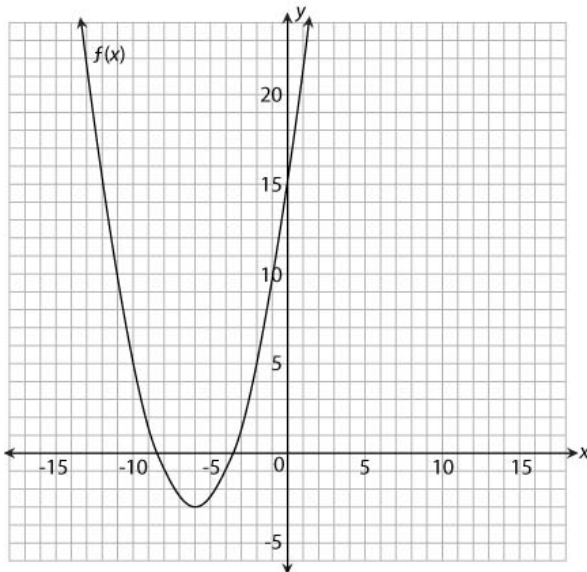


Directions: Answer the following question(s).

- 1 Vladimir sketches the graph of the function  $f(x) = \frac{1}{2}(x + 6)^2 - 3$  as shown below.



He then translates this function 11 units to the right and 4 units down to obtain the new function  $g(x) = \frac{1}{2}(x - h)^2 + k$ . What are the integer values for  $h$  and  $k$ ?

Use the drop-down menus to choose the correct values of  $h$  and  $k$ .

Web Only Interaction

Master ID: 2115785 Revision: 4  
Rubric: 1 Point(s)

This is the result of first noting that because  $f(x) = (1/2)(x + 6)^2 - 3$  is expressed in vertex form,  $f(x)$  has a vertex at  $(-6, -3)$ . Because  $g(x)$  is formed as a result of translating  $f(x)$  11 units to the right and 4 units down, the new vertex is located at  $(-6 + 11, -3 - 4)$  or  $(5, -7)$ . The vertex form of a quadratic equation is given as  $g(x) = a(x - h)^2 + k$ , where the vertex is given by  $(h, k)$ . Therefore for  $g(x)$ ,  $h = 5$ , and  $k = -7$ .

Standards:

CCSS.Math.Content.HSF-BF.B.3

- 2 This equation describes function  $h$ .

$$h(x) = \frac{1}{2}x - 4$$

The graph of function  $h$  is translated 2 units in a negative  $y$ -direction to form function  $j$ . Write an equation to describe function  $j$ . Show your work and explain your answer.

Master ID: 2115767 Revision: 4  
Rubric: 2 Point(s)

- 2 The response is correct and complete. A sample 2-point response is shown below. Accept a correct answer with appropriate work and a complete explanation.

Sample Correct Answer:

To find the equation, subtract 2 from  $h(x)$ .

$$j(x) = h(x) - 2 \rightarrow \frac{1}{2}x - 4 - 2 \rightarrow \frac{1}{2}x - 6$$

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

- 1 The response is partially correct. This level may include a correct answer with insufficient work or an insufficient explanation, or an incorrect answer based on a minor error.
- 0 The response is incorrect or there is no response.

Standards:

CCSS.Math.Content.HSF-BF.B.3

Directions: Answer the following question(s).

3 Pedro drew the graph of  $y = 4(x - 7)^2 + 3$ . How should he transform that graph to produce the graph of  $y = 4(x - 12)^2 + 3$ ?

- A. He should shift it 5 units to the left.
- B. He should shift it 5 units down.
- C. He should shift it 5 units up.
- D. He should shift it 5 units to the right.

Master ID: 308950 Revision: 3  
 Correct: D  
 Rationale:  
 A. this shift produces the graph of  $y = 4(x - 2)^2 + 3$ .  
 B. This shift produces the graph of  $y = 4(x - 7)^2 - 2$ .  
 C. This answer produces the graph of  $y = 4(x - 7)^2 + 8$ .  
 D. Changing -7 to -12 in this equation shifts the graph of the parabola 5 units to the right.  
 Standards:  
 CCSS.Math.Content.HSF-BF.B.3

4 Which equation represents a parabola with the same vertex as  $y = 4(x - 5)^2 + 20$  but that opens in the opposite direction?

- A.  $y = -4(x + 5)^2 - 20$
- B.  $y = -4(x - 5)^2 + 20$
- C.  $y = 4(x + 5)^2 - 20$
- D.  $y = 4(x + 5)^2 + 20$

Master ID: 308948 Revision: 3  
 Correct: B  
 Rationale:  
 A. The -4 inverts the parabola, but adjusting the signs on 5 and 20 will shift the vertex down and left.  
 B. The negative 4 indicates the parabola opens down, and the -5 and 20 determine the vertex, which is the same as in the given parabola.  
 C. Adjusting the -5 to +5 shifts the parabola left. In addition, adjusting the +20 to -20 shifts the parabola down.  
 D. Reversing the -5 to +5 will shift the parabola to the left, so the vertex will change.  
 Standards:  
 CCSS.Math.Content.HSF-BF.B.3

5 The parent function for a quadratic is represented by  $f(x) = x^2$ .

Drag and drop the "X" into each box that represents the transformation of the function from the parent function  $f(x) = x^2$ . A function may have more than one transformation.

Web Only Interaction

Directions: Answer the following question(s).

Master ID: 2552986 Revision: 1

Rubric: 1 Point(s)

This item is worth 2 points, with partial credit.

The correct response is:

Function	Vertical Translation	Horizontal Translation	Vertical Reflection
$f(x) = (x - \frac{2}{5})^2$		<input type="checkbox"/>	
$f(x) = (x + 10)^2 - 1$	<input type="checkbox"/>	<input type="checkbox"/>	
$f(x) = x^2 + 4$	<input type="checkbox"/>		
$f(x) = -(x - 7)^2$		<input type="checkbox"/>	<input type="checkbox"/>

Standards:

CCSS.Math.Content.HSF-BF.B.3