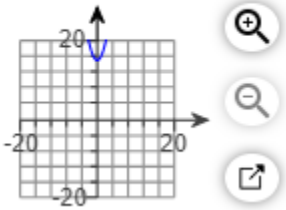
change the h sign

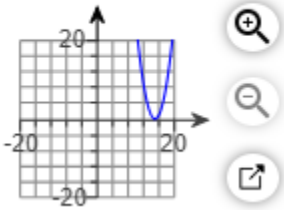
axis of symmetry is x = h

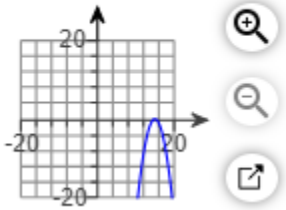
The vertex is (15,0). (Type an ordered pair.)

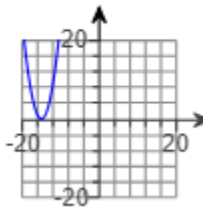
The axis of symmetry is x = 15. (Type an equation.)

Choose the correct graph of $f(x) = (x - 15)^2$.

A. 

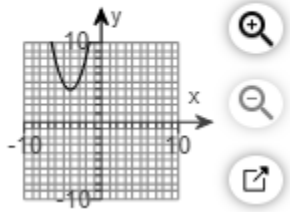
B. 

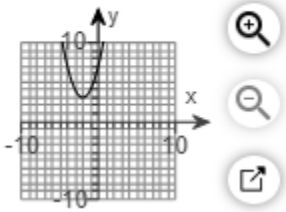
C. 

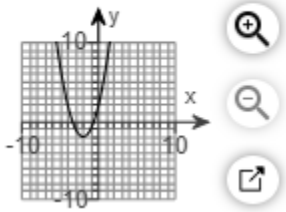
D. 

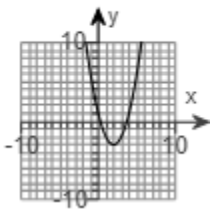
8) Determine the graph of the quadratic function, find the vertex and determine the axis of symmetry.

$f(x) = (x + 2)^2 + 3$

A. 

B. 

C. 

D. 

$y = (x - h)^2 + k$ vertex is (h,k)

axis of symmetry is x = h

Find the vertex of the parabola.

The vertex is (−2 , 3).

Find the equation of the axis of symmetry.

x = −2

9) Identify the vertex and the axis of symmetry of the quadratic function. Then, graph the quadratic function.

$f(x) = (x + 9)^2 - 5$

The vertex is $(-9, -5)$. (Type an ordered pair.)

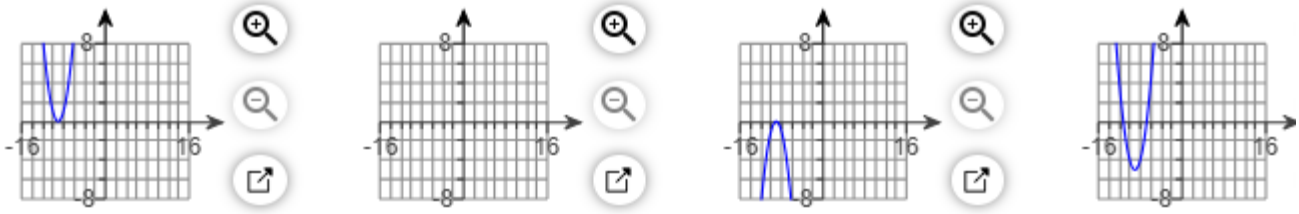
The axis of symmetry is $x = -9$. (Type an equation.)

$y = (x - h)^2 + k$ vertex is (h,k)

axis of symmetry is x = h

Choose the correct graph of $f(x) = (x + 9)^2 - 5$.

○ A. ○ B. ○ C. ● D.



10) Determine the graph of the quadratic function, find the vertex and determine the axis of symmetry.

$f(x) = 4(x - 5)^2$

The vertex is $(5,0)$.

$y = (x - h)^2 + k$ vertex is (h,k)

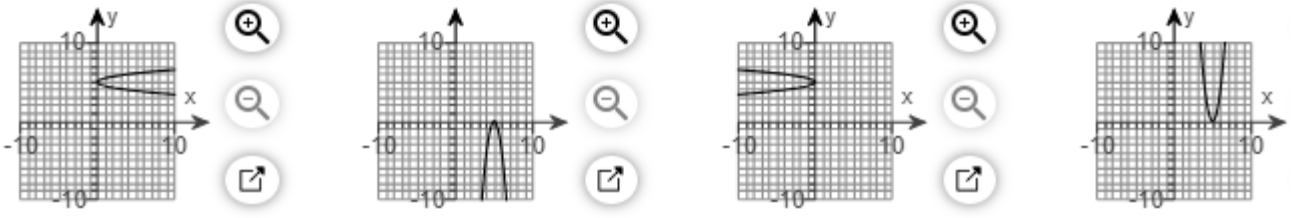
Find the equation of the axis of symmetry.

