

Name: _____

Period: _____

4.1 Graphing Quadratic Functions: Vertex and Axis of Symmetry

Find the vertex and the direction of the opening of the graph for each of the following quadratic equations. Find the y-intercept and axis of symmetry.

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

Vertex: _____

Axis of Symmetry: _____

Direction of opening: _____

y-intercept: _____

2. $y = -2(x + 3)^2$

Vertex: _____

Axis of Symmetry: _____

Direction of opening: _____

y-intercept: _____

3. $y = x^2 - 2x - 11$

Vertex: _____

Axis of Symmetry: _____

Direction of opening: _____

y-intercept: _____

4. $f(x) = -2x^2 + 8x - 58$

Vertex: _____

Axis of Symmetry: _____

Direction of opening: _____

y-intercept: _____

5. $y = (x - 3)(x - 7)$

Vertex: _____

Axis of Symmetry: _____

Direction of opening: _____

y-intercept: _____

6. $f(x) = (x + 2)(x - 6)$

Vertex: _____

Axis of Symmetry: _____

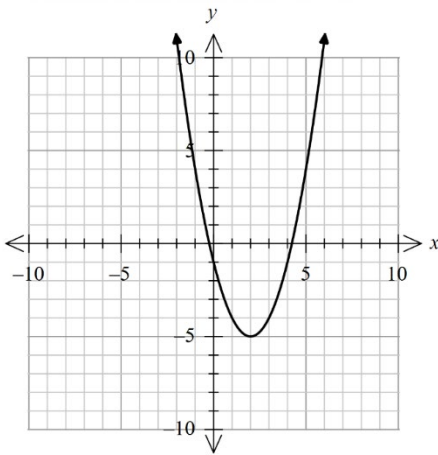
Direction of opening: _____

y-intercept: _____

6a. What do the vertex and axis of symmetry always have in common?

For each of the following graphs, find the vertex, axis of symmetry, and y-intercept.

7.



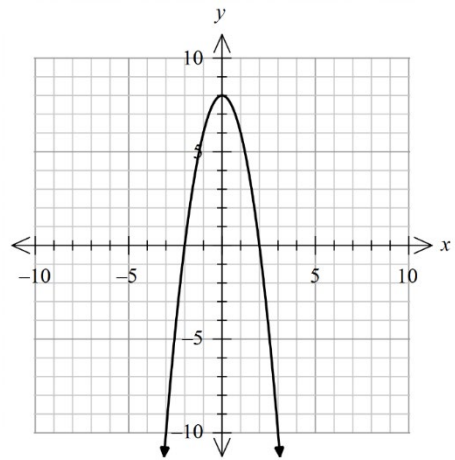
Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

is the value of "a" positive or negative? _____

8.



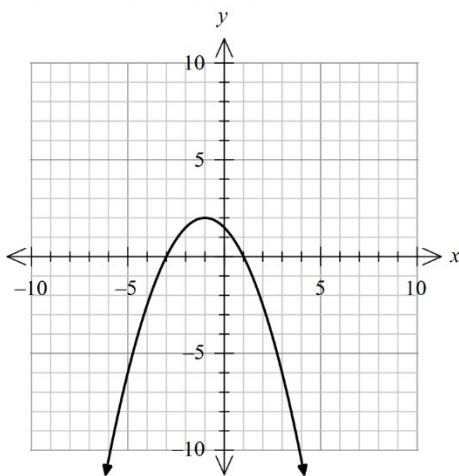
Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

is the value of "a" positive or negative? _____

9.



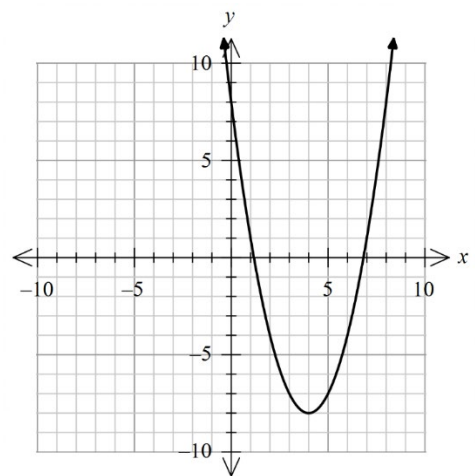
Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

is the value of "a" positive or negative? _____

10.



Vertex: _____

Axis of Symmetry: _____

y-intercept: _____

is the value of "a" positive or negative? _____

Solve.

