Name _____ Date _____

Transformations of Functions

$$f(x) \rightarrow af(x-h)+k$$

What does *a* do?

- reflect across the x-axis. (–a)
- vertical stretch (a >1)
- vertical shrink (0<a<1)

What does *h* do?

- moves left (+h)
- moves right (–h)

What does *k* do?

- moves up (+k)
- moves down (–k)

Describe the transformations that are applied.

Function	a	h	k
1. $f(x-3)+5$			
2. $-f(x)+3$			
3. $f(x+2)-3$			
4. $\frac{1}{3}f(x)-7$			
5. $-3f(x+1)+5$			

Consider the function: f(x) = 3x + 2, and apply the following transformations. Write the new function.

6. f(x) + 3

7. f(x) – 2

8. shift down 4

Consider the function: $g(x) = (x-2)^2 + 1$, and apply the following transformations. Write the new function.

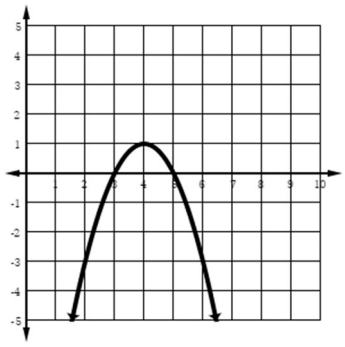
9. g(x) + 2

10. g(x – 2)

11. reflect over the x-axis and shift down 3

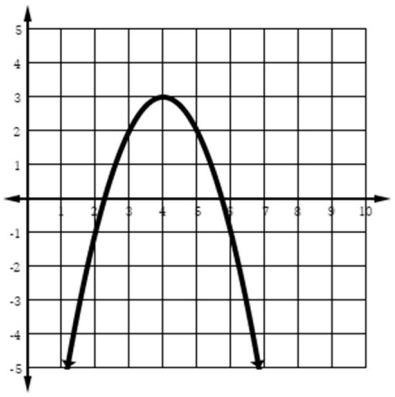
12. shift right 1 and up 3

Given the graph of f(x) on the right, match the following three functions to their graphs.

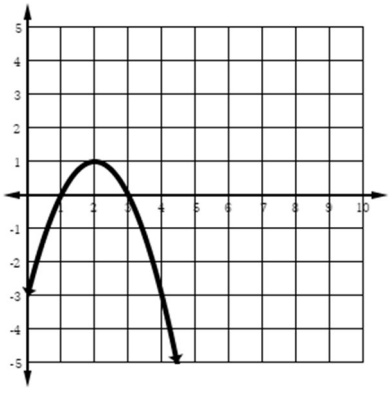


13. $f(x)-2$ 14. $f(x)+2$ 15. $f(x+2)$

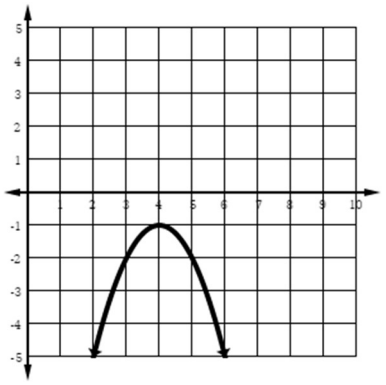
A.



B.



C.



16. Which of the following functions represent a shift right 4 ad up 3?

A. $f(x+4)-3$ B. $f(x-4)+3$ C. $f(x-4)-3$ D. $f(x+4)+3$

17. Which of the following functions are reflected over the x-axis and shifted left 11?

A. $-f(x)-11$ B. $-f(x)+11$ C. $-f(x-11)$ D. $-f(x+11)$

18. Which of the following functions have been moved right 3 units?

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

19. Which of the following functions are reflected over the x-axis, shifted down 8, and left 9?

A. $-f(x-8)+9$ B. $-f(x+9)-8$ C. $-f(x-8)-9$ D. $-f(x-9)-8$