

# CHAPTER 9 Quadratic Functions and Equations

## Key Concepts

### Graphing Quadratic Functions (Lesson 9-1)

- A quadratic function can be described by an equation of the form  $y = ax^2 + bx + c$ , where  $a \neq 0$ .
- The axis of symmetry for the graph of  $y = ax^2 + bx + c$ , where  $a \neq 0$ , is  $x = -\frac{b}{2a}$ .

### Solving Quadratic Equations (Lessons 9-2, 9-4, and 9-5)

- Quadratic equations can be solved by graphing. The solutions are the  $x$ -intercepts or zeros of the related quadratic function.
- Quadratic equations can be solved by completing the square. To complete the square for  $x^2 + bx$ , find  $\frac{1}{2}$  of  $b$ , square this result, and then add the result to  $x^2 + bx$ .
- Quadratic equations can be solved by using the Quadratic Formula,  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ .

### Transformations of Quadratic Functions (Lesson 9-3)

- $f(x) = x^2 + c$  translates the graph up or down.
- $f(x) = ax^2$  compresses or expands the graph vertically.

### Special Functions (Lesson 9-7)

- The greatest integer function is written as  $f(x) = \llbracket x \rrbracket$ , where  $f(x)$  is the greatest integer not greater than  $x$ .
- The absolute value function is written as  $f(x) = |x|$ , where  $f(x)$  is the distance from  $x$  to 0 on a number line.

In this chapter, you will:

- Solve quadratic equations by graphing, completing the square, and using the Quadratic Formula.
- Analyze functions with successive differences and ratios.
- Identify and graph special functions.

## Key Vocabulary



absolute value function (p. 599)	piecewise-defined function (p. 599)
axis of symmetry (p. 543)	piecewise-linear function (p. 598)
completing the square (p. 574)	Quadratic Formula (p. 583)
dilation (p. 566)	quadratic function (p. 543)
discriminant (p. 586)	reflection (p. 566)
double root (p. 556)	standard form (p. 543)
greatest integer function (p. 598)	step function (p. 598)
maximum (p. 543)	transformation (p. 564)
minimum (p. 543)	translation (p. 564)
parabola (p. 543)	vertex (p. 543)