

Rational Expression Remix

Combine, simplify, and keep track of excluded values.

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 _____

OPERATE WITH EXPRESSIONS

You can add or subtract rational expressions by rewriting them with a common denominator. Multiply by multiplying numerators and denominators, and divide by multiplying by the reciprocal of the divisor. Keep any values that make an original denominator zero, or make a divisor equal to zero, out of the domain.

WORKED EXAMPLE

Simplify: $(8x/15) + (4/15)$

1. The denominators already match.
2. Add the numerators: $(8x + 4)/15$.

Answer: $(8x + 4)/15$

PRACTICE 6 problems

1 Simplify. State excluded value(s): $3/x + 6/x$

ANSWER _____

2 Simplify. State excluded value(s): $7/x - 5/x$

ANSWER _____

3 Simplify. State excluded value(s): $(3x/7) / (7/(9x))$

ANSWER _____

4 Simplify. State excluded value(s): $(6x/11)$ divided by $(3/x)$

ANSWER _____

5 Simplify. State excluded value(s): $1/x + 1/3$

ANSWER _____

6 Simplify. State excluded value(s): $x/(x + 6) - 1/(x + 6)$

ANSWER _____

APPLY IT Show your work

- 1** At an esports event, the time to prepare one set of highlight clips is $12/x$ hour. A second set takes $18/(3x)$ hour because a faster computer works at 3 times the rate. Write the total preparation time as one simplified rational expression.

WORK SPACE

ANSWER _____

- 2** An art club's design fee for each poster is $7/(x + 3)$ dollars. A sponsor pays $1/(x + 3)$ dollars of that fee per poster. Write the club's remaining design fee per poster as a simplified rational expression.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Simplify and state all excluded values: $(x/(x + 5))$ divided by $((x - 7)/(x + 5))$

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Simplify. State excluded value(s): $3/x + 6/x$	$9/x, x \neq 0$
2	Simplify. State excluded value(s): $7/x - 5/x$	$2/x, x \neq 0$
3	Simplify. State excluded value(s): $(3x/7)(7/(9x))$	$1/3, x \neq 0$
4	Simplify. State excluded value(s): $(6x/11)$ divided by $(3/x)$	$2x^2/11, x \neq 0$
5	Simplify. State excluded value(s): $1/x + 1/3$	$(x + 3)/(3x), x \neq 0$
6	Simplify. State excluded value(s): $x/(x + 6) - 1/(x + 6)$	$(x - 1)/(x + 6), x \neq -6$

PART 2 • APPLY IT

- $18/x$ hours, $x \neq 0$** Add $12/x$ and $18/(3x)$. Since $18/(3x) = 6/x$, the total is $18/x$.
- $6/(x + 3)$ dollars, $x \neq -3$** Subtract the sponsor's contribution from the design fee. The shared denominator gives $(7 - 1)/(x + 3) = 6/(x + 3)$.

CHALLENGE

$x/(x - 7), x \neq -5, 7$

Accept algebraically equivalent simplified forms when they preserve all excluded values from the original expression. For division, students must exclude values that make an original denominator zero or make the divisor equal to zero.