9.4 Solve Polynomial Equations in Factored Form

TEKS *A.4.A, A.10.A*

Before You solved linear equations.

Now You will solve polynomial equations.

Why So you can analyze vertical motion, as in Ex. 55.

Key Vocabulary
- **roots**
- **vertical motion model**

In Lesson 2.4, you learned the property of zero: For any real number a, $a \cdot 0 = 0$. This is equivalent to saying:

For real numbers a and b, if $a = 0$ or $b = 0$, then $ab = 0$.

The converse of this statement is also true (as shown in Exercise 49), and it is called the zero-product property.

KEY CONCEPT *For Your Notebook*

Zero-Product Property

Let a and b be real numbers. If $ab = 0$, then $a = 0$ or $b = 0$.

The zero-product property is used to solve an equation when one side is zero and the other side is a product of polynomial factors. The solutions of such an equation are also called **roots**.

EXAMPLE 1 Use the zero-product property

Solve $(x - 4)(x + 2) = 0$.

$(x - 4)(x + 2) = 0$ Write original equation.

$x - 4 = 0$ *or* $x + 2 = 0$ Zero-product property

$x = 4$ *or* $x = -2$ Solve for x.

▶ The solutions of the equation are 4 and −2.

CHECK Substitute each solution into the original equation to check.

$(4 - 4)(4 + 2) \stackrel{?}{=} 0$ $\qquad$ $(-2 - 4)(-2 + 2) \stackrel{?}{=} 0$

$0 \cdot 6 \stackrel{?}{=} 0$ $\qquad$ $-6 \cdot 0 \stackrel{?}{=} 0$

$0 = 0$ ✓ $\qquad$ $0 = 0$ ✓

✓ **GUIDED PRACTICE** for Example 1

1. Solve the equation $(x - 5)(x - 1) = 0$.