

RATIONAL FUNCTIONS

- Fraction Action!

↳ fractions with variables in denom.

difference of Squares

SIMPLIFY!

- Reduce the expression
- Will usually still have variables

Factoring

$$a^2 - b^2 = (a+b)(a-b) \quad \text{conjugates}$$

$$x^2 - 4 = (x+2)(x-2)$$

$$x^2 + 4 = \text{not factorable}$$

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

Square - multiply - Square

$$x^3 + 8 = (x+2)(x^2 - 2x + 4)$$

4 terms

Grouping

$$\begin{aligned} & (x^3 - 3x^2) + 2x - 6 \\ & \underline{x^2(x-3) + 2(x-3)} \\ & (x-3)(x^2+2) \end{aligned}$$

Multiplication/Division

$$\frac{\cancel{2}^1 \cancel{4}^1}{\cancel{5}^1} \cdot \frac{\cancel{24}^8}{\cancel{35}^1} = \frac{16}{25}$$

$$\frac{x^2 - 16}{x^3 + 64} \cdot \frac{x^3 - 4x^2 + 16x}{4 - x}$$

4^3

$$\frac{\cancel{2}^1 \cancel{7}^1}{\cancel{3}^1 \cdot 5} = \frac{\cancel{3}^1 \cdot 8}{5 \cdot \cancel{7}^1}$$

$$\frac{\cancel{(x+4)}^1 \cancel{(x-4)}^1}{\cancel{(x+4)}^1 \cancel{(x^2 - 4x + 16)}^1} \cdot \frac{x \cancel{(x^2 - 4x + 16)}^1}{-(\cancel{x-4})^1} = \frac{x}{-1} = \boxed{-x}$$

$$\frac{4y^2 - 9}{y^2 + 6y + 9} \div \frac{8y - 12}{2y^2 + 5y - 3}$$

$$\frac{4y^2 - 9}{y^2 + 6y + 9} \cdot \frac{2y^2 + 5y - 3}{8y - 12}$$

$$\frac{\cancel{(2y-3)}(2y+3)}{(y+3)\cancel{(y+3)}} \cdot \frac{\overset{+6y}{\cancel{(2y-1)}}\overset{-3}{\cancel{(y+3)}}}{4\cancel{(2y-3)}}$$

$$= \frac{(2y+3)(2y-1)}{4(y+3)}$$

$$\frac{3}{7} \div \frac{6}{35} \quad \text{Keep-change-flip}$$

Flip \cdot $\frac{35}{6}$ = $\frac{105}{42}$

$$\frac{5}{5} \cdot \frac{3}{4} + \frac{7 \cdot 2}{10 \cdot 2} = \frac{15}{20} + \frac{14}{20} = \frac{29}{20}$$

$\begin{array}{c} \swarrow \quad \searrow \\ 2 \quad 2 \end{array}$
 $\begin{array}{c} \swarrow \quad \searrow \\ 2 \quad 5 \end{array}$
 $2 \cdot 2 \cdot 5$

$$b^2 \cdot \frac{a^3 b^2}{a^3 b^2} + \frac{a^2}{a b} \cdot \frac{a^2}{a^2} = \frac{a^3 b^4}{a^3 b^4}$$

$$\frac{3y+1}{2y-10} - \frac{y+4}{y^2-2y-15} \leftarrow \text{Factor denominators first!}$$

$$\frac{(3y+1)(y+3)}{2(y-5)(y+3)} - \frac{(2)y+4}{(2)(y+3)(y-5)}$$

$$\frac{3y^2+10y+3}{2(y-5)(y+3)} + \frac{-2y+8}{2(y-5)(y+3)}$$

$$\frac{3y^2+8y-5}{2(y-5)(y+3)}$$

← Check to see if numerator could factor & cancel.

~~$$\frac{(3y+5)(y-1)}{2(y-5)(y+3)}$$~~

$$\frac{2x+1}{\cancel{x^2+6x+9}} + \frac{x+2}{\cancel{9-x^2}} \quad 1) \text{ Factor denominators} \quad \frac{-1}{2} \frac{1}{-2} \frac{-1}{2}$$

$$(x+3)(x+3) \quad -(x^2-9)$$

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

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

$$\frac{x^2-10x-9}{(x+3)^2(x-3)}$$