

# Chapter 2 Polynomial and Rational Functions

Course Number

## Section 2.1 Quadratic Functions and Models

Instructor

**Objective:** In this lesson you learned how to sketch and analyze graphs of functions.

Date

### Important Vocabulary

Define each term or concept.

**Axis of symmetry**

**Vertex**

### I. The Graph of a Quadratic Function (Pages 128–130)

Let  $n$  be a nonnegative integer and let  $a_n, a_{n-1}, \dots, a_2, a_1, a_0$  be real numbers with  $a_n \neq 0$ . A **polynomial function of  $x$  with degree  $n$**  is . . .

#### *What you should learn*

How to analyze graphs of quadratic functions

Let  $a, b,$  and  $c$  be real numbers with  $a \neq 0$ . A **quadratic function** is . . .

A quadratic function is a polynomial function of \_\_\_\_\_ degree. The graph of a quadratic function is a special “U”-shaped curve called a \_\_\_\_\_.

If the leading coefficient of a quadratic function is positive, the graph of the function opens \_\_\_\_\_ and the vertex of the parabola is the \_\_\_\_\_  $y$ -value on the graph. If the leading coefficient of a quadratic function is negative, the graph of the function opens \_\_\_\_\_ and the vertex of the parabola is the \_\_\_\_\_  $y$ -value on the graph. The absolute value of the leading coefficient  $a$  determines \_\_\_\_\_  
\_\_\_\_\_. If  $|a|$  is small,  
\_\_\_\_\_  
\_\_\_\_\_

**II. The Standard Form of a Quadratic Function**

(Pages 131–132)

The **standard form** of a quadratic function is

\_\_\_\_\_.

For a quadratic function in standard form, the axis of the associated parabola is \_\_\_\_\_ and the vertex is

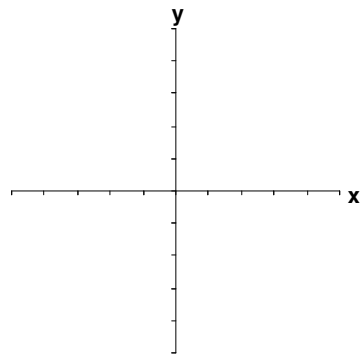
\_\_\_\_\_.

To write a quadratic function in standard form, . . .

To find the  $x$ -intercepts of the graph of  $f(x) = ax^2 + bx + c$ , . . .

**Example 1:** Sketch the graph of  $f(x) = x^2 + 2x - 8$  and identify the vertex, axis, and  $x$ -intercepts of the parabola.

*What you should learn*  
How to write quadratic functions in standard form and use the results to sketch graphs of functions



**III. Applications of Quadratic Functions** (Page 133)

For a quadratic function in the form  $f(x) = ax^2 + bx + c$ , the  $x$ -coordinate of the vertex is given as \_\_\_\_\_ and the  $y$ -coordinate of the vertex is given as \_\_\_\_\_.

**Example 2:** Find the vertex of the parabola defined by  $f(x) = 3x^2 - 11x + 16$ .

*What you should learn*  
How to use quadratic functions to model and solve real-life problems

**Homework Assignment**

Page(s)

Exercises