Transformations of Functions

Choose one answer per question. Circle A, B, C, or D.

1. What happens to the graph of $y = f(x)$ when it becomes $y = f(x) + 7$?
   A. It shifts up 7 units.
   B. It shifts down 7 units.
   C. It shifts left 7 units.
   D. It shifts right 7 units.

2. How does the graph of $y = f(x - 3)$ compare with the graph of $y = f(x)$?
   A. It shifts up 3 units.
   B. It shifts left 3 units.
   C. It shifts right 3 units.
   D. It shifts down 3 units.

3. Across which axis is the graph reflected when $y = f(x)$ becomes $y = -f(x)$?
   A. The y-axis
   B. The x-axis
   C. The line $y = x$
   D. The line $y = 1$

4. Which change produces the graph of $y = f(-x)$ from $y = f(x)$?
   A. A shift down 1 unit
   B. Reflection across the x-axis
   C. A vertical stretch by 2
   D. Reflection across the y-axis

5. What does multiplying the function by 3, as in $y = 3f(x)$, do to its graph?
   A. It stretches the graph horizontally by a factor of 3.
   B. It stretches the graph vertically by a factor of 3.
   C. It shifts the graph up 3 units.
   D. It compresses the graph vertically to one third of its height.

6. What is the horizontal scale factor from the graph of $f(x)$ to the graph of $f(4x)$?
   A. 1/4
   B. 4
   C. 1/16
   D. 16

7. Suppose $f(2) = -5$ and $g(x) = f(x + 4) + 3$. What is $g(-2)$?

A. 8
B. -8
C. 2
D. -2

8. The point $(-3, 4)$ lies on $y = f(x)$. What is its corresponding point on $y = f(x - 5) - 2$?

A. (2, 6)
B. $(-8, 2)$
C. (2, 2)
D. $(-3, -3)$

9. Where is the vertex of $g(x) = (x + 2)^2 - 4$?

A. $(-2, -4)$
B. $(2, -4)$
C. $(-2, 4)$
D. (2, 4)

10. Suppose the range of f is all values from -1 through 8. What is the range of $g(x) = 2f(x) - 3$?

A. 1 through 19
B. -1 through 16
C. -4 through 5
D. -5 through 13

11. If $(6, -4)$ lies on $y = f(x)$, which point must lie on $y = -2f(x - 1) + 3$?

A. $(7, -11)$
B. (5, 11)
C. (7, 11)
D. (6, 5)

12. Suppose $f(3) = 7$ and $g(x) = f(6 - 2x) - 4$. Which point must be on the graph of g?

A. $(-1.5, 3)$
B. (1.5, 3)
C. (4.5, 11)
D. (3, 7)

13. The domain of f is all x from −4 through 8. What is the domain of g(x) = f(2x − 4)?

A. −12 through 12
B. −4 through 8
C. −8 through 16
D. 0 through 6

14. The range of f is all values from 2 through 9. What is the range of g(x) = −3f(x) + 5?

A. −22 through −1
B. −1 through 22
C. −32 through −11
D. 11 through 32

15. Points (−1, 0) and (2, 5) lie on f. Points (3, −2) and (6, 13) lie on g(x) = af(x − 4) + k. What are a and k?

A. a = −3 and k = −2
B. a = 3 and k = 2
C. a = 3 and k = −2
D. a = 2 and k = 3