

6-3

Adding and Subtracting Rational Expressions



Essential Question: How can you simplify complex fractions?

Objectives

Add and subtract rational expressions.

Simplify complex fractions.

Vocabulary

complex fraction

Why learn this?

You can add and subtract rational expressions to estimate a train's average speed. (See Example 6.)

Adding and subtracting rational expressions is similar to adding and subtracting fractions. To add or subtract rational expressions with like denominators, add or subtract the numerators and use the same denominator.

$$\frac{1}{5} + \frac{3}{5} = \frac{4}{5} \quad \frac{6}{7} - \frac{4}{7} = \frac{2}{7}$$



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EXAMPLE 1

MCC9-12.A.APR.7(+)

Adding and Subtracting Rational Expressions with Like Denominators

Add or subtract. Identify any x -values for which the expression is undefined.

A $\frac{3x-4}{x+3} + \frac{2x+5}{x+3}$

$$\frac{3x-4 + 2x+5}{x+3}$$

Add the numerators.

$$\frac{5x+1}{x+3}$$

Combine like terms.

The expression is undefined at $x = -3$ because this value makes $x + 3$ equal 0.

B $\frac{2x-1}{x^2+2} - \frac{4x+4}{x^2+2}$

$$\frac{2x-1 - (4x+4)}{x^2+2}$$

Subtract the numerators.

$$\frac{2x-1-4x-4}{x^2+2}$$

Distribute the negative sign.

$$\frac{-2x-5}{x^2+2}$$

Combine like terms.

There is no real value of x for which $x^2 + 2 = 0$; the expression is always defined.

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Add or subtract. Identify any x -values for which the expression is undefined.

1a. $\frac{6x+5}{x^2-3} + \frac{3x-1}{x^2-3}$

1b. $\frac{3x^2-5}{3x-1} - \frac{2x^2-3x-2}{3x-1}$

To add or subtract rational expressions with unlike denominators, first find the least common denominator (LCD). The LCD is the least common multiple of the polynomials in the denominators.