Rational Expressions

Tuesday, April 19, 2016   11:13 AM

$$= \frac{m}{n} = \frac{22}{7} \quad \pi \quad 2\pi$$
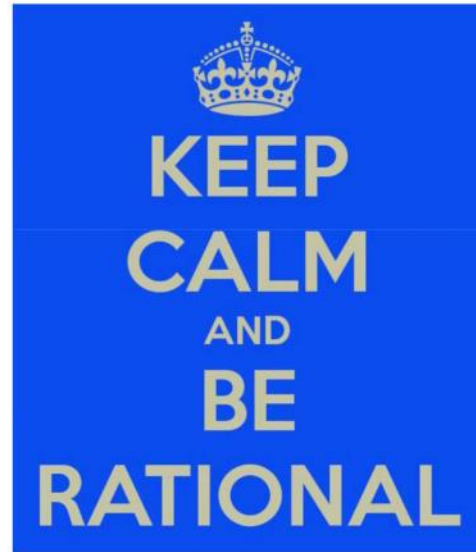
Let's Get Rational

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?

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

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

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

KEEP CALM AND BE RATIONAL

Great

You just divided by zero, didn't you?

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)

$$ab = 0$$

$\dfrac{2x}{x-2}$	$\dfrac{5}{2xy^3}$
$x - 2 \neq 0$	$2xy^3 \neq 0$
$x \neq 2$	$\underset{\uparrow \ \uparrow}{}$
	$x \neq 0 \qquad y^3 \neq 0$
	$\textcolor{green}{y \neq 0}$

$\longrightarrow \dfrac{5x-6}{x^2-3x+2}$

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

$x(x - 2) - (x - 2)$

$(x - 2)(x - 1)$

$\dfrac{5x - 6}{(x-2)(x-1)}$

$\uparrow \quad \uparrow$

$ab = 2$

$a + b = -3$

$\boxed{-2, -1}$

$x - 2 \neq 0$

$x \neq 2$

or $x - 1 \neq 0$

$x \neq 1$

$x \neq 2, 1$

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:

$$ab = 4$$
$$a+b = 4$$
$$2, 2$$

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

$X + 2 \neq 0$

$x \neq -2$

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

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

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

$$\frac{2x^2+6x}{x^2+8x+15} \longrightarrow 2x(x+3)$$

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

$$2x$$

$$ab = 15$$
$$a+b = 8$$
$$(x^2 + 5x) + (3x + 15) \quad 5, 3$$
$$x(x+5) + 3(x+5)$$
$$(x+5)(x+3)$$

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

$\rightarrow x+5$

$(x+\underline{})(x+3)$

$\hookrightarrow x+5 \neq 0$

$x \neq -5$

$\underline{\text{or}}$

$x+3 \neq 0$

$x \neq -3$

$x \neq -5, -3$

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

$\rightarrow 2(4-x)$

$\searrow (x-4)(x+4)$

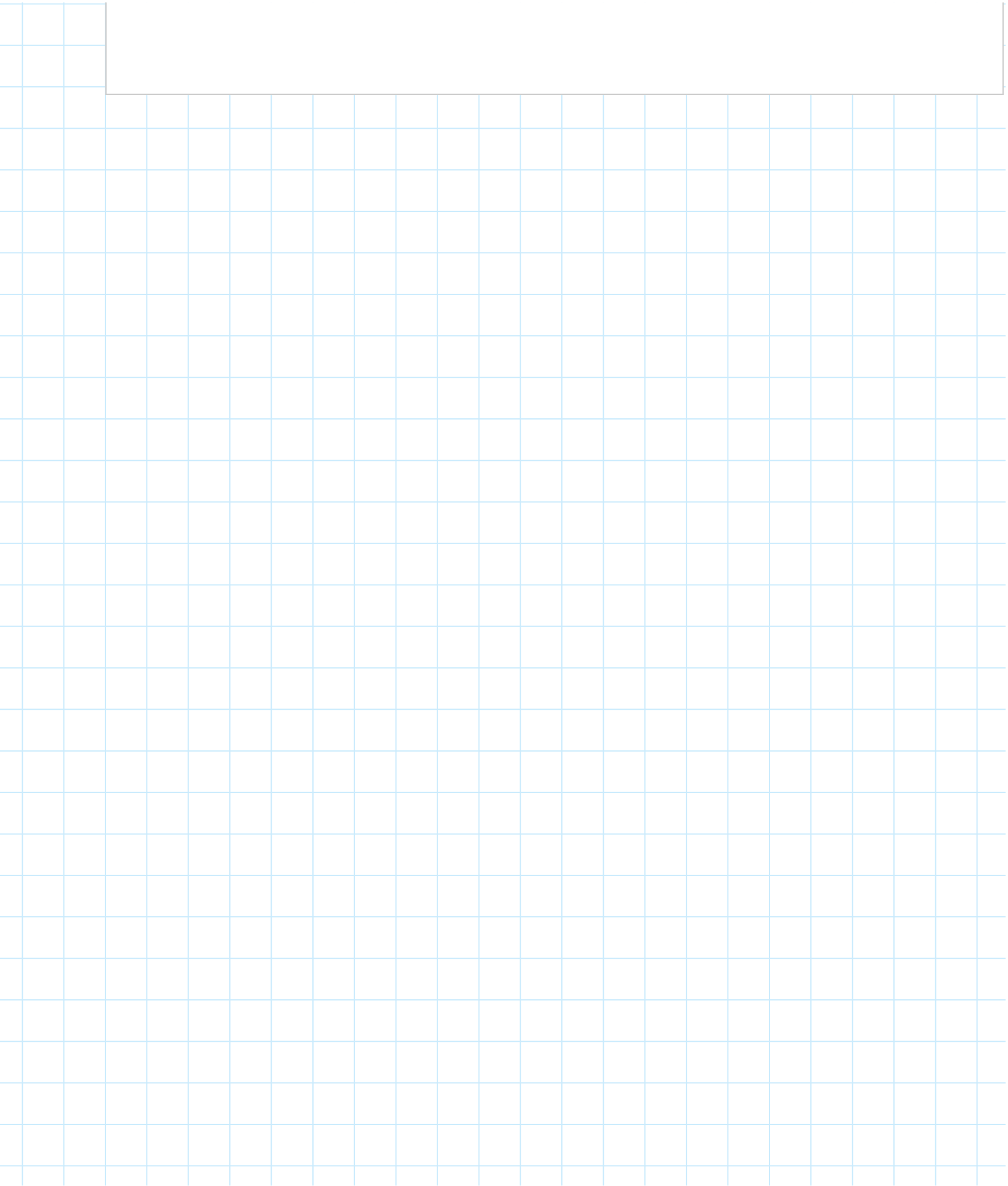$$\frac{2(\cancel{4-x})}{(\cancel{x-4})(x+4)}$$

$x-4 \neq 0$

$x \neq 4$

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

$x+4 \neq 0$

$x \neq -4$

$x \neq \pm 4$

n

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

$8x - 6y \neq 0$

$2(4x - 3y) \neq 0$

$4x - 3y \neq 0$

$4x \neq 3y$

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

$\left[x \neq \frac{3y}{4} \right.$ ∞

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

$4^2 = 16$

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

Hw Pg 317

3ce
   4de, 5b
   8a-f