6.1 Rational Expressions - Day 1

Objectives To simplify rational expressions

To multiply and divide rational expressions

Definition:

Rational Expression:

A **rational expression** is the quotient of two polynomials. You will find that, at different times, it is helpful to think of rational expressions as ratios, as fractions, or as quotients.

Ex.

$$\frac{x^2+7x+10}{x+2}$$

$$\frac{3x^2y}{12y}$$

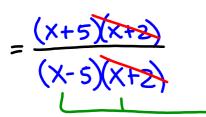
$$\frac{1}{x^2-9}$$

Simplest Form:

A rational expression is in **simplest form** when its numerator and denominator are polynomials that have no common divisors.

"After we factor and cancel"

What is $\frac{x^2 + 7x + 10}{x^2 - 3x - 10}$ in simplest form? State any restrictions on the variable.



STEPS:

- Factor
 State Restrictions on any denominators.
- 3. Cancel like terms and factors. Left over is simplest form.

$$= \underbrace{X+5}_{X-5}$$

What is the rational expression in simplest form? State any restrictions on the variables.

$$\frac{-18x^{3}y^{2}z^{2}}{24x^{2}y^{3}z^{7}}$$

$$= \frac{-3x}{4yz^{5}}$$

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$$= \frac{3x+5}{2x+1}$$

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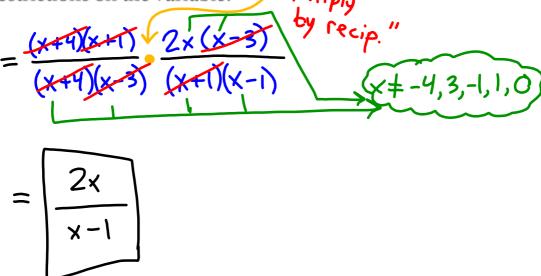
What is the product $\frac{2x-8}{x^2-16} \cdot \frac{x^2+5x+4}{x^2+8x+16}$ in simplest form? State any restrictions on the variable.

$$= \frac{2(x+1)}{(x+4)(x+1)}$$

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What is the quotient $\frac{x^2 + 5x + 4}{x^2 + x - 12}$ $\div \frac{x^2 - 1}{2x^2 - 6x}$ in simplest form? State any restrictions on the variable.



What is the quotient $\frac{2-x}{x^2+2x+1}$ $\div \frac{x^2+3x-10}{x^2-1}$ in simplest form? State any restrictions on the variable.

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

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