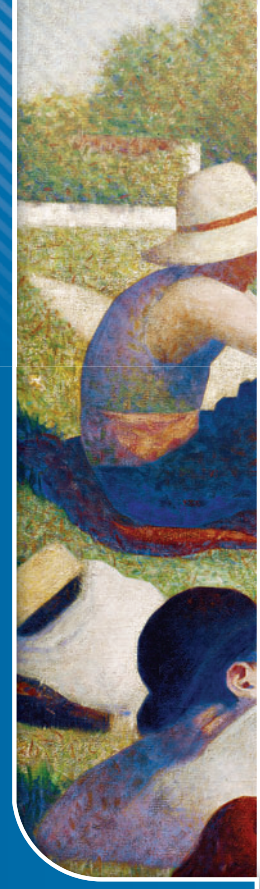
Chapter

12 More Work with Quadratics



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In writing it is important to know and use synonyms for the same idea.

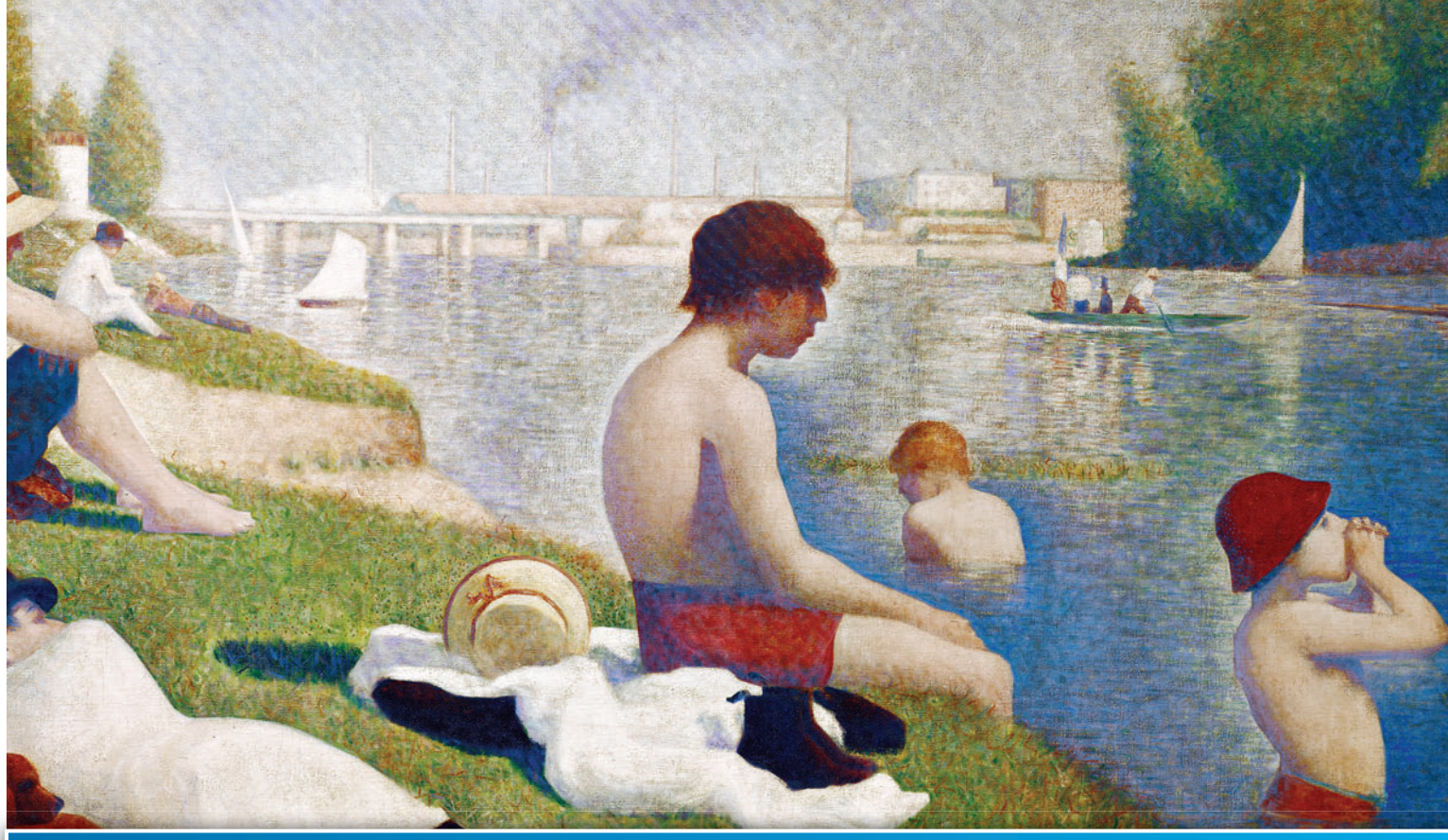
A picture may be beautiful or pretty, or it may be dazzling or brilliant, or it may be dull or drab or gray. Synonyms help convey ideas more clearly and one word may fit a situation just a little better than another.

Equivalent expressions in mathematics are like synonyms in writing. Equivalent expressions are often classified by their form.

Here are four ways to write the same number:

2,048	base 10
$2 \cdot 10^3 + 4 \cdot 10^1 + 8 \cdot 1$	expanded form
2^{11}	exponential form
$2.048 \cdot 10^3$	scientific notation

There are occasions when each of these forms is most appropriate or most helpful to understanding a situation. Base 10 is our normal compact way of writing numbers. Expanded form shows the meaning of base 10. Exponential form arises in many counting situations and situations of growth. Scientific notation is useful when comparing numbers that differ greatly in size.

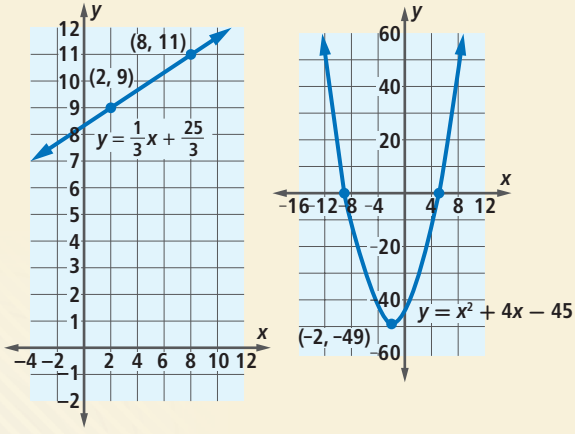


Equivalent equations are also like synonyms. Consider the line that contains the two points (2, 9) and (8, 11). Three equivalent equations for this line are in forms that you saw in Chapter 6.

$y = \frac{1}{3}x + \frac{25}{3}$ slope-intercept form

$x - 3y = -25$ standard form

$y - 9 = \frac{1}{3}(x - 2)$ point-slope form



In this chapter, we return to quadratic equations and parabolas. Here are three equivalent equations for the parabola that is graphed at the left.

$y = x^2 + 4x - 45$ standard form

$y + 49 = (x + 2)^2$ vertex form

$y = (x - 5)(x + 9)$ factored form

In Chapter 9, you saw that standard form enables you to use the Quadratic Formula to find the x-intercepts of the graph. Standard form also is very useful for solving equations. The vertex form, which opens the chapter, lets you quickly find the vertex of the parabola. This is useful for graphing and for obtaining the minimum (or maximum) value of y. The factored form, which you will study later in this chapter, shows the x-intercepts of the graph.