$x = 5$

axis of symmetry is x = h

Choose the correct graph of the function below.

○ A. ○ B. ○ C. ● D.

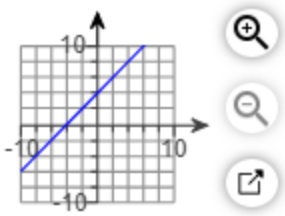


11) Sketch the graph of the parabola.

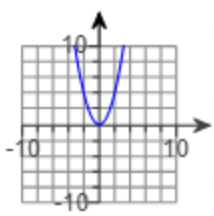
$f(x) = x^2 - 4$

Down 4 units

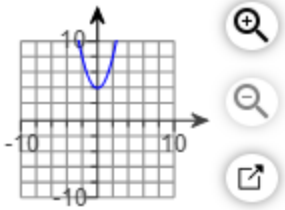
○ A.



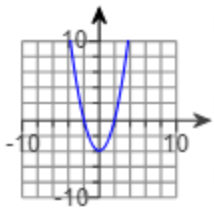
○ B.



○ C.



● D.



12) Identify the vertex and the axis of symmetry of the quadratic function. Then, graph the quadratic function.

$f(x) = (x - 9)^2$

The vertex is (9,0). (Type an ordered pair.)

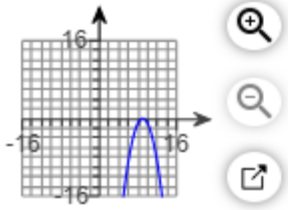
The axis of symmetry is $x = 9$. (Type an equation.)

$y = (x - h)^2 + k$ vertex is (h,k)

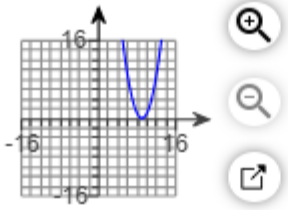
axis of symmetry is x = h

Choose the correct graph of $f(x) = (x - 9)^2$.

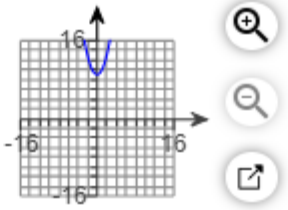
○ A.



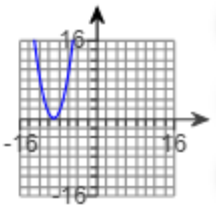
● B.



○ C.



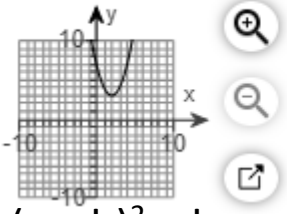
○ D.



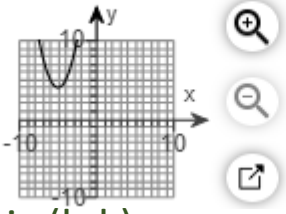
13) Determine the graph of the quadratic function, find the vertex and determine the axis of symmetry.

$f(x) = (x + 5)^2 + 4$

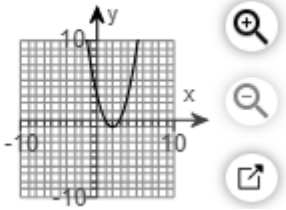
○ A.



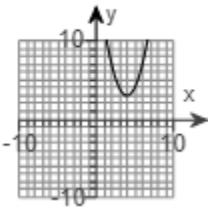
● B.



○ C.



○ D.



$y = (x - h)^2 + k$ vertex is (h,k)

axis of symmetry is x = h

Find the vertex of the parabola.

The vertex is (−5 , 4).

Find the equation of the axis of symmetry.

x = −5

14) Identify the vertex and the axis of symmetry of the quadratic function. Then, graph the quadratic function.

$f(x) = (x + 7)^2 - 2$

The vertex is $(-7, -2)$. (Type an ordered pair.)

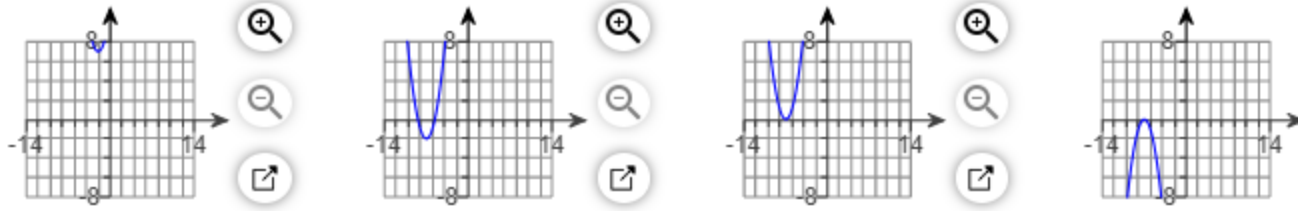
The axis of symmetry is $x = -7$. (Type an equation.)

