LESSON MAKER PRO

Rational Expression Remix

Add, subtract, multiply, and divide algebraic fractions.

HIGH SCHOOL · HSA-APR.D.7

CCSS.Math.Content.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..."

NAME _____ **DATE** _____

RULES FOR RATIONAL EXPRESSIONS

Add or subtract rational expressions by using a common denominator, then combine the numerators. Multiply straight across and factor when possible to cancel common factors. To divide, multiply by the reciprocal of the second expression, and make sure that expression is not zero.

WORKED EXAMPLE

Simplify $(x + 2)/(x - 3) + 4/(x - 3)$. State the restriction.

1. The denominators match, so add the numerators: $(x + 2 + 4)/(x - 3)$.
2. Combine constants: $(x + 6)/(x - 3)$.
3. The denominator cannot equal 0, so $x \neq 3$.

Answer: $(x + 6)/(x - 3)$, $x \neq 3$

PRACTICE 6 problems

1 Simplify $(x + 1)/(x + 5) + 7/(x + 5)$. State the restriction.

ANSWER _____

2 Simplify $9x/(x - 8) - 5/(x - 8)$. State the restriction.

ANSWER _____

3 Simplify $(x + 7)/(x + 1) \cdot (x + 1)/(x - 9)$. State the restrictions.

ANSWER _____

4 Simplify $(x + 8)/(x - 5) \div (x + 8)/(x + 9)$. State the restrictions.

ANSWER _____

5 Simplify $7/(x + 5) + 9/(x - 5)$. State the restrictions.

ANSWER _____

6 Simplify $x/(x^2 - 25) - 1/(x + 5)$. State the restrictions.

ANSWER _____

APPLY IT Show your work

1 A student sells x custom phone cases online. The platform fee per case is (x + 8)/(x - 5) dollars, and packaging costs 7/(x - 5) dollars per case. Write and simplify the combined cost per case. State the restriction.

WORK SPACE

ANSWER _____

2 A music creator compares engagement indexes for two versions of a post. Version A has index (x + 9)/(x - 8), and Version B has index (x + 9)/(x + 7). Find the factor A ÷ B, and state all restrictions.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Simplify $[(x + 5)/(x - 7) - (x - 5)/(x + 7)] \div [10x/(x^2 - 49)]$. State all excluded values.

WORK SPACE AND ANSWER

ANSWER KEY

Rational Expression Remix

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Simplify (x + 1)/(x + 5) + 7/(x + 5). State the restriction.	**(x + 8)/(x + 5), x ≠ -5**
2	Simplify 9x/(x - 8) - 5/(x - 8). State the restriction.	**(9x - 5)/(x - 8), x ≠ 8**
3	Simplify (x + 7)/(x + 1) · (x + 1)/(x - 9). State the restrictions.	**(x + 7)/(x - 9), x ≠ -1, 9**
4	Simplify (x + 8)/(x - 5) ÷ (x + 8)/(x + 9). State the restrictions.	**(x + 9)/(x - 5), x ≠ -8, -9, 5**
5	Simplify 7/(x + 5) + 9/(x - 5). State the restrictions.	**(16x + 10)/(x^2 - 25), x ≠ -5, 5**
6	Simplify x/(x^2 - 25) - 1/(x + 5). State the restrictions.	**5/(x^2 - 25), x ≠ -5, 5**

PART 2 · APPLY IT

1. **(x + 15)/(x - 5) dollars per case, x ≠ 5** The costs already have the same denominator, so add their numerators. The denominator shows that x cannot equal 5.
2. **(x + 7)/(x - 8), x ≠ -9, -7, 8** Multiply Version A by the reciprocal of Version B, then cancel the common factor x + 9. Exclude values that make an original denominator zero or make Version B equal zero.

CHALLENGE

12/5, x ≠ -7, 0, 7

Accept equivalent simplified forms and restrictions written in any clear order. For division, students must exclude values that make the divisor expression zero, even if a factor cancels.