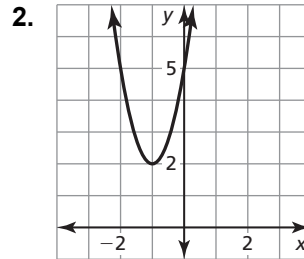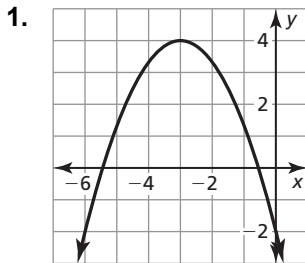Name _____ Date _____

In Exercises 1 and 2, find the vertex, the axis of symmetry, and the *y*-intercept of the graph.

1.

2.

In Exercises 3–6, find (a) the axis of symmetry and (b) the vertex of the graph of the function.

3. $f(x) = 4x^2 + 12x$

4. $y = -5x^2 - 20x + 4$

5. $y = -8x^2 + 24x + 13$

6. $f(x) = \frac{2}{3}x^2 - 6x + 15$

In Exercises 7–10, graph the function. Describe the domain and range.

7. $f(x) = 4x^2 + 8x + 11$

8. $y = -6x^2 - 12x - 7$

9. $y = \frac{1}{2}x^2 - 8x + 3$

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

11. Describe and correct the error in finding the vertex of the graph of $y = x^2 + 6x + 2$.

$$\times \quad x = -\frac{b}{2a} = -\frac{6}{2(1)} = -3$$

So, the vertex is $(-3, 2)$.

In Exercises 12 and 13, tell whether the function has a minimum value or a maximum value. Then find the value.

12. $f(x) = -6x^2 + 24x - 5$

13. $y = \frac{1}{3}x^2 + 8x - 1$

In Exercises 14 and 15, use the *minimum* or *maximum* feature of a graphing calculator to approximate the vertex of the graph of the function.

14. $y = -2.1x^2 + \pi x + 3$

15. $y = 1.25x^2 - 2^{3/4}x + 3$