$y = (x - h)^2 + k$ vertex is (h,k)

axis of symmetry is x = h

Choose the correct graph of $f(x) = (x + 7)^2 - 2$.

○ A. ● B. ○ C. ○ D.



15) Determine the graph of the quadratic function, find the vertex and determine the axis of symmetry.

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

Reflects across the x-axis with vertical stretch of 2

The vertex is $(4,0)$.

Find the equation of the axis of symmetry.

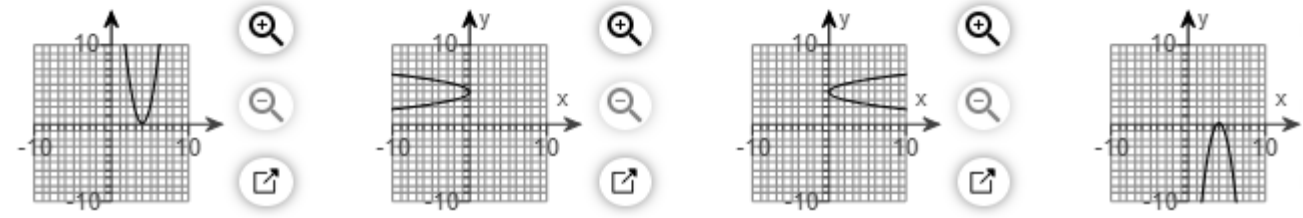
$x = 4$

$y = (x - h)^2 + k$ vertex is (h,k)

axis of symmetry is x = h

Choose the correct graph of the function below.

○ A. ○ B. ○ C. ● D.



16) Describe how the graph of $y = x^2$ can be transformed to the graph of the given equation.

$y = (x - 7)^2$

Describe the transformation. Choose the correct answer below.

- A translation of the graph up by 7 units
- A translation of the graph down by 7 units
- A translation of the graph to the left by 7 units
- ✔ A translation of the graph to the right by 7 units

17) Describe how the graph of $y = x^2$ can be transformed to the graph of the given equation.

$y = (x - 9)^2 + 6$

Describe the transformation. Choose the correct answer below.

- A translation of the graph to the left by 6 units and up by 9 units
- ✔ A translation of the graph to the right by 9 units and up by 6 units
- A translation of the graph to the left by 9 units and up by 6 units
- A translation of the graph to the right by 6 units and down by 9 units

18) Describe how the graph of $y = x^2$ can be transformed to the graph of the given equation.

$y = (x + 8)^2$

Describe the transformation. Choose the correct answer below.

- ✔ A translation of the graph to the left by 8 units
- A translation of the graph up by 8 units
- A translation of the graph down by 8 units
- A translation of the graph to the right by 8 units

19) Describe how the graph of $y = x^2$ can be transformed to the graph of the given equation.

$y = (x - 2)^2 + 4$

Describe the transformation. Choose the correct answer below.

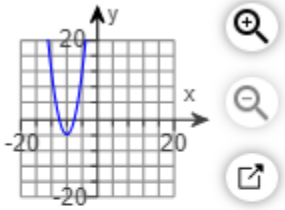
- A translation of the graph to the right by 4 units and down by 2 units
- A translation of the graph to the left by 4 units and up by 2 units
- A translation of the graph to the left by 2 units and up by 4 units
- ✔ A translation of the graph to the right by 2 units and up by 4 units

20) Choose the graph that represents the function.

$f(x) = (x - 4)^2 - 8$

$y = (x - h)^2 + k$ vertex is (4,-8)

A.



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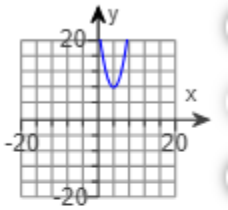

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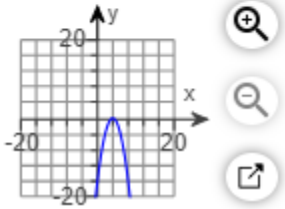
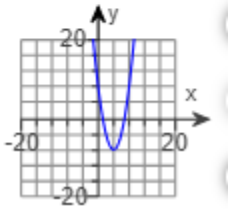


D.

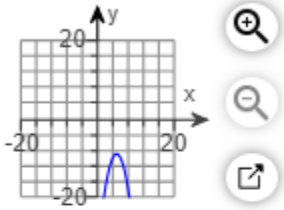


21) Choose the graph that correctly represents the function.

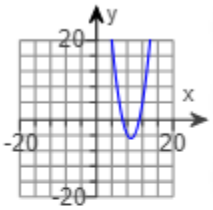
$f(x) = (x + 9)^2 - 5$

$y = (x - h)^2 + k$ vertex is (-9,-5)

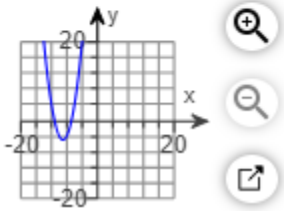
A.



B.



C.



D.