Algebra 2
WS: 2.1 – 2.2 Review

In Exercises 1–9, describe the transformation of $f(x) = x^2$ represented by g.

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

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

3. $f(x) = -3(x + 6)^2 - 4$

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

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

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

7. $g(x) = -\left(\frac{1}{2}x\right)^2$

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

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

In Exercises 10 and 11, write a rule for g described by the transformations of the graph of f. Then identify the vertex.

10. $f(x) = x^2$; vertical shrink by a factor of $\frac{1}{2}$ and a reflection in the x-axis, followed by a translation 2 units left

11. $f(x) = (x + 4)^2 + 2$; horizontal shrink by a factor of $\frac{1}{3}$ and a translation 2 units up, followed by a reflection in the x-axis

12. Let the graph of g be a translation 4 units down and 3 units right, followed by a horizontal shrink by a factor of $\frac{1}{2}$ of the graph of $f(x) = x^2$.

a. Identify the values of a, h, and k. Write the transformed function in vertex form.

b. Suppose the horizontal shrink was performed first, followed by the translations. Identify the values of a, h, and k, and write the transformed function in vertex form.

In Exercises 13 - 18, graph the function. Label the vertex and axis of symmetry.

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

14. $h(x) = \frac{1}{2}(x - 2)^2 - 1$

15. $y = 0.6(x - 2)^2$

16. $f(x) = 0.25x^2 - 1$

17. $y = 1.5x^2 - 6x + 3$

18. $f(x) = -\frac{3}{2}x^2 - 6x - 4$

19. A quadratic function is decreasing to the left of $x = 3$ and increasing to the right of $x = 3$. Will the vertex be the highest or lowest point on the graph of the parabola? Explain.

In Exercises 20 - 21, find the minimum or maximum value of the function. Describe the domain and range of the function, and where the function is increasing and decreasing.

20. $y = 3x^2 + 12$

21. $f(x) = \frac{1}{2}x^2 + 3x + 7$

22. The height of a bridge is given by $y = -3x^2 + x$, where y is the height of the bridge (in miles) and x is the number of miles from the base of the bridge.

a. How far from the base of the bridge does the maximum height occur?

b. What is the maximum height of the bridge?