Identify the vertex, axis of symmetry, direction of opening, and maximum or minimum value. Then graph the function.

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

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

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

4. $y = 3x^2 - 10$

Write the equation in vertex form by completing the square. (Show all your work!) The state the vertex, axis of symmetry, and maximum or minimum value of the graph.

5. $f(x) = x^2 - 18x + 76$

6. $y = x^2 + 8x + 24$

7. $y = -x^2 + 10x - 21$

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

9. $y = 2x^2 - 24x + 82$

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

11. $f(x) = \frac{1}{2}x^2 - 8x + 37$

12. $y = x^2 + 5x - 1$

Identify the vertex, direction of opening, and maximum or minimum value of each using the vertex formula.

13. $f(x) = -x^2 - 18x - 74$

14. $y = 4x^2 + 6x + 3$

15. $y = \frac{1}{4}x^2 - 2x - 1$

16. $f(x) = -0.2x^2 + 3.8x - 24.4$

Determine the x- and y-intercepts of the graph of each function.

17. $y = x^2 + 9x + 18$

18. $f(x) = -16x^2 + 96x$

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

20. $y = x^2 + 10x + 30$

21. $y = -4x^2 + 20x + 6$

22. $f(x) = \frac{1}{12}x^2 + x + \frac{5}{3}$

Graph each equation.

23. $f(x) = x^2 + 4x + 1$

24. $f(x) = -2x^2 - 12x - 18$

25. $y = -x^2 - 2x$

26. $y = \frac{1}{2}x^2 + 4x + 3$

27. $f(x) = 2x^2 - 20x + 47$

28. $y = -\frac{1}{3}x^2 + 2x - 5$

Use the information provided to write the vertex form of the equation of each parabola.

29. Vertex: $(-5, 0)$, Passes through: $(-4, -3)$

30. Vertex: $(3, -2)$, Passes through: $(6, -5)$

31.

32.