Name: Date: Period:

In Exercises 1 – 6, find the axis of symmetry and the vertex of the graph of the function.

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

   Vertex:_____ AOS: _____

2. $y = -4x^2 + 16x$

   Vertex:_____ AOS: _____

3. $y = -2x^2 - 8x + 5$

   Vertex:_____ AOS: _____

4. $f(x) = -3x^2 + 6x + 1$

   Vertex:_____ AOS: _____

5. $f(x) = -4(x + 8)^2$

   Vertex:_____ AOS: _____

6. $f(x) = -(x + 1)^2 - 5$

   Vertex:_____ AOS: _____

In Exercises 7 – 8, graph of the function on a separate piece of graph paper and compare the graph to the parent function.

7. $m(x) = 3(x + 2)^2$

8. $g(x) = -\frac{1}{4}(x - 6)^2 + 4$

In Exercises 9 and 10, graph f(x), then on the same graph, graph g(x). Remember that function notation is just substitution.

9. $f(x) = 3(x + 1)^2 - 1$; $g(x) = f(x + 2)$

10. $f(x) = \frac{1}{2}(x - 3)^2 - 5$; $g(x) = -f(x)$

In Exercises 11 – 13, find the new vertex.

11. If f(x) has a vertex at (-2, 1), find the vertex of $f(x - 2)$.

12. If g(x) has a vertex at (5, 4), find the vertex of $g(x + 3)$.

13. If h(x) has a vertex at (-3, 5), find the vertex of $h(x - 3)$.

Exercises 14 – 17, find the zeros of the function (zeroes are just the roots of the equation).

14. $y = -x^2 + 1$

15. $y = -4x^2 + 16$

16. $n(x) = -x^2 + 64$

17. $p(x) = -9x^2 + 1$

In Exercises 18 – 19, write the equation of the parabola with the given characteristics.

18. The parabola opens down, and the vertex is (0, 5).

19. The lowest point on the parabola is (2, 4) and it is vertically stretched by a factor of 3.

20. The function $f(t) = -16t^2 + s_0$ represents the approximate height (in feet) of a falling object *t* seconds after it is dropped from an initial height s_0 (in feet). A tennis ball falls from a height of 400 feet.

    a. After how many seconds does the tennis ball hit the ground?
    b. Suppose the initial height is decreased by 384 feet. After how many seconds does the ball hit the ground?

21. The function $h = -16t^2 + 250t$ represents the height *h* (in feet) of a rocket *t* seconds after it is launched. The rocket explodes at its highest point.

    a. When does the rocket explode?
    b. At what height does the rocket explode?