

Complex Fractions

$$\frac{\frac{1}{2} + \frac{2}{3}}{\frac{1}{5} + \frac{1}{2}} = \frac{\frac{3}{6} + \frac{4}{6}}{\frac{2}{10} + \frac{5}{10}} = \frac{\frac{7}{6}}{\frac{7}{10}} = \frac{7}{6} \cdot \frac{10}{7} = \frac{10}{6} = \frac{5}{3}$$

$$\frac{\frac{(x-2)x}{(x-2)x+2} - \frac{3(x+2)}{x-2(x+2)} \cdot \frac{x^2-2x-3x-6}{(x+2)(x-2)}}{\frac{(x+3)3x}{(x+3)x-2} - \frac{x+2(x-2)}{x+3(x-2)} \cdot \frac{3x^2+9x+(x^2+4)}{(x-2)(x+3)}} = \frac{\frac{x^2-5x-6}{(x+2)(x-2)}}{\frac{2x^2+9x+4}{(x-2)(x+3)}}$$

$x-c-f$

$$= \frac{x^2-5x-6}{(x+2)(x-2)} \cdot \frac{(x-2)(x+3)}{2x^2+9x+4}$$

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

$$= \frac{(x-6)(x+1)(x+3)}{(x+2)(2x+1)(x+4)}$$

SOLVING

RATIONAL EQUATIONS

Simplify

- * Results in an expression with variables
- * No = sign

Solve

- * Results in $x = \#$
- * Contains = sign

$$21 \left[\frac{\cancel{7} \cdot x}{\cancel{3}} + \frac{\cancel{3} \cdot x}{\cancel{7}} = 2 \right]$$

$$7x + 3x = 42$$

$$\frac{10x}{10} = \frac{42}{10}$$

$$x = \frac{21}{5}$$

- * multiply by the common denominator!

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

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

$$(x+5)(x-2) - 2x(x+1) = -3x^2$$

$$x^2 - 2x + 5x - 10 - 2x^2 - 2x = -3x^2$$

$$-x^2 + x - 10 = -3x^2$$

$$+3x^2$$

$$2x^2 + x - 10 = 0$$

$$(2x+5)(x-2) = 0$$

$$x = \frac{-5}{2} \quad x = 2$$

↑
extraneous
solution

1) Factor the denominators

2) Check for excluded values

$$x \neq 0, -1, 2$$

3) Multiply by the common denom + cancel all denom

4) Write down all terms that are left

5) Combine like terms
set = 0, + solve

6) Check for excluded values

$$w + \frac{w+7}{w^2-3w-4} = \frac{w^2}{w-4}$$

$$\begin{matrix} (w-4) \\ (w+1) \end{matrix} \left[w + \frac{\cancel{(w-4)}(w+7)}{\cancel{(w-4)}(w+1)} = \frac{w^2 \cancel{(w-4)}}{\cancel{w-4}} \right]$$

$$w \neq 4, -1$$

$$w(w-4)(w+1) + w+7 = w^2(w+1)$$

$$w(w^2-3w-4) + w+7 = w^3 + w^2$$

$$w^3 - 3w^2 - 4w + w + 7 = w^3 + w^2$$

$$\cancel{w^3} - 3w^2 - 3w + 7 = \cancel{w^3} + w^2$$

$$0 = 4w^2 + 3w - 7$$

$$0 = (4w+7)(w-1)$$

$$\boxed{w = -\frac{7}{4} \quad w = 1}$$

← Check for excluded values!
(All are OK.)