Let's Get Rational

A rational expression is an algebraic fraction with a polynomial in the numerator and/or denominator.

Think of this unit as "factoring with fractions". Sound fun?

$$\frac{1}{2x}$$

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

$$\frac{x^2+1}{1}$$

The additional rule that you have to remember is that you cannot divide by zero. As we will have variables in our denominators, this will be a possibility. We must show the non-permissible values.

Determine non permissible values: (where divide by zero is a possibility)

$\frac{2x}{x-2}$ $x-2 \neq 0$ $x \neq 2$	$\frac{5}{2xy^3}$ $2xy^3 \neq 0$ $x \neq 0$ $y \neq 0$

$ab = 0$ $\therefore$ a and/or b $= 0$

$\frac{5x-6}{x^2-3x+2}$ → $(x-2)(x-1)$

$mn = 2$
$m+n = -3$
$-2, -1$

if $x^2-3x+2 = 0$
then either
$x-2 \neq 0$ or $x-1 \neq 0$
$x \neq 2$ $x \neq 1$

$\frac{5x-6}{(x-2)(x-1)}$ N.P.V $x \neq 2$ $x \neq 1$

Factor:

1. Greatest Common Factor
   - ➢ Always. Everytime.
2. Look for a difference of squares
   - ➢ $a^2 - b^2 = (a+b)(a-b)$
3. Quadratic Factoring (decomposition)
   - ➢ We will want to factor so that we can cancel. Do not use the method of graphing, or completing the square. You need to factor.

Simplify:

$$\frac{x+2}{x^2+4x+4}$$

$ab = 4$

$a+b = 4$

$2, 2$

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

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

N.o.u $x+2 \neq 0$

$x \neq -2$

$\frac{2x^2+6x}{x^2+8x+15}$

$2x(x+3)$

$ab = 15$
$a+b = 8$
$5, 3$

$(x+5)(x+3)$

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

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

N.P.V. also!

$x+5 \neq 0$
$x \neq -5$

$x+3 \neq 0$
$x \neq -3$

$\frac{8-2x}{x^2-16}$ x^2-4^2

$\frac{2(4-x)}{(x+4)(x-4)}$

$(x-4)$

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

$= \frac{-2}{x+4}$

N.D.V

$x+4 \neq 0$
$x \neq -4$

Also $x-4 \neq 0$
$x \neq 4$

$x \neq \pm 4$

$\frac{16x^2-9y^2}{8x-6y}$ Hint:

$\frac{4x+3y}{2}$ N.R.V $4x \neq 3y$

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

$= \frac{4x+3y}{2}$

$4x-3y \neq 0$

$4x \neq 3y$

$x \neq \frac{3y}{4}$ ←

$y \neq \frac{4x}{3}$ ←

HW:

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3ce, 4de, 5b

8af