LESSON MAKER PRO

Expression Moves

Combine, simplify, and track excluded values

HIGH SCHOOL · A3.A.16

A3.A.16 "Add, subtract, multiply and divide rational expressions."

NAME _____ DATE _____

THE BIG IDEA

To add or subtract rational expressions, use a common denominator and combine the numerators. To multiply, factor and cancel common factors; to divide, multiply by the reciprocal first. Exclude values that make an original denominator zero or make a divisor equal zero.

WORKED EXAMPLE

Simplify $(x^2-49)/(x+11) * 13/(x+7)$. State excluded x-values.

1. Factor: ((x-7)(x+7))/(x+11) * 13/(x+7).
2. Cancel x+7 to get 13(x-7)/(x+11).
3. The original denominators are zero when x=-11 or x=-7.

Answer: 13(x-7)/(x+11); x≠-11, -7

PRACTICE 6 problems

1 Simplify (x+8)/x + 2/x. State excluded x-values.

ANSWER _____

2 Simplify 5/(x+2) - 1/(x+2). State excluded x-values.

ANSWER _____

3 Simplify 1/x + 2/(x+1). State excluded x-values.

ANSWER _____

4 Simplify 3/x - 2/(x+4). State excluded x-values.

ANSWER _____

5 Simplify $(x^2-16)/(x+1) * (x+1)/(x-4)$. State excluded x-values.

ANSWER _____

6 Simplify $(x^2-9)/(x+5) \div ((x-3)/(x+5))$. State excluded x-values.

ANSWER _____

APPLY IT Show your work

1 You edit one video in x hours. A friend edits one video in x+3 hours. If you work at the same time on separate videos, what is your combined editing rate in videos per hour? Write a simplified expression. Assume x>0.

WORK SPACE

ANSWER _____

2 A game update is x+6 GB. It downloads in x minutes on Wi-Fi and x+3 minutes on mobile data. How many times as fast is the average Wi-Fi download rate as the average mobile data rate? Write a quotient of the two rates, then simplify. Assume x>0.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Simplify (1/x + 1/(x+2)) ÷ ((2x+2)/(x+3)). State every excluded x-value, including any value that makes the divisor zero.

WORK SPACE AND ANSWER

ANSWER KEY # Expression Moves

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Simplify (x+8)/x + 2/x. State excluded x-values.	**(x+10)/x; x≠0**
2	Simplify 5/(x+2) - 1/(x+2). State excluded x-values.	**4/(x+2); x≠-2**
3	Simplify 1/x + 2/(x+1). State excluded x-values.	**(3x+1)/(x(x+1)); x≠0, -1**
4	Simplify 3/x - 2/(x+4). State excluded x-values.	**(x+12)/(x(x+4)); x≠0, -4**
5	Simplify (x^2-16)/(x+1) * (x+1)/(x-4). State excluded x-values.	**x+4; x≠-1, 4**
6	Simplify (x^2-9)/(x+5) ÷ ((x-3)/(x+5)). State excluded x-values.	**x+3; x≠-5, 3**

PART 2 · APPLY IT

1. **(2x+3)/(x(x+3)) videos per hour** Add the individual rates: 1/x + 1/(x+3) = (2x+3)/(x(x+3)).
2. **((x+6)/x) ÷ ((x+6)/(x+3)) = (x+3)/x** Divide the Wi-Fi rate by the mobile data rate. Multiply by the reciprocal and cancel x+6.

CHALLENGE

(x+3)/(x(x+2)); x≠0, -2, -3, -1

Accept equivalent simplified forms. Excluded values must come from the original expression, even when factors cancel.