

SM2H 4.3 HW- Writing Quadratic Equations

For each of the parabolas described below, write a quadratic equation in Vertex Form, $f(x) = a(x - h)^2 + k$. **SHOW ALL YOUR WORK.**

1. Vertex: $(0, -6)$, passes through $(-2, -10)$ 2. Vertex: $(-3, 7)$ passes through $(0, -20)$

3. Vertex: $(10, -6)$, passes through $(8, 22)$ 4. Vertex: $(-9, 3)$, passes through $(-8, \frac{5}{2})$

Write a quadratic equation (or function) for each parabola described below. Keep your equations in factored form, $f(x) = (x - p)(x - q)$. SHOW ALL YOUR WORK!

5. x -intercepts: $(3, 0)$ & $(6, 0)$, passes through $(4, -8)$

6. Roots: $(-15, 0)$ & $(-7, 0)$, passes through $(-4, 33)$

7. Zeros: $x = -4$ & $x = 7$, passes through $(-5, 8)$

8. Roots: $x = \sqrt{2}$ & $x = -\sqrt{2}$, passes through $(5, 23)$

For each of the parabolas described below, write a quadratic equation in Standard Form, $f(x) = ax^2 + bx + c$. SHOW ALL YOUR WORK.

9. Vertex: $(1, -5)$, passes through $(2, -2)$

10. Vertex: $(-2, -8)$, passes through $(4, 1)$

11. Roots: $(-1, 0)$ & $(9, 0)$, passes through $(-4, 5)$

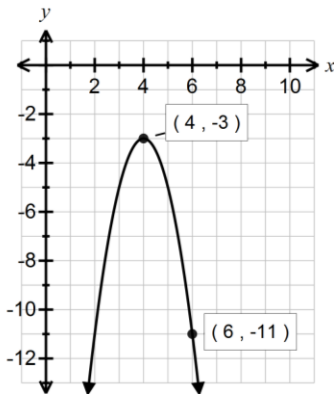
12. Roots: $x = \sqrt{7}$ & $x = -\sqrt{7}$, passes through $(3, -4)$

13. Solutions: $x = 4i$ & $x = -4i$, passes through $(-2, 20)$

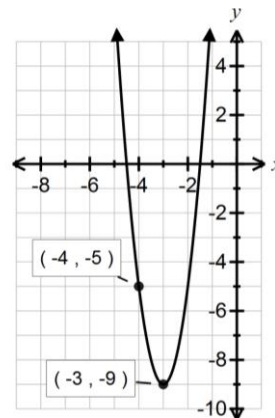
14. Solutions: $x = 6i$ & $x = -6i$ passes through $(3, -45)$

Using the information shown in each of the following graphs, write a quadratic equation in Vertex Form.

15.

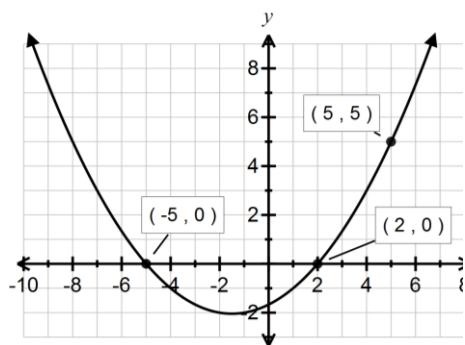


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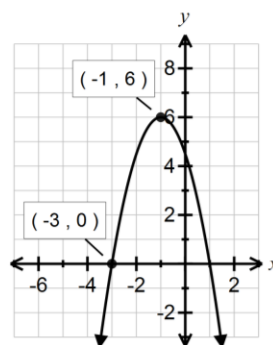


Write the equation of each parabola based on the information in the graph. Keep your equations in factored form or vertex form.

17.

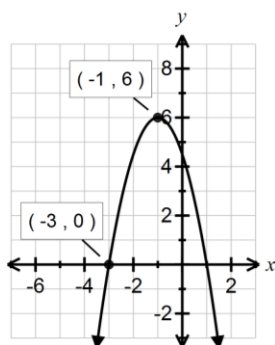


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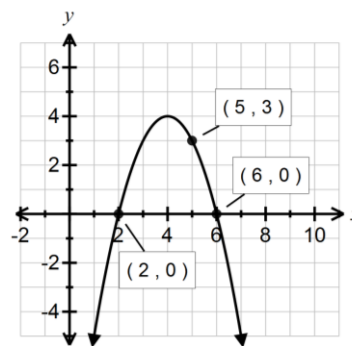


Write the equation of each parabola based on the information in the graph. Write your answer in standard form

19.



20.



Write the equation of each parabola described. Write your answer in Factored Form, then Standard form, then Vertex Form (hint: you will need to complete the square to make this work)

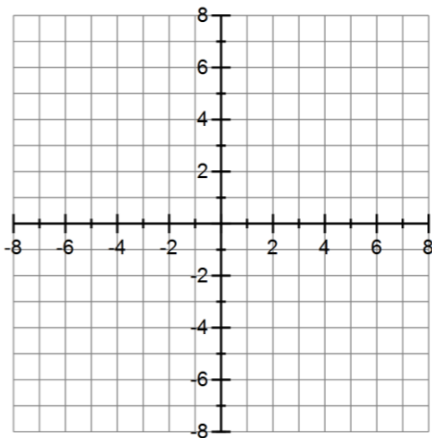
21. Zeros: $x = 2$ & $x = 4$, passes through $(-6, 80)$

Write the equation of each parabola described. Write your answer in Factored Form, then Standard form, then Vertex Form (hint: you will need to complete the square to make this work)

22. x-intercepts: $(-5,0)$ & $(2,0)$, passes through $(1,-6)$

Graph each parabola. Give the coordinates of the vertex and y-intercept. Give the equation of the axis of symmetry. Find the domain and range. Clearly mark the vertex and four other points on the graph.

