12.4-12.6: Operations with Rational Expressions
Study Guide

12.4: Simplify Rational Expressions:

· Be able to identify excluded values of a rational expression

State the excluded values of each rational expression:

Ex: $\frac{8}{x^2+4x-12}$

$\frac{8}{(x-2)(+6)}$

EVs: 2 and -6

Ex: $\frac{7x}{x^2-25}$

$\frac{7x}{(x-5)(x+5)}$

EVs: 5 and -5

· Be able to simplify a rational expression

Simplify:

Ex: $\frac{-36x^2}{18x}$

$-2x$

Ex: $\frac{4x-12}{3-x}$

$\frac{4(x-3)}{3-x}$

-4

Ex: $\frac{x+3}{x^2+10x+21}$

$\frac{x+3}{(x+7)(x+3)}$

$\frac{1}{x+7}$

12.5: Multiply and Divide Rational Expressions:

· Be able to multiply rational expressions

Multiply:

Ex: $\frac{x^2+4x-12}{x^2+7x+10} \cdot \frac{x+5}{2x-4}$

$\frac{(x+6)(x-2)}{(x+5)(x+2)} \cdot \frac{x+5}{2(x-2)}$

$\frac{x+6}{2(x+2)}$

Ex: $\frac{3x-6}{x^2-x-2} \cdot (x^2+6x+5)$

$\frac{3(x-2)}{(x-2)(x+1)} \cdot \frac{(x+5)(x+1)}{1}$

$3(x+5)$

· Be able to divide rational expression

Divide:

Ex: $\frac{2x+10}{x^2-25} \div \frac{4x^2}{2x^2-10x}$

$\frac{2(x+5)}{(x+5)(x-5)} \cdot \frac{2x(x-5)}{4x^2}$

$\frac{1}{x}$

Ex: $\frac{x^2+2x-35}{x^2-3x-10} \div \frac{3x^2+21x}{9x+18}$

$\frac{(x+7)(x-5)}{(x-5)(x+2)} \cdot \frac{9(x+2)}{3x(x+7)}$

$\frac{3}{x}$

12.6 Add and Subtract Rational Expressions:

· Be able to add and subtract rational expressions with a common denominator

Add or subtract:

Ex: $\frac{x-5}{x+2} - \frac{x-6}{x+2}$

$\frac{1}{x+2}$

Ex: $\frac{x+3}{x-9} + \frac{5x}{x-9}$

$\frac{6x+3}{x-9}$

$\frac{3(x+1)}{x-9}$

· Be able to find a common denominator

Find the common denominator:

Ex: $\frac{6}{5x^3}, \frac{7}{15x}$

$15x^3$

Ex: $\frac{1}{x^2+5x+4}, \frac{1}{x^2-16}$

$(x + 4)(x - 4)(x + 1)$

· Be able to add or subtract rational expressions with like and unlike denominators

Add or subtract:

Ex: $\frac{8}{3x^3} - \frac{5}{12x}$

$\frac{4}{4} \cdot \frac{8}{3x^3} - \frac{5}{12x} \cdot \frac{x^2}{x^2}$

$\frac{32}{12x^3} - \frac{5x^2}{12x^3}$

$\frac{-5x^2+32}{12x^3}$

Ex: $\frac{x+3}{x-1} + \frac{x+2}{x-1}$

$\frac{2x+5}{x-1}$