12.6 Add and Subtract Rational Expressions

TEKS *A.1.C, A.4.A*

Before You multiplied and divided rational expressions.

Now You will add and subtract rational expressions.

Why? So you can solve work problems, as in Ex. 49.

Key Vocabulary
• least common denominator (LCD) of rational expressions

Adding and subtracting rational expressions with the same denominator is similar to adding and subtracting numerical fractions with the same denominator.

KEY CONCEPT *For Your Notebook*

Adding and Subtracting Rational Expressions with the Same Denominator

Let a, b, and c be polynomials where $c \neq 0$.

Algebra $\dfrac{a}{c} + \dfrac{b}{c} = \dfrac{a+b}{c}$ $\qquad$ $\dfrac{a}{c} - \dfrac{b}{c} = \dfrac{a-b}{c}$

Examples $\dfrac{2}{x} + \dfrac{3}{x} = \dfrac{2+3}{x} = \dfrac{5}{x}$ $\qquad$ $\dfrac{5}{4x} - \dfrac{2}{4x} = \dfrac{5-2}{4x} = \dfrac{3}{4x}$

EXAMPLE 1 **Add and subtract with the same denominator**

a. $\dfrac{5}{3x} + \dfrac{7}{3x} = \dfrac{12}{3x}$ $\qquad$ **Add numerators.**

$\qquad\quad = \dfrac{\cancel{3} \cdot 4}{\cancel{3} \cdot x}$ $\qquad$ **Factor and divide out common factor.**

$\qquad\quad = \dfrac{4}{x}$ $\qquad$ **Simplify.**

b. $\dfrac{3x}{x-1} - \dfrac{x+5}{x-1} = \dfrac{3x-(x+5)}{x-1}$ $\qquad$ **Subtract numerators.**

$\qquad\qquad\qquad = \dfrac{2x-5}{x-1}$ $\qquad$ **Simplify.**

CHECK Check your simplification using a graphing calculator. For part (b), graph $y_1 = \dfrac{3x}{x-1} - \dfrac{x+5}{x-1}$ and $y_2 = \dfrac{2x-5}{x-1}$. The graphs coincide. So, the expressions are equivalent for all values of x other than the excluded value of 1.