Looking Ahead

The following example shows one method for solving rational equations. This method requires the subtraction of rational expressions, which follows the same procedure as the subtraction of fractions.

Example Preview

Solve the following rational equation and simplify your answer.

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

Solution

To solve this equation, assume no denominator is 0. This means $x \neq -2,4$. Begin by subtracting the rational expressions on the left side of the equation. Note that the LCD is $(x+2)(x-4)$. Change each expression into an equivalent rational expression with that denominator and subtract.

$$\frac{x}{x+2}\cdot\frac{x-4}{x-4}-\frac{1}{x-4}\cdot\frac{x+2}{x+2}=1$$
$$\frac{x^2-4x-(x+2)}{(x+2)(x-4)}=1$$
$$\frac{x^2-4x-x-2}{x^2-2x-8}=1$$
$$\frac{x^2-5x-2}{x^2-2x-8}=1$$

Next, multiply both sides by the denominator and solve the resulting equation.

$$x^2-5x-2=x^2-2x-8$$
$$-5x-2=-2x-8$$
$$-3x=-6$$
$$x=2$$

Since 2 is not equal to –2 or 4, the solution is $\{2\}$.

1.R.3 Exercises

Concept Check

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

1. The final step in adding fractions is to reduce, if possible.

2. The process for finding the LCD is the same as the process for finding the LCM.

3. LCD represents the Least Common Digit.

4. When subtracting fractions, simply subtract the numerators and the denominators.

5. Subtraction of fractions requires that the fractions have the same denominators.

Practice

Add and reduce to lowest terms.

6. $\frac{3}{25}+\frac{12}{25}$

7. $\frac{2}{7}+\frac{4}{21}+\frac{1}{3}$

Subtract and reduce to lowest terms.

8. $-\frac{7}{15}+\frac{3}{5}$

9. $\frac{1}{4}+\left(-\frac{1}{20}\right)+\frac{8}{15}$

10. $\frac{7}{8}-\frac{5}{8}$

11. $\frac{9}{14}-\frac{2}{21}$

12. $2-\frac{9}{16}$

13. $-\frac{5}{12}-\left(-\frac{1}{6}\right)$

Applications

Solve.

14. ***Cooking:*** A recipe calls for the following spices: $\frac{1}{2}$ teaspoon of turmeric, $\frac{1}{4}$ teaspoon of ginger, and $\frac{1}{8}$ teaspoon of cumin. What is the total quantity of these three spices?

15. ***Postage:*** Three pieces of mail weigh $\frac{1}{2}$ ounce, $\frac{1}{5}$ ounce, and $\frac{3}{10}$ ounce. What is the total weight of the letters?

Writing & Thinking

16. Give an example of a situation where you might add or subtract fractions (other than in class).

17. Explain how finding the LCM relates to LCDs.