

F.BF.B.3: Transformations with Functions 1

- 1 Given the graph of the line represented by the equation $f(x) = -2x + b$, if b is increased by 4 units, the graph of the new line would be shifted 4 units
 - 1) right
 - 2) up
 - 3) left
 - 4) down

- 2 Which function represents the graph of $w(x) = |x|$ shifted 2 units to the right?
 - 1) $g(x) = |x + 2|$
 - 2) $h(x) = |x - 2|$
 - 3) $q(x) = |x| + 2$
 - 4) $r(x) = |x| - 2$

- 3 The function $f(x) = |x|$ is multiplied by k to create the new function $g(x) = k|x|$. Which statement is true about the graphs of $f(x)$ and $g(x)$ if $k = \frac{1}{2}$?
 - 1) $g(x)$ is a reflection of $f(x)$ over the y -axis.
 - 2) $g(x)$ is a reflection of $f(x)$ over the x -axis.
 - 3) $g(x)$ is wider than $f(x)$.
 - 4) $g(x)$ is narrower than $f(x)$.

- 4 In the functions $f(x) = kx^2$ and $g(x) = |kx|$, k is a positive integer. If k is replaced by $\frac{1}{2}$, which statement about these new functions is true?
 - 1) The graphs of both $f(x)$ and $g(x)$ become wider.
 - 2) The graph of $f(x)$ becomes narrower and the graph of $g(x)$ shifts left.
 - 3) The graphs of both $f(x)$ and $g(x)$ shift vertically.
 - 4) The graph of $f(x)$ shifts left and the graph of $g(x)$ becomes wider.

- 5 Compared to the graph of $f(x) = x^2$, the graph of $g(x) = (x - 2)^2 + 3$ is the result of translating $f(x)$
 - 1) 2 units up and 3 units right
 - 2) 2 units down and 3 units up
 - 3) 2 units right and 3 units up
 - 4) 2 units left and 3 units right

- 6 If the parent function of $f(x)$ is $p(x) = x^2$, then the graph of the function $f(x) = (x - k)^2 + 5$, where $k > 0$, would be a shift of
 - 1) k units to the left and a move of 5 units up
 - 2) k units to the left and a move of 5 units down
 - 3) k units to the right and a move of 5 units up
 - 4) k units to the right and a move of 5 units down

7 Given $f(x) = x^2$, which function will shift $f(x)$ to the left 3 units?

- 1) $g(x) = x^2 + 3$
- 2) $h(x) = x^2 - 3$
- 3) $j(x) = (x - 3)^2$
- 4) $k(x) = (x + 3)^2$

8 If $f(x) = x^2$, which function is the result of shifting $f(x)$ 3 units left and 2 units down?

- 1) $g(x) = (x + 2)^2 - 3$
- 2) $g(x) = (x - 2)^2 + 3$
- 3) $g(x) = (x + 3)^2 - 2$
- 4) $g(x) = (x - 3)^2 + 2$

9 If $f(x) = x^2$, then which function represents a shift of the graph of $f(x)$ 4 units to the right and 3 units down?

- 1) $g(x) = (x + 4)^2 + 3$
- 2) $j(x) = (x + 4)^2 - 3$
- 3) $h(x) = (x - 4)^2 - 3$
- 4) $k(x) = (x - 4)^2 + 3$

10 What would be the order of these quadratic functions when they are arranged from the narrowest graph to the widest graph?

$$f(x) = -5x^2 \quad g(x) = 0.5x^2 \quad h(x) = 3x^2$$

- 1) $f(x), g(x), h(x)$
- 2) $g(x), h(x), f(x)$
- 3) $h(x), f(x), g(x)$
- 4) $f(x), h(x), g(x)$

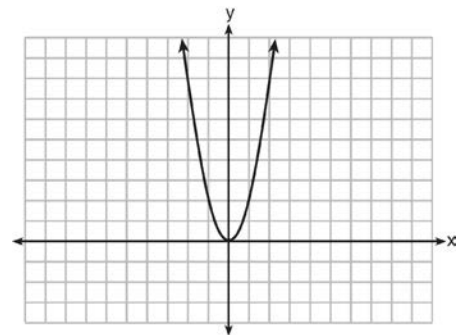
11 When the function $f(x) = x^2$ is multiplied by the value a , where $a > 1$, the graph of the new function, $g(x) = ax^2$

- 1) opens upward and is wider
- 2) opens upward and is narrower
- 3) opens downward and is wider
- 4) opens downward and is narrower

12 Caitlin graphs the function $f(x) = ax^2$, where a is a positive integer. If Caitlin multiplies a by -2 , when compared to $f(x)$, the new graph will become

- 1) narrower and open downward
- 2) narrower and open upward
- 3) wider and open downward
- 4) wider and open upward

