NAME

Module 15 Simplifying Rational Expressions
Lesson 4 Adding and Subtracting Rational Expressions

independent practice

Find each sum or difference. Write answer in simplest form.

1. $\frac{a}{4} + \frac{5a}{4}$ $\frac{3a}{2}$
2. $\frac{2m}{n} + \frac{3}{n}$ $\frac{2m + 3}{n}$
3. $\frac{2x}{5} - \frac{8x}{5}$ $\frac{-6x}{5}$
4. $\frac{c}{3} - \frac{c - 2}{3}$ $\frac{2}{3}$
5. $\frac{2 + y}{y - 1} + \frac{3 - 2y}{y - 1}$ $\frac{5 - y}{y - 1}$
6. $\frac{6 - 3r}{r + 5} - \frac{-5r + 2}{r + 5}$ $\frac{4 + 2r}{r + 5}$
7. $\frac{6z - 5}{2z - 3} + \frac{8z}{2z - 3}$ $\frac{14z - 5}{2z - 3}$
8. $\frac{2x - 1}{x - 2} - \frac{3x + 4}{2 - x}$ $\frac{5x + 3}{x - 2}$
9. $\frac{2}{a} - \frac{5}{a^2}$ $\frac{2a - 5}{a^2}$
10. $\frac{5}{3b} + \frac{a}{6b}$ $\frac{10 + a}{6b}$
11. $\frac{5}{3z} + \frac{9}{z^2}$ $\frac{5z + 27}{3z^2}$
12. $\frac{m}{6n} - \frac{3m}{2n^2}$ $\frac{mn - 9m}{6n^2}$
13. $\frac{t + 3}{t - 4} + \frac{5}{t - 3}$ $\frac{t^2 + 5t - 29}{(t - 4)(t - 3)}$
14. $\frac{3}{b + 6} - \frac{4}{b - 3}$ $\frac{-b - 33}{(b + 6)(b - 3)}$
15. $\frac{x - 1}{4x} + \frac{x}{4}$ $\frac{x^2 + x - 1}{4x}$
16. $\frac{y + 3}{2y} + \frac{7}{4}$ $\frac{9y + 6}{4y}$
17. $\frac{4}{c - 3} + \frac{6}{c + 3}$ $\frac{10c - 6}{c^2 - 9}$
18. $\frac{x}{x + 1} + \frac{2}{x}$ $\frac{x^2 + 2x + 2}{x^2 + x}$
19. $\frac{x + 2}{x - 7} + \frac{x + 5}{x - 5}$ $\frac{2x^2 - 5x - 45}{(x - 7)(x - 5)}$
20. $\frac{d}{d - 4} - \frac{d + 2}{d + 8}$ $\frac{10d + 8}{(d - 4)(d + 8)}$

Journal

1. Describe the process used to subtract rational expressions with like denominators.
2. Gary was absent from school. Explain to him how to add rational expressions with unlike denominators.
3. Jennifer performed the following operation: $\frac{(2x + 3)(x + 2)}{(3x + 4)(x - 1)} + \frac{(3x + 4)(x - 3)}{(x + 2)(2x + 3)} = \frac{x - 3}{x - 1}$. Is she correct? Explain.
4. Explain how the GCF of two algebraic expressions is similar to the GCF of two natural numbers.

Cumulative Review

Simplify and find the restricted value(s) of the variable.

1. $\frac{x^4}{x^2}$ x^2; $x \neq 0$
2. $\frac{y^2 + 5y}{y + 5}$ y; $y \neq -5$
3. $\frac{b^2 - 9}{b - 3}$ $b + 3$; $b \neq 3$
4. $\frac{t^2 + 11t + 18}{t^2 + 13t + 36}$ $\frac{t + 2}{t + 4}$; $t \neq -9$ or -4
5. $\frac{8d^2 - 2d - 15}{4d^2 - 7d - 15}$ $\frac{2d - 3}{d - 3}$; $d \neq 3$ or $-\frac{5}{4}$

Find each product or quotient. Write the answer in simplest form.

6. $\frac{2b}{c} \cdot \frac{c}{6}$ $\frac{b}{3}$

7. $\frac{g}{2h} \div \frac{5g}{6h^2}$ $\frac{3h}{5}$

8. $\frac{x^2 + 7x + 12}{x^2 - 25} \cdot \frac{x^2 + 5x}{x^2 - 3x - 28}$ $\frac{x^2 + 3x}{x^2 - 12x + 35}$

9. $\frac{s^2 + 9s + 20}{2s^2 + 15s + 25} \div \frac{2s^2 - s - 1}{2s^2 + 3s - 5}$ $\frac{s + 4}{2s + 1}$

10. $\frac{2x^2 - 7x - 15}{x^2 - 11x + 30} \cdot \frac{x^2 - 4x - 5}{2x^2 + 5x + 3}$ $\frac{x - 5}{x - 6}$

Possible Journal Answers

1. To find the difference of rational expressions with like denominators, subtract the numerators and write the result in the numerator of the answer. The denominator of the answer is the common denominator of the original problem. Simplify the expression, if necessary.
2. First, find the least common denominator; if necessary, factor this expression. Write each rational expression as an equivalent expression with the least common denominator. Then, add or subtract these rational expressions and simplify, if necessary.
3. Jennifer is incorrect. She has found the product of the two rational expressions instead of their sum. She should have first found a common denominator instead of canceling the like factors.
4. The GCF two factored algebraic expressions is the product of the factors common to each expression. Similarly, the GCF of two natural numbers is the product of the factors common to each number. The GCF is the greatest number that divides each number.