23. $y = x^2 + 2x - 8$



Vertex: _____

Zeros: _____

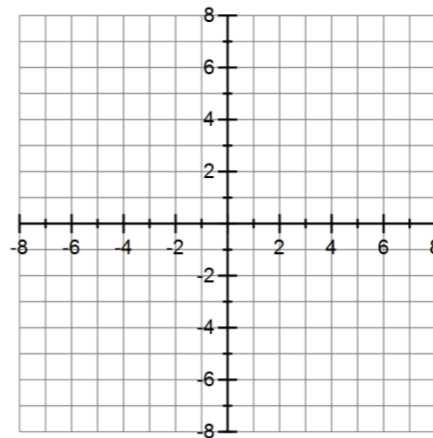
y-intercept: _____

Axis of Symmetry: $x =$ _____

Domain: _____

Range: _____

24. $y = (x - 1)^2 - 1$



Vertex: _____

Zeros: _____

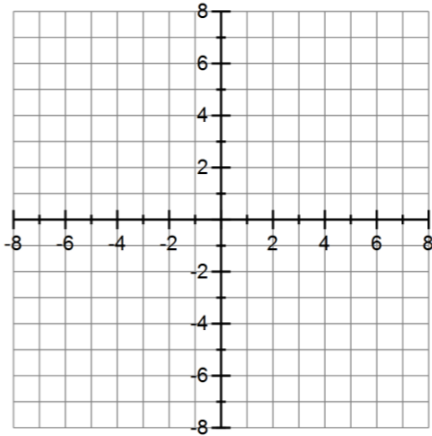
y-intercept: _____

Axis of Symmetry: $x =$ _____

Domain: _____

Range: _____

25. $y = -x^2 - 8x - 12$



Vertex: _____

Zeros: _____

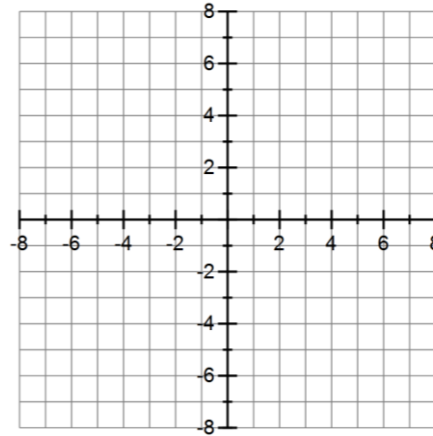
y-intercept: _____

Axis of Symmetry: $x =$ _____

Domain: _____

Range: _____

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



Vertex: _____

Zeros: _____

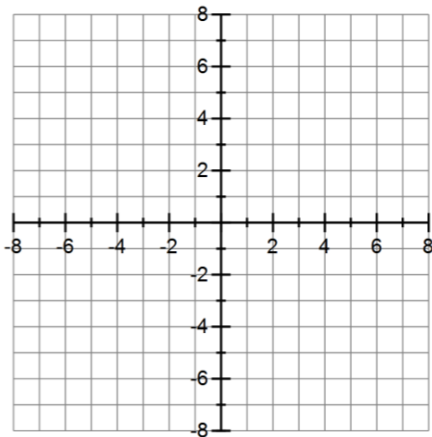
y-intercept: _____

Axis of Symmetry: $x =$ _____

Domain: _____

Range: _____

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



Vertex: _____

Zeros: _____

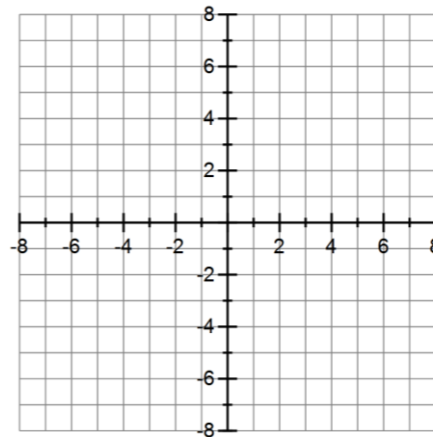
y-intercept: _____

Axis of Symmetry: $x =$ _____

Domain: _____

Range: _____

28. $y = 2(x - 1)(x + 1)$



Vertex: _____

Zeros: _____

y-intercept: _____

Axis of Symmetry: $x =$ _____

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!

29. Methane is a gas produced by landfills, natural gas systems, and coal mining that contributes to the greenhouse effect and global warming. Projected methane emissions in the United States can be modeled by the quadratic function $f(x) = -0.072x^2 + 1.93x + 173.9$, where $f(x)$ is the amount of methane produced in million metric tons, and x is the number of years after 2000.

Source: U.S. Environmental Protection Agency, data for 2000-2020

- a. Sketch of graph.

- b. Will this function have a maximum or a minimum? How can you tell?

- c. In what year will the methane emissions in the United States be at their maximum/minimum? Round to the nearest whole year.

- d. What is the level of methane emissions for that year? Use your rounded answer from part b.

30. A gardener is creating a rectangular garden, using the side of her house as one side of the rectangle. She has 40 feet of fence to enclose the other three sides of the garden.

 - e. Write an equation to represent the area function.

 - f. What should the dimensions of the garden be to yield the maximum area?

 - g. What is the maximum area of the garden?