13 The graph of the equation $y = ax^2$ is shown below.

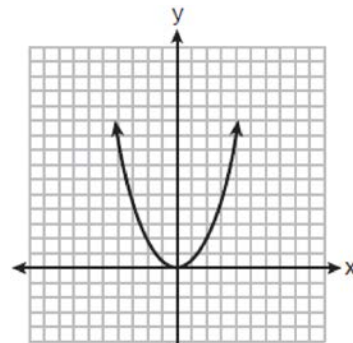


If a is multiplied by $-\frac{1}{2}$, the graph of the new equation is

- 1) wider and opens downward
- 2) wider and opens upward
- 3) narrower and opens downward
- 4) narrower and opens upward

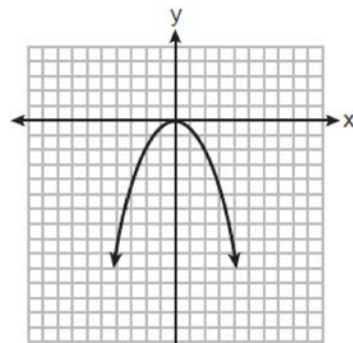
14 Isabella wants to shift the graph of the function $f(x) = (x + 5)^2 - 2$ left 3 units. Which function represents the shifted graph?

- 1) $g(x) = (x + 2)^2 - 2$
- 2) $g(x) = (x + 8)^2 - 2$
- 3) $g(x) = (x + 5)^2 - 5$
- 4) $g(x) = (x + 5)^2 + 1$



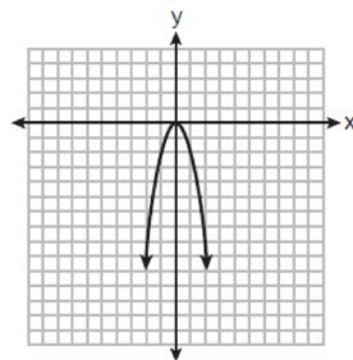
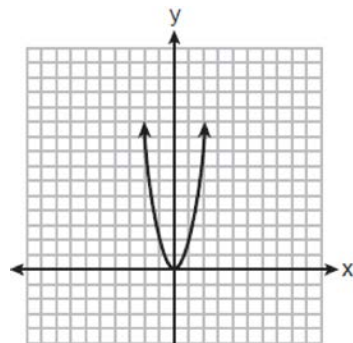
15 The students in Mrs. Smith's algebra class were asked to describe the graph of $g(x) = 2(x - 3)^2$ compared to the graph of $f(x) = x^2$. Which student response is correct?

- 1) Ashley said that the graph of $g(x)$ is wider and shifted left 3 units.
- 2) Beth said that the graph of $g(x)$ is narrower and shifted left 3 units.
- 3) Carl said that the graph of $g(x)$ is wider and shifted right 3 units.
- 4) Don said that the graph of $g(x)$ is narrower and shifted right 3 units.



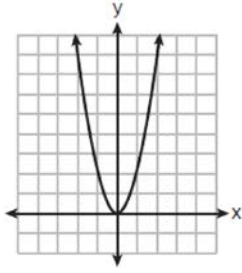
16 How does the graph of $f(x) = 3(x - 2)^2 + 1$ compare to the graph of $g(x) = x^2$?

- 1) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.
- 2) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.
- 3) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.
- 4) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.

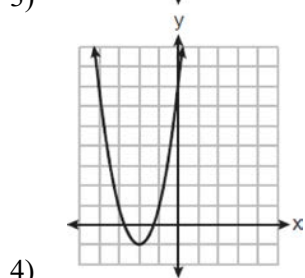
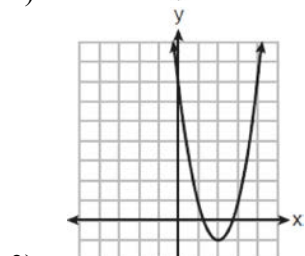
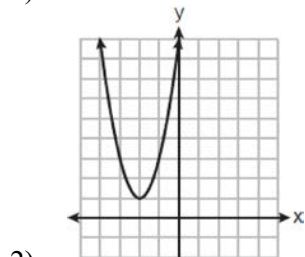
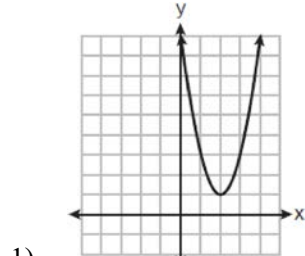


18 The graph of $y = f(x)$ is shown below.

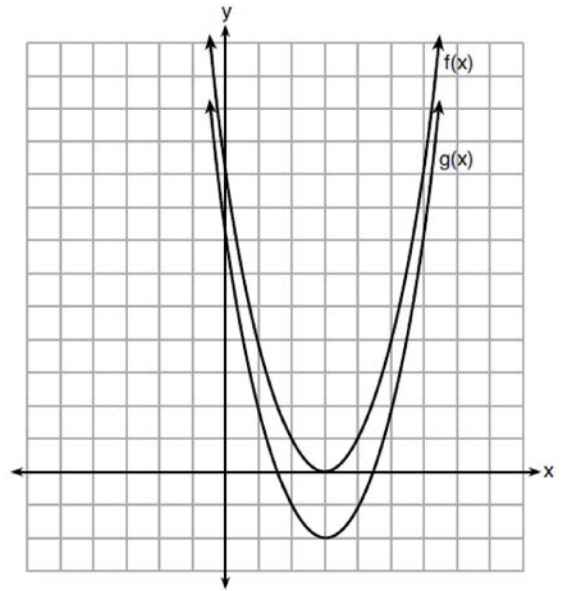
17 The function $f(x) = x^2$ is multiplied by k , where $k < -1$. Which graph could represent $g(x) = kf(x)$?