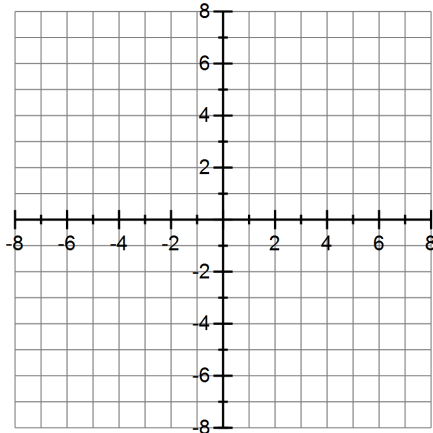
11. $(x+3)(2x-5)=0$

12. $-3(x-7)^2+45=0$

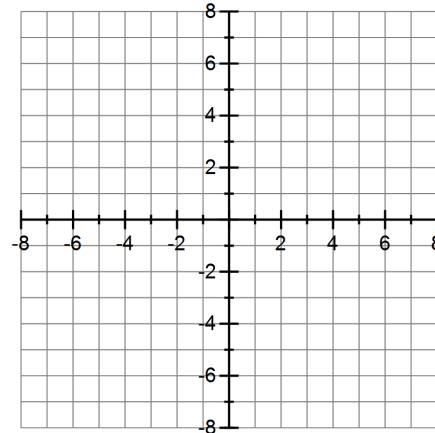
13. $4x^2-11=3x$

State the vertex and graph each parabola. Clearly mark the vertex and four other points on the graph.

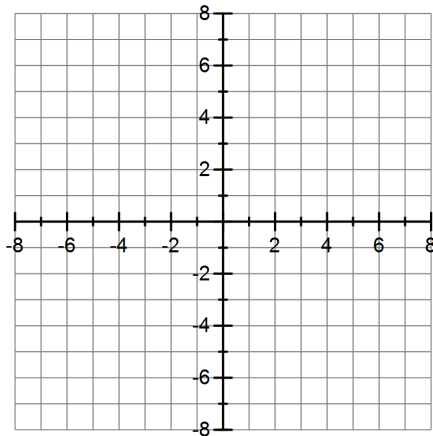
14. $y = x^2 + 2x - 1$ Vertex: _____



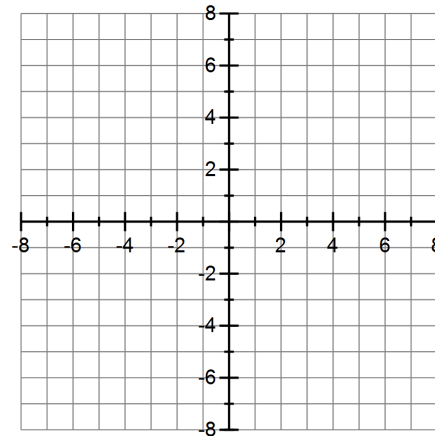
15. $y = -(x - 2)^2 + 4$ Vertex: _____



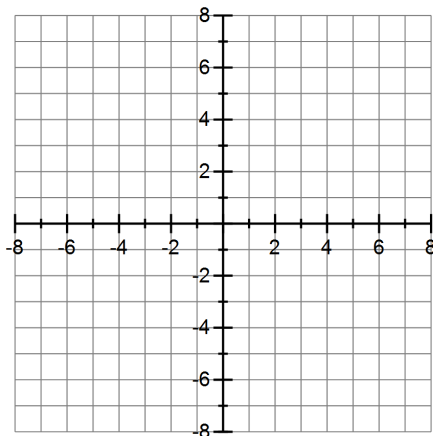
16. $f(x) = -x(x + 2)$ Vertex: _____



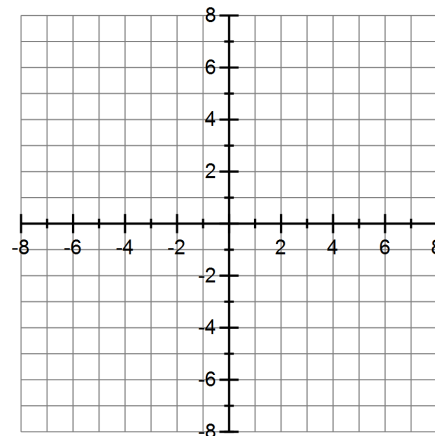
17. $y = 3(x - 2)^2 - 8$ Vertex: _____



18. $f(x) = 3x^2 - 24x + 45$ Vertex: _____

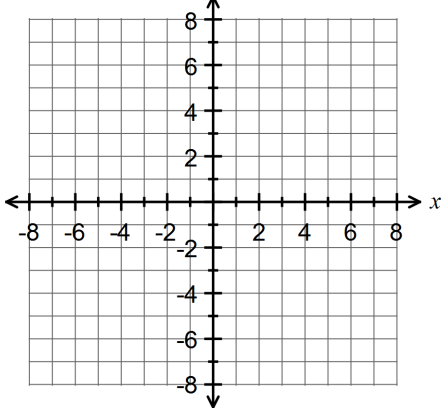


19. $y = \frac{1}{3}(x - 1)^2 - 5$ Vertex: _____



Fill in the requested information for each function. Draw the graph. You need AT LEAST 5 POINTS!

