

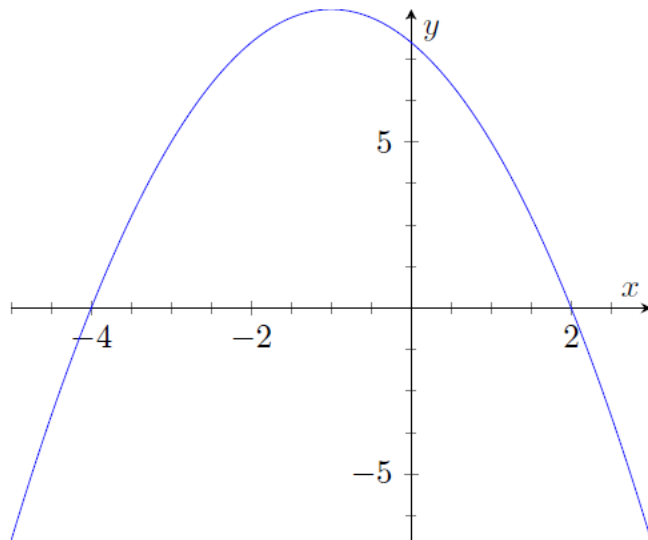
Quadratic Functions and the Parabola

Learning Objectives

- Determine the x- and y-intercepts of parabola from a graph
 - Determine axis of symmetry and vertex of parabolas from a graph
 - Find the direction a parabola opens and its axis of symmetry and vertex from the general form of its equation
 - Find the domain and range of a quadratic function
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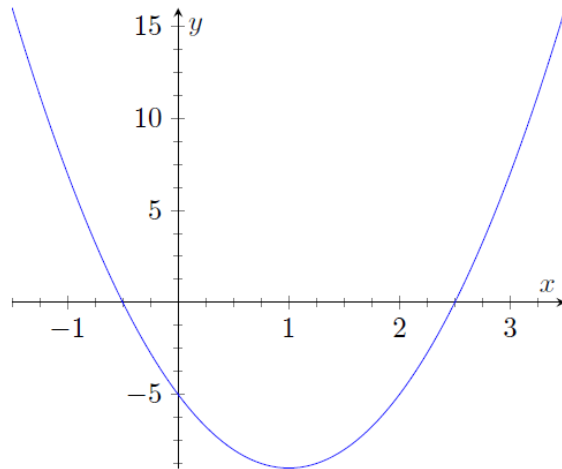
Determine the x- and y-intercepts of parabola from a graph

1. The graph of the function $f(x) = -x^2 - 2x + 8$ is shown below. Use the graph to determine the x- and y-intercepts. Confirm your results with the equation.



Determine axis of symmetry and vertex of parabolas from a graph

2. The graph of $f(x) = 4x^2 - 8x - 5$ is shown below. Use the graph to determine the vertex and axis of symmetry. Confirm your results from the equation.



Find the direction a parabola opens and its axis of symmetry and vertex from the general form of its equation

3. Determine whether the function $f(x) = 6 - 5x - x^2$ opens up or down. Find its axis of symmetry and vertex. Use that information to sketch the graph of the function.

Find the domain and range of a quadratic function

4. Find the domain and range of the function $f(x) = -\frac{1}{2}x^2 + 4x - 6$. [Hint: put the equation in vertex form.]

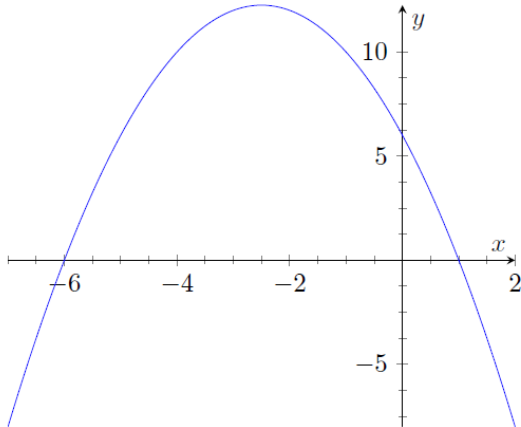
- Vertex form of the parabola: $f(x) = a(x - h)^2 + k$
- Complete the square: $(x + a)^2 = x^2 + 2ax + a^2$
- Axis of symmetry: $x = -\frac{b}{2a}$
- Vertex: $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

ANSWER KEY

1. $x = -4, y = 8$

2. $x = 1, (1, -9)$

3. down; $x = -\frac{5}{2}, \left(-\frac{5}{2}, \frac{49}{4}\right)$



4. $f(x) = -\frac{1}{2}(x - 4)^2 + 2$; D: all real numbers; R: $(-\infty, 2]$.