Which graph represents $y = f(x - 2) + 1$?



19 The functions $f(x) = x^2 - 6x + 9$ and $g(x) = f(x) + k$ are graphed below.



Which value of k would result in the graph of $g(x)$?

- 1) 0
- 2) 2
- 3) -3
- 4) -2

20 If the original function $f(x) = 2x^2 - 1$ is shifted to the left 3 units to make the function $g(x)$, which expression would represent $g(x)$?

- 1) $2(x - 3)^2 - 1$
- 2) $2(x + 3)^2 - 1$
- 3) $2x^2 + 2$
- 4) $2x^2 - 4$

21 Given: $f(x) = (x - 2)^2 + 4$
 $g(x) = (x - 5)^2 + 4$

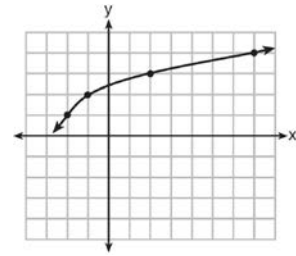
When compared to the graph of $f(x)$, the graph of $g(x)$ is

- 1) shifted 3 units to the left
- 2) shifted 3 units to the right
- 3) shifted 5 units to the left
- 4) shifted 5 units to the right

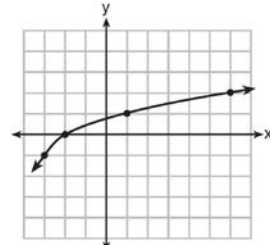
22 Josh graphed the function $f(x) = -3(x - 1)^2 + 2$. He then graphed the function $g(x) = -3(x - 1)^2 - 5$ on the same coordinate plane. The vertex of $g(x)$ is

- 1) 7 units below the vertex of $f(x)$
- 2) 7 units above the vertex of $f(x)$
- 3) 7 units to the right of the vertex of $f(x)$
- 4) 7 units to the left of the vertex of $f(x)$

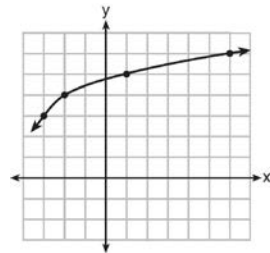
23 The graph of $y = f(x)$ is shown below.



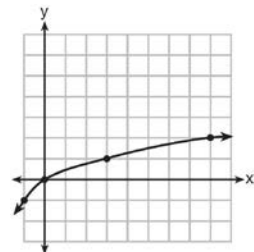
What is the graph of $y = f(x + 1) - 2$?



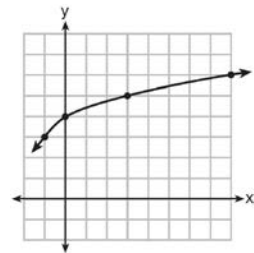
1)



2)



3)



4)

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Answer Section

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|----|---------------|---------------|
| 1 | ANS: 2 | REF: 081501ai |
| 2 | ANS: 2 | REF: 062509ai |
| 3 | ANS: 3 | REF: 062316ai |
| 4 | ANS: 1 | REF: 081706ai |
| 5 | ANS: 3 | REF: 081808ai |
| 6 | ANS: 3 | REF: 062113ai |
| 7 | ANS: 4 | REF: 082513ai |
| 8 | ANS: 3 | REF: 012407ai |
| 9 | ANS: 3 | REF: 082411ai |
| 10 | ANS: 4 | REF: 082211ai |
| 11 | ANS: 2 | REF: 011717ai |
| 12 | ANS: 1 | REF: 012310ai |
| 13 | ANS: 1 | REF: 081417ai |
| 14 | ANS: 2 | REF: 012615ai |
| 15 | ANS: 4 | REF: 062417ai |
| 16 | ANS: 2 | REF: 011512ai |
| 17 | ANS: 4 | REF: 012521ai |
| 18 | ANS: 1 | REF: 082305ai |
| 19 | ANS: 4 | REF: 012007ai |
| 20 | ANS: 2 | REF: 011819ai |
| 21 | ANS: 2 | REF: 061904ai |
| 22 | ANS: 1 | |
| | $-5 - 2 = -7$ | |

REF: 081905ai

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| 23 | ANS: 1 | REF: 011620ai |
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