

Unit 4 Worksheet 3
Adding and Subtracting Rational Expressions

Name: _____
Date: _____ **Per:** _____

[1-15] Perform the indicated operation. Write your final answer in simplest form.

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

2. $\frac{26}{7x^2y} - \frac{5}{7x^2y}$

3. $\frac{3x-4}{x+3} - \frac{6x+5}{x+3}$

4. $\frac{x^2+5x+16}{x+3} - \frac{1-3x}{x+3}$

5. $\frac{3x}{2x-6} + \frac{9}{6-2x}$

6. $\frac{x}{x-2} - \frac{x+1}{2-x}$

7. $\frac{2x^2}{x^2-9} - \frac{x+15}{9-x^2}$

8. $\frac{5}{3x^2} + \frac{x}{2}$

9. $\frac{1}{6xy} - \frac{2}{15x^2}$

10. $\frac{2}{x+3} - \frac{1-x}{x-4}$

11. $\frac{3}{x+2} - \frac{8}{x-2}$

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

EXTENSION:

30. Suppose that $x \neq 0$ and $y \neq 0$. We know from our work in this section that $\frac{1}{x} \cdot \frac{1}{y}$ is equivalent to $\frac{1}{xy}$. Is it also true that $\frac{1}{x} + \frac{1}{y}$ is equivalent to $\frac{1}{x+y}$? Provide evidence to support your answer.

31. Suppose that $x = \frac{2t}{1+t^2}$ and $y = \frac{1-t^2}{1+t^2}$. Show that the value of $x^2 + y^2$ does not depend on the value of t .

32. Show that for any real numbers a and b , and any integers x and y so that $x \neq 0$, $y \neq 0$, $x \neq y$, and $x \neq -y$,

$$\left(\frac{y}{x} - \frac{x}{y}\right) \left(\frac{ax + by}{x + y} - \frac{ax - by}{x - y}\right) = 2(a - b).$$

33. Suppose that n is a positive integer.

a. Simplify the expression $\left(1 + \frac{1}{n}\right) \left(1 + \frac{1}{n+1}\right)$.

b. Simplify the expression $\left(1 + \frac{1}{n}\right) \left(1 + \frac{1}{n+1}\right) \left(1 + \frac{1}{n+2}\right)$.

c. Simplify the expression $\left(1 + \frac{1}{n}\right) \left(1 + \frac{1}{n+1}\right) \left(1 + \frac{1}{n+2}\right) \left(1 + \frac{1}{n+3}\right)$.

d. If this pattern continues, what is the product of n of these factors?