20. $y = (x+3)^2 + 1$



Vertex: _____

Axis of Symmetry: _____

Direction of Opening: _____

Is the vertex a maximum or a minimum? _____

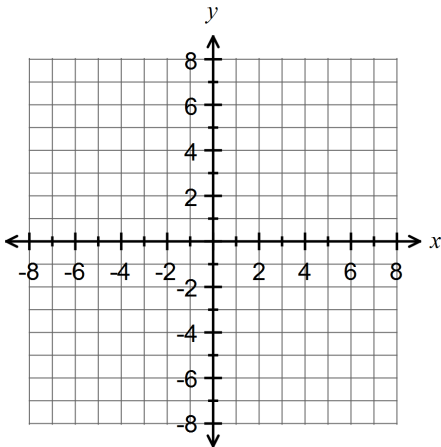
Maximum or minimum value: _____

y-intercept: _____

Domain: _____

Range: _____

21. $y = -2x^2 + 5$



Vertex: _____

Axis of Symmetry: _____

Direction of Opening: _____

Is the vertex a maximum or a minimum? _____

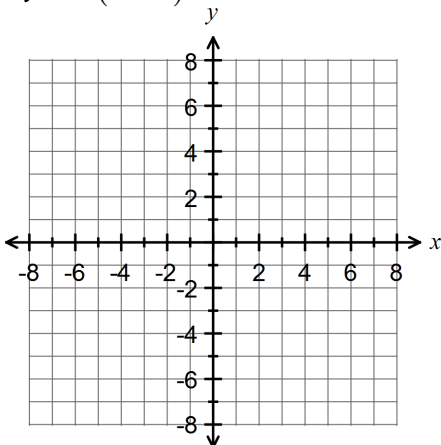
Maximum or minimum value: _____

y-intercept: _____

Domain: _____

Range: _____

22. $y = -(x+2)^2$



Vertex: _____

Axis of Symmetry: _____

Direction of Opening: _____

Is the vertex a maximum or a minimum? _____

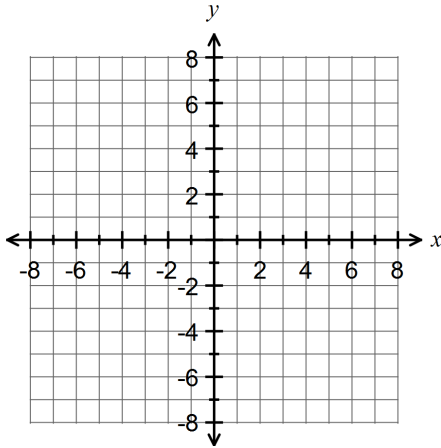
Maximum or minimum value: _____

y-intercept: _____

Domain: _____

Range: _____

23. $y = 2x^2 - 5$



Vertex: _____

Axis of Symmetry: _____

Direction of Opening: _____

Is the vertex a maximum or a minimum? _____

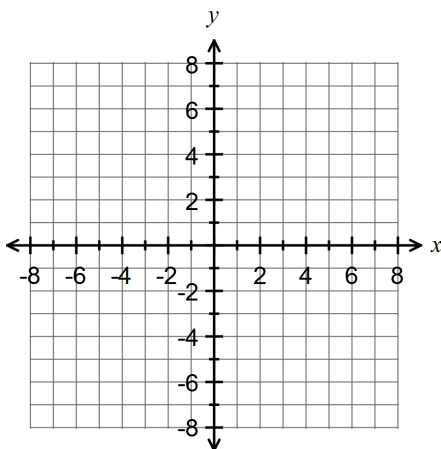
Maximum or minimum value: _____

y-intercept: _____

Domain: _____

Range: _____

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



Vertex: _____

Axis of Symmetry: _____

Direction of Opening: _____

Is the vertex a maximum or a minimum? _____

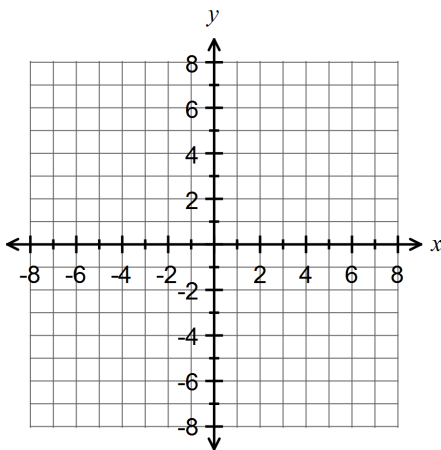
Maximum or minimum value: _____

y-intercept: _____

Domain: _____

Range: _____

25. $y = -\frac{1}{2}x^2 + 5x - 8$



Vertex: _____

Axis of Symmetry: _____

Direction of Opening: _____

Is the vertex a maximum or a minimum? _____

Maximum or minimum value: _____

y-intercept: _____

Domain: _____

Range: _____

For each problem, draw a rough sketch of a graph representing the situation. Determine which variable belongs on each axis. **SHOW ALL YOUR WORK!**

26. The cost C in dollars of manufacturing x bicycles at a production plant is given by the function $C(x) = 2x^2 - 800x + 92,000$.

a. Sketch of graph.



b. Find the number of bicycles that must be manufactured to minimize the cost.

c. Find the minimum cost.

27. The number of mosquitoes, M , in millions, in a certain area depends on the June rainfall, x , in inches: $M(x) = -x^2 + 8x$

a. Sketch of graph.



b. How much rain results in the maximum number of mosquitoes?

c. What is the maximum number of mosquitoes?