Write the letter for the best answer.

Describe the transformation of $f(x) = x^2$ represented by g.

1. $g(x) = x^2 + 5$

A. Vertical shrink by a factor of $\frac{1}{5}$
B. Vertical stretch by a factor of 5
C. Translation 5 units down
D. Translation 5 units up

2. $g(x) = (x - 3)^2 - 2$

A. Translation 2 units down, 3 right
B. Translation 2 units down, 3 left
C. Translation 2 units up, 3 right
D. Translation 2 units up, 3 left

3. $g(x) = -\frac{1}{3}x^2$

A. Vertical stretch by a factor of 3, reflection
B. Vertical shrink by a factor of 3, reflection
C. Vertical stretch by a factor of $\frac{1}{3}$, reflection
D. Vertical shrink by a factor of $\frac{1}{3}$, reflection

4. $g(x) = 3(x + 4)^2$

A. Translation 4 units left, vertical stretch by a factor of 3
B. Translation 4 units right, vertical stretch by a factor of 3
C. Translation 4 units up, vertical stretch by a factor of 3
D. Translation 4 units down, vertical stretch by a factor of 3

Write a rule for g described by the transformations of the graph of f.

5. $f(x) = x^2 - 1$; vertical stretch by a factor of 4, translation 3 units up, followed by a translation 2 unit to the left.

A. $f(x) = 4(x + 3)^2 - 6$
C. $f(x) = 4(x + 2)^2 + 2$
B. $f(x) = 4(x + 2)^2 - 1$
D. $f(x) = 4(x - 3)^2 - 2$

6. $f(x) = 4(x - 6)^2 - 8$; vertical shrink by a factor of $\frac{1}{2}$, translation 3 units down, followed by a translation 5 units to the right.

A. $f(x) = 2(x + 2)^2 - 7$
C. $f(x) = 2(x - 9)^2 + 1$
B. $f(x) = 2(x - 1)^2 - 1$
D. $f(x) = 2(x - 11)^2 - 7$

7. $f(x) = (x - 3)^2 + 2$; vertical stretch by a factor of 2, translation 3 units down, followed by a reflection in the x-axis.

A. $f(x) = -2(x - 3)^2 - 1$
C. $f(x) = -2(x - 3)^2 + 1$
B. $f(x) = -2(x - 6)^2 - 1$
D. $f(x) = -2(x - 6)^2 + 1$

Find the vertex and the axis of symmetry for each function.

8. $f(x) = 3(x + 2)^2 + 6$

9. $f(x) = -\frac{1}{5}(x - 4)^2 - 3$

A. $V: (-2, -6), AS: x = -2$
B. $V: (2,6), AS: x = 2$
C. $V: (2, -6), AS: x = 2$
D. $V: (-2,6), AS: x = -2$

A. $V: (4, -3), AS: x = 4$
B. $V: (4,3), AS: x = 4$
C. $V: (-4,3), AS: x = -4$
D. $V: (-4, -3), AS: x = -4$

Find the minimum or maximum value of each function. Find the domain and range of the function, and when the function is increasing and decreasing.

10. $f(x) = -3(x - 2)^2 + 4$

11. $f(x) = \frac{1}{6}(x + 3)^2 - 2$

A. $Min = 4, D: \mathbb{R}, R: y \leq 4, I: x > 2, D: x < 2$
B. $Max = 4, D: \mathbb{R}, R: y \leq 4, I: x < 2, D: x > 2$
C. $Min = 4, D: \mathbb{R}, R: y \leq 4, I: x < 2, D: x > 2$
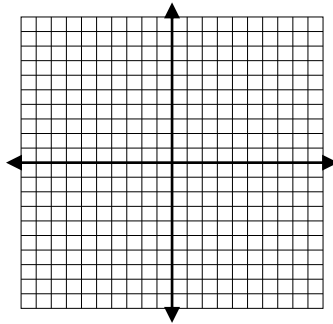D. $Max = 4, D: \mathbb{R}, R: y \leq 4, I: x > 2, D: x < 2$

A. $Min = -2, D: \mathbb{R}, R: y \leq -2, I: x < -3, D: x > -3$
B. $Max = -2, D: \mathbb{R}, R: y \geq -2, I: x > -3, D: x < -3$
C. $Min = -2, D: \mathbb{R}, R: y \geq -2, I: x > -3, D: x < -3$
D. $Max = -2, D: \mathbb{R}, R: y \leq -2, I: x < -3, D: x > -3$

Graph each function. Find the x-intercept(s), vertex, and the axis of symmetry.

12. $f(x) = 2(x - 2)(x - 4)$

A. $(2,0)(4,0), V: (3, -2), AS: x = 3$

B. $(0,2)(0,4), V: (3, -2), AS: x = 3$

C. $(0,2)(0,4), V: (3, -4), AS: x = 3$

D. $(2,0)(4,0), V: (3, -4), AS: x = 3$

13. $f(x) = -2(x - 1)(x + 3)$

A. $(0,1)(0, -3), V: (-1,8), AS: x = -1$

B. $(0,1)(0, -3), V: (-1,0), AS: x = -1$

C. $(1,0)(-3,0), V: (-1,8), AS: x = -1$

D. $(1,0)(-3,0), V: (-1,0), AS: x = -1$