Bellwork: Divide $\frac{2x^4+x^3-24x^2+13x+2}{x+4}$

$$\begin{array}{r|rrrrr} -4 & 2 & 1 & -24 & 13 & 2 \\ & \downarrow & -8 & 28 & -16 & 12 \\ \hline & 2 & -7 & 4 & -3 & 14 \end{array}$$

$$2x^3-7x^2+4x-3+\frac{14}{x+4}$$

7)

$$x^3+2x^2+x+2 \;\overline{)\; x^5+2x^4-3x^3+2x^2-x+3}$$

x^2-4

$-x^5-2x^4-x^3-2x^2$ ↓

$-4x^3+0-x+3$

$+4x^3+8x^2+4x+8$

$8x^2+3x+11$

$$x^2-4+\frac{8x^2+3x+11}{x^3+2x^2+x+2}$$

Lesson 4.2/4.3 Objectives:

I can simplify rational expressions

I can multiply and divide rational expressions

NOTES A **rational function** is a function of the form $f(x) = \frac{p(x)}{q(x)}$, where $p(x)$ and $q(x)$ are polynomials and $q(x) \neq 0$. For example, $f(x) = \frac{3x-4}{x+1}$.

Simplified Form: Recall that simplified form means that there is nothing that will multiply into both the numerator and denominator of an expression.
To multiply rational expressions, multiply the numerators then multiply the denominators, then simplify if possible.

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$$

To divide rational expressions, take the reciprocal of the second expression, then multiply.

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$$

$\frac{7}{2} \div \frac{3}{2}$

$\frac{7}{2} \cdot \frac{3}{2} = \frac{21}{4}$

$\frac{7}{2} \cdot \frac{2}{3} = \frac{14}{6}$

$= \frac{7}{3}$ $= \frac{7}{3}$

1. $f(x) = \frac{x^2-4}{x+2} = \frac{(x-2)(x+2)}{x+2} = x-2$

2. $f(x) = \frac{x^2-5x+4}{x^2+2x-3}$ $\frac{(x-4)(x-1)}{(x-1)(x+3)} = \frac{x-4}{x+3}$

$\frac{1-2}{1+3}$ $\frac{5}{10}$ $\frac{-2}{3}$ $\frac{1}{2}$

3. Multiply $\frac{x+1}{x+4} \cdot \frac{x^2+4x}{x+2}$

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

4. Multiply $\frac{x^2-4}{2x+2} \cdot \frac{x^2-2x-3}{x^2+4x+4}$

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

$\frac{x^2-5x+6}{2x+4}$

5. Divide $\frac{3x^6yz^2}{7xy^3} \div \frac{15xy^3z^8}{7x^6y^2z^6}$

$$\frac{3x^6yz^2}{7xy^3} \cdot \frac{7x^6y^2z^6}{15xy^3z^8}$$

$$\frac{21x^{12}y^3z^8}{105x^7y^6z^8} = \boxed{\frac{x^{10}}{5y^3}}$$

$$\frac{x^5 z^2 x^5}{5y^2 y z^2} \quad \frac{x^{10}}{5y^3}$$

6. Divide $\frac{12x-20}{x^2-4x-21} \div \frac{9x^2-25}{3x^2+14x+15}$

$$\frac{4(3x-5)}{(x-7)(x+3)} \cdot \frac{(x+3)(3x+5)}{(3x+5)(3x-5)}$$

45: $\frac{5}{3}$ $\frac{9}{3}$ 14

$$= \boxed{\frac{4}{x-7}}$$

3) $\frac{42x^2+54x}{24x} = \frac{6x(7x+9)}{4\ 24x}$

$\frac{7x+9}{4}$