

RATIONAL FUNCTIONS

Fractions!

Multiplication/Division

$$\frac{\frac{2}{15}}{\frac{5}{5}} \cdot \frac{\frac{8}{24}}{\frac{35}{5}} = \frac{16}{25}$$

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

4^3

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

$$= \frac{x}{-1} = \boxed{-x}$$

Factoring

2 terms

$$x^2 - 25 = (x+5)(x-5)$$

Difference of perfect square

$$x^2 + 25 = \text{not factorable}$$

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

$$x^3 + 27 = (x+3)(x^2-3x+9)$$

4 terms - Grouping!

$$(x^3 - 3x^2) + 2x - 6$$

$$1) x^2(x-3) + 2(x-3)$$

$$2) (x-3)(x^2+2)$$

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

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

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

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

$$\frac{\frac{4}{9}}{\frac{6}{27}} = \frac{4}{9} \cdot \frac{27}{6} = 2$$

Keep change flip

ADDITION/SUBTRACTION

$$\begin{array}{c} 5 \cdot \frac{3}{4} + 2 \cdot \frac{7}{10} = \frac{15}{20} + \frac{14}{20} = \frac{29}{20} \quad \left| \frac{4}{a^2 b} + \frac{3}{a b^3} = \frac{\quad}{a^2 b^3} \right. \\ \begin{array}{c} \swarrow \quad \searrow \\ 2 \quad 2 \end{array} \quad \begin{array}{c} \swarrow \quad \searrow \\ 2 \quad 5 \end{array} \quad \begin{array}{c} \swarrow \quad \searrow \\ 2 \cdot 2 \cdot 5 \end{array} \end{array}$$

$$\frac{3y+1}{2y-10} - \frac{y+4}{y^2-2y-15}$$

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

Factor!

$$\frac{3y^2+y+9y+3}{2(y-5)(y+3)} + \frac{-2y-8}{2(y-5)(y+3)}$$

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

1) Factor all denominators!

2) Determine the common denominator!

3) Multiply each fraction to make the common denom.

4) Add numerators.

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

↙ signs won't work

$$\frac{(x-3) \cancel{x^2+6x+9} 2x+1}{(x-3)(x+3)(x+3)} + \frac{-x+2 \cancel{9-x^2} (x+3)}{(x+3)(x-3) (x+3)} \quad \frac{1}{-2} \quad \frac{-1}{2}$$

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

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