

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:

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

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

EVs: 2 and -6

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

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

EVs: 5 and -5

· Be able to simplify a rational expression

Simplify:

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

$$-2x$$

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

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

$$-4$$

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

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

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

12.5: Multiply and Divide Rational Expressions:

Multiply:

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

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

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

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

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

$$3(x+5)$$

Divide:

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

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

$$\frac{1}{x}$$

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

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

$$\frac{3}{x}$$

12.6 Add and Subtract Rational Expressions:

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

Add or subtract:

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

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

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

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

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

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

Add or subtract:

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

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

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

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

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

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

$$\text{Ex: } \frac{3}{3} \cdot \frac{6}{5x^3} + \frac{7}{15x} \cdot \frac{x^2}{x^2}$$

$$\frac{18}{15x^3} + \frac{7x^2}{15x^3}$$

$$\frac{7x^2+18}{15x^3}$$

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

$$\frac{1}{(x+1)(x+4)} - \frac{1}{(x+4)(x-4)}$$

$$\frac{(x-4)}{(x-4)} \cdot \frac{1}{(x+1)(x+4)} - \frac{1}{(x+4)(x-4)} \cdot \frac{(x+1)}{(x+1)}$$

$$\frac{x-4}{(x-4)(x+1)(x+4)} - \frac{x+1}{(x-4)(x+1)(x+4)}$$

$$\frac{-5}{(x-4)(x+1)(x+4)}$$