ALBERT

Name _____ Date _____

Operations with Rational Expressions Worksheet

Algebra 2 · Common Core HSA-APR.D.7

> (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

Practice

Builds the skill step by step.

1. Simplify: $\frac{x}{3} + \frac{x}{6}$.

2. Simplify: $\frac{2}{x} \cdot \frac{x^2}{4}$.

3. Simplify: $\frac{x+1}{x} - \frac{1}{x}$.

4. Simplify: $\frac{x^2 - 4}{x - 2}$ $(x \neq 2)$.

5. Rational expressions are closed under which operations?

   A. addition, subtraction, multiplication and division by a nonzero rational expression

   B. addition only

   C. multiplication only

   D. none of them

6. Simplify: $\frac{3}{x} + \frac{5}{x}$.

7. Simplify: $\frac{x}{x+1} \div \frac{2x}{x+1}$.

8. Simplify: $\frac{1}{2} + \frac{1}{x}$.

9. Simplify: $\frac{x^2 + 3x}{x}$ $(x \neq 0)$.

10. Simplify: $\frac{4}{x-1} \cdot \frac{x-1}{2}$ $(x \neq 1)$.

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On Level

Grade-level practice.

1. Simplify: $\frac{1}{x} + \frac{1}{x+1}$.

2. Simplify: $\frac{x^2 - 9}{x^2 + 6x + 9}$.

3. Simplify: $\frac{x+2}{x-1} - \frac{3}{x-1}$ $(x \neq 1)$.

4. Simplify: $\frac{x^2 - 1}{x+2} \cdot \frac{x+2}{x+1}$.

5. Simplify: $\frac{2}{x-2} - \frac{1}{x+2}$.

6. For which values of x is $\frac{1}{x-3} \div \frac{x-3}{x}$ undefined?

   A. $x = 3$ only

   B. $x = 0$ and $x = 3$

   C. $x = 0$ only

   D. $x = -3$

7. Simplify: $\frac{x+3}{2x} \div \frac{x+3}{4x^2}$.

8. Explain how to add $\frac{3}{x} + \frac{2}{x+1}$.

9. Simplify: $\frac{x}{x-1} + \frac{1}{1-x}$ $(x \neq 1)$.

10. Simplify: $\frac{x^2}{x+1} - \frac{1}{x+1}$ $(x \neq -1)$.

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Challenge

Multi-step and word problems that stretch it.

1. Simplify: $(\frac{1}{x} + \frac{1}{y}) \div \frac{1}{xy}$.

2. Simplify: $\frac{x^2 - x - 6}{x^2 - 4} \div \frac{x - 3}{x - 2}$.

3. Simplify: $\frac{1}{x - 1} - \frac{1}{x + 1}$.

4. Simplify: $(1 + \frac{1}{x}) \div (1 - \frac{1}{x})$.

5. Which analogy describes rational expressions?

   A. Rational expressions are to integers as decimals are to fractions.

   B. Polynomials are never rational expressions.

   C. Polynomials are to rational expressions as integers are to rational numbers.

   D. Rational expressions are all polynomials.

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

7. Simplify: $\frac{2x + 6}{x - 5} \cdot \frac{x^2 - 25}{x + 3}$.

8. Explain why simplifying $\frac{x^2 - 4}{x - 2}$ to $x + 2$ needs the note $x \neq 2$.

9. One pipe fills a tank in 3 hours and another in 6 hours. Working together, their rate is $\frac{1}{3} + \frac{1}{6}$ of the tank per hour. How many hours do they take together?

10. Use $\frac{1}{n(n + 1)} = \frac{1}{n} - \frac{1}{n + 1}$ to find $\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \ldots + \frac{1}{9 \cdot 10}$.