## 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 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 $f(x)$.

3 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.

4 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

5 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

6 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) $g(x) = (x - 3)^2 + 2$

7 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) $k(x) = (x - 4)^2 + 3$

8 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) $f(x), h(x), g(x)$

9 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

10 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

11 The graph of the equation $y = ax^2$ is shown below.
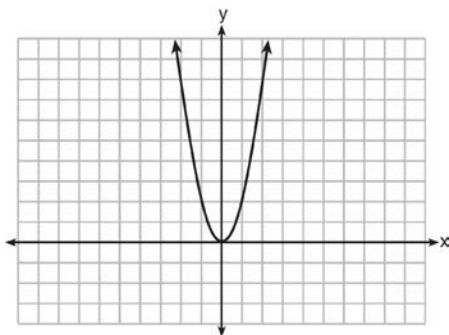
If a is multiplied by $-\dfrac{1}{2}$, the graph of the new equation is
1)   wider and opens downward
2)   wider and opens upward
3)   narrower and opens downward
4)   narrower and opens upward

12 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.

13 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.
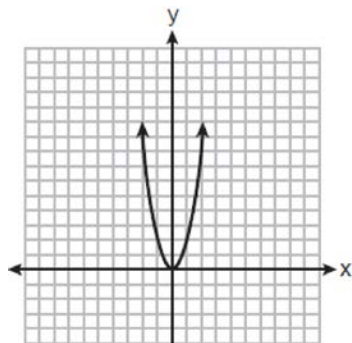3)   The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.
4)   The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.

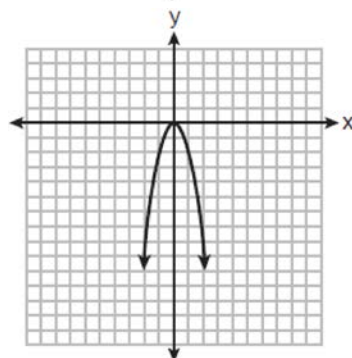14 The function $f(x) = x^2$ is multiplied by k, where $k < -1$. Which graph could represent $g(x) = kf(x)$?
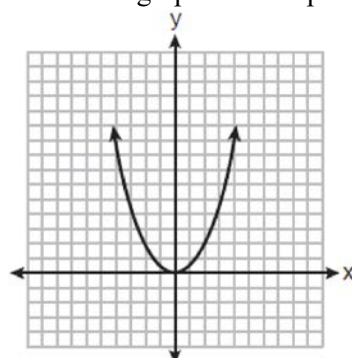
1)
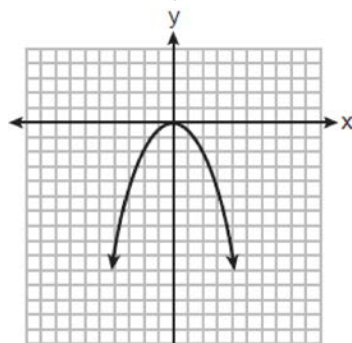
2)
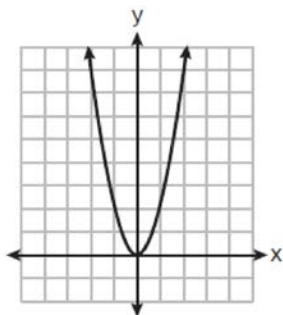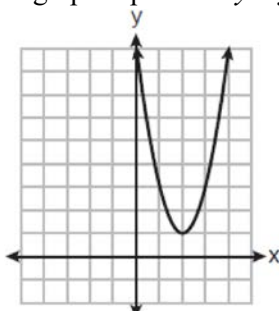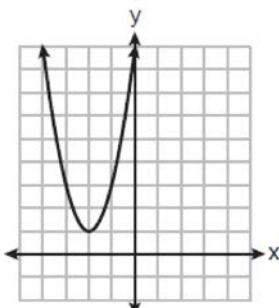

3)

4)

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

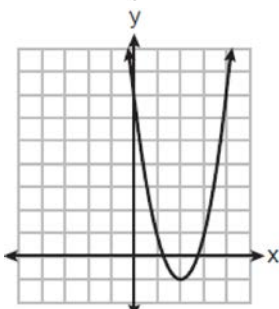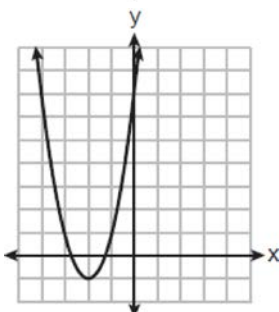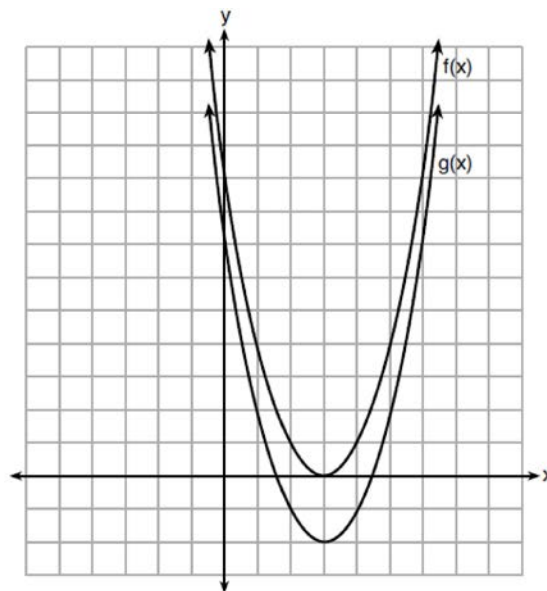Which graph represents $y = f(x-2)+1$?

1)

2)

3)

4)

16 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

17 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) $2x^2 - 4$

18 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
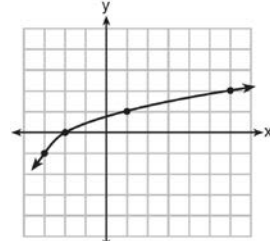4) shifted 5 units to the right

3

19 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 $f(x)$
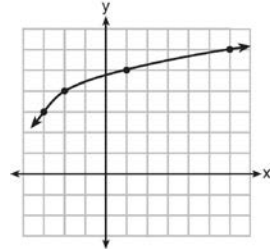4) 7 units to the left of the vertex of $f(x)$

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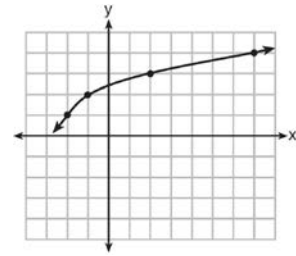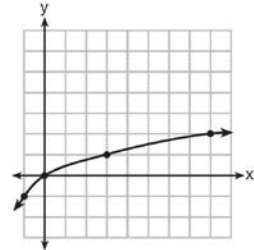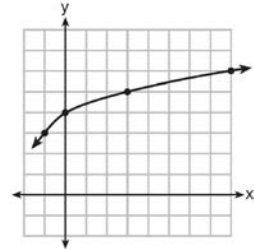

What is the graph of $y = f(x + 1) - 2$?

1)

2)

3)

4)

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Answer Section

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

     REF: 081905ai
20 ANS: 1   REF: 011620ai