Section 10.4b Further Graphing of Quadratic Functions

# Objective 1: Writing Quadratic Functions in the Form

When the equation of a quadratic function is written in the form , we can easily identify the vertex of its graph. When a quadratic function is given in the form , we can use the process of completing the square to rewrite it in the form .

1. Consider the function .

a. Rewrite the function in the form .

b. Does have a maximum value or a minimum value? What is that value?

c. State the vertex and the axis of symmetry of the graph of .

d. Find the - and -intercepts of the graph of .

e. Graph showing the vertex, axis of symmetry, and intercepts. State the domain and range of .



2. Consider the function .

a. Rewrite the function in the form .

b. Does have a maximum value or a minimum value? What is that value?

c. State the vertex and the axis of symmetry of the graph of .

d. Find the - and -intercepts of the graph of .

e. Graph showing the vertex, axis of symmetry, and intercepts. State the domain and range of .



3. Consider the function .

a. Rewrite the function in the form .

b. Does have a maximum value or a minimum value? What is that value?

c. State the vertex and the axis of symmetry of the graph of .

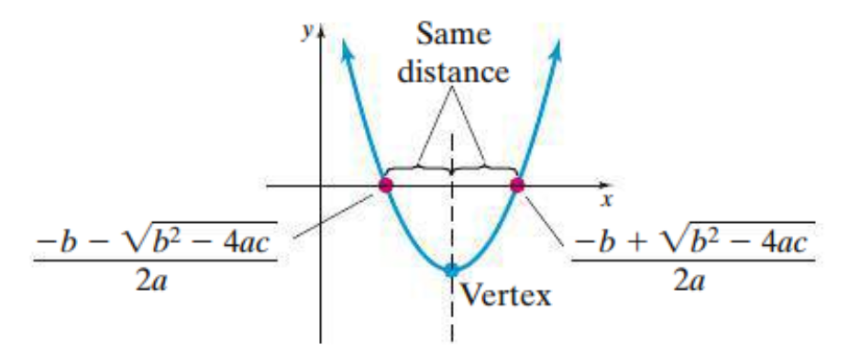
d. Find the - and -intercepts of the graph of .

e. Graph showing the vertex, axis of symmetry, and intercepts. State the domain and range of .



# Objective 2: Using the Vertex Formula

When given the equation of a quadratic function written in the form , there is also a formula we can use to find the vertex. One way to think about the formula is to consider the graph of a quadratic function that has two -intercepts. We can find the -intercepts by using the quadratic formula.



Using the symmetry of the graph of the parabola, we can find the -coordinate of the vertex by averaging the values of the -intercepts. Doing that, we find that the -coordinate of the vertex is . We can find the -coordinate of the vertex by substituting the -coordinate into the equation of the function.

**Vertex Formula**

The graph of the quadratic function is a parabola with vertex .

1. Consider the function .

a. Find the vertex and the axis of symmetry of the graph of .

b. Find the - and -intercepts of the graph of .

c. Graph showing the vertex, axis of symmetry, and intercepts. State the domain and range of .



2. Consider the function .

a. Find the vertex and the axis of symmetry of the graph of .

b. Find the - and -intercepts of the graph of .

c. Graph showing the vertex, axis of symmetry, and intercepts. State the domain and range of .

