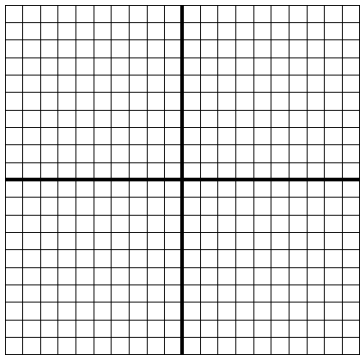
Section 2.4 WS 3 **Name** _____

Graph the quadratic function, then state the axis of symmetry.

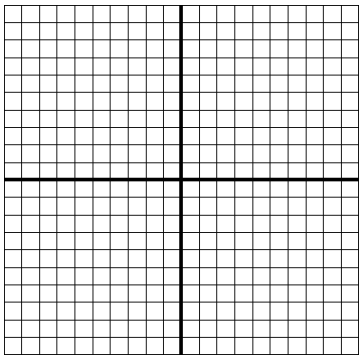
1. $f(x) = (x-3)^2 + 4$

Axis of Symmetry: _____



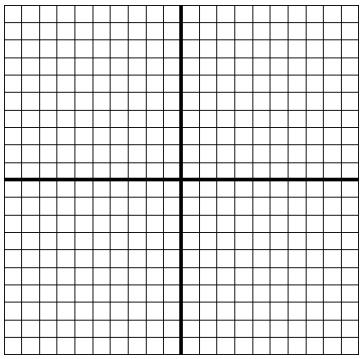
2. $f(x) = -\frac{1}{3}(x+2)^2 + 3$

Axis of Symmetry: _____



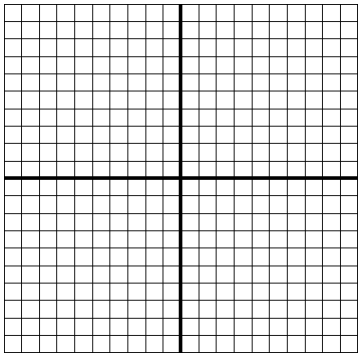
3. $f(x) = -x^2 + 5$

Axis of Symmetry: _____



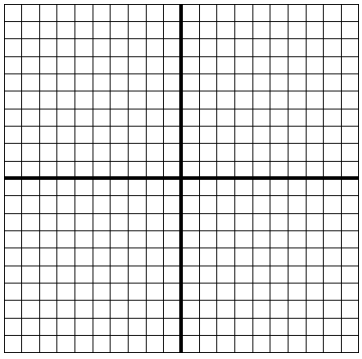
4. $g(x) = 2x^2 - 4x + 3$

Axis of Symmetry: _____



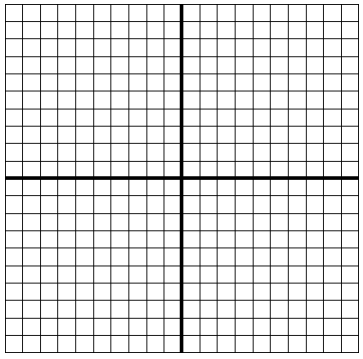
5. $f(x) = -\frac{1}{2}x^2 + 2x + 6$

Axis of Symmetry: _____



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

Axis of Symmetry: _____



Write the quadratic function in vertex form.

7. $h(x) = 2x^2 + 8t$

8. $f(x) = x^2 - 12x - 2$

9. $g(t) = -4t^2 + t + 1$

10. $h(x) = -5x^2 - 6x + 3$

Find the range of the quadratic function.

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

12. $h(x) = -\frac{1}{2}x^2 + 6x + 17$

Find the zeros of f and the *x*-intercepts of the graph of f.

13. $f(x) = x^2 + 4x - 45$

14. $h(x) = 5x^2 - 17x + 6$

Find the minimum or maximum value of the function. State whether this value is a minimum or a maximum.

15. $g(t) = -t^2 + 4t + 2$

16. $f(x) = x^2 + 7x + 2$

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

18. $g(t) = -8t^2 + 15$

19. **Temperature Fluctuations:** The temperature $T(t)$, in degrees Fahrenheit, during the day can be modeled by the equation $T(t) = -0.7t^2 + 9.4t + 59.3$, where t is the number of hours after 6:00 A.M.

a. At what time is the temperature a maximum? Round to the nearest minute.
b. What is the maximum temperature? Round to the nearest degree.

20. **Geology:** In June 2001, Mt. Etna in Sicily, Italy, erupted, sending volcanic bombs (masses of molten lava ejected from the volcano) into the air. A model of the height h, in meters, of a volcanic bomb the crater of the volcano t seconds after the eruption is given by $h(t) = -9.8t^2 + 100t$. Find the maximum height of a volcanic bomb above the crater for this eruption. Round to the nearest meter.

21. **Automotive Engineering:** The fuel efficiency for the certain midsize car is given by $E(v) = -0.018v^2 + 1.476v + 3.4$ where $E(v)$ is the fuel efficiency in miles per gallon for a car traveling v miles per hour.

a. What speed will yield the maximum fuel efficiency? Round to the nearest mile per hour.
b. What is the maximum fuel efficiency for this car? Round to the nearest mile per gallon.

22. **Larvae Survival:** Soon after insect larvae are hatched, they must begin to search for food. The survival rate of the larvae depends on many factors, but the temperature of the environment is one of the most important. For a certain species of insect, a model of the number of larvae, $N(T)$, that survive this searching period is given by $N(T) = -0.6T^2 + 32.1T - 350$ where T is the temperature in degrees Celsius.

a. At what temperature will the maximum number of larvae survive? Round to the nearest degree.
b. What is the maximum number of surviving larvae? Round to the nearest integer.
c. Find the x-intercepts, to the nearest integer, for the graph of this function.
d. Write a sentence that describes the meaning of the x-intercepts in the context of this problem.

23. **Projectile:** The height in feet of a projectile with an initial velocity of 64 feet per second and an initial height of 80 feet is a function of time t in seconds given by $h(t) = -16t^2 + 64t + 80$.

a. Find the maximum height of the projectile.
b. Find the time t when the projectile achieves its maximum height.
c. Find the time t when the projectile has a height of 0 feet.