12.7 Solve Rational Equations

Before	You simplified rational expressions.
Now	You will solve rational equations.
Why?	So you can calculate a hockey statistic, as in Ex. 31.

Key Vocabulary
- **rational equation**
- **cross product,** *p. 168*
- **extraneous solution,** *p. 730*
- **least common denominator (LCD) of rational expressions,** *p. 813*

A **rational equation** is an equation that contains one or more rational expressions. One method for solving a rational equation is to use the cross products property. You can use this method when both sides of the equation are single rational expressions.

EXAMPLE 1 **Use the cross products property**

REVIEW CROSS PRODUCTS
For help with using the cross products property, see p. 168.

Solve $\frac{6}{x+4} = \frac{x}{2}$. Check your solution.

$\frac{6}{x+4} = \frac{x}{2}$ **Write original equation.**

$12 = x^2 + 4x$ **Cross products property**

$0 = x^2 + 4x - 12$ **Subtract 12 from each side.**

$0 = (x+6)(x-2)$ **Factor polynomial.**

$x + 6 = 0$ *or* $x - 2 = 0$ **Zero-product property**

$x = -6$ *or* $x = 2$ **Solve for x.**

▶ The solutions are -6 and 2.

CHECK   If $x = -6$:   If $x = 2$:

$\frac{6}{-6+4} \overset{?}{=} \frac{-6}{2}$ $\frac{6}{2+4} \overset{?}{=} \frac{2}{2}$

$-3 = -3$ ✓ $1 = 1$ ✓

✓ **GUIDED PRACTICE**   **for Example 1**

Solve the equation. Check your solution.

1. $\frac{5}{y-2} = \frac{y}{3}$ 2. $\frac{2}{z+5} = \frac{z}{7}$

USING THE LCD Given an equation with fractional coefficients such as $\frac{2}{3}x + \frac{1}{6} = \frac{3}{4}$, you can multiply each side by the least common denominator (LCD), 12. The equation becomes $8x + 2 = 9$, which you may find easier to solve than the original equation. You can use this method to solve a rational equation.