2-6a Notes Introduction to Rationals Name ______________________

Pre-Calculus

A rational expression is one where two polynomials are in the form of a fraction (dividing two polynomials – one in the numerator and one in the denominator of a fraction.

The key to simplifying rational expressions is to be able to ______________. Let's review factoring basics.

GCF	**Difference of Squares**	**X-Factor**
$3x^2 + 15x$	$x^2 - 4$	$x^2 + 2x - 15$
X-Factor	**Combination**	**Combination**
$3x^2 - 7x - 6$	$2x^3 - 18x$	$4x^3 - 28x^2 + 48$

So if we have a rational expression that looks like these, we can simplify it by writing each part as factors. Then we can cancel out common factors (same factor on top and bottom).

$$\frac{\boldsymbol{x^2-4}}{\boldsymbol{2x^3-4x^2+5x-10}} = \frac{(x+2)(x-2)}{(2x^2+5)(x-2)} = \frac{(x+2)}{(2x^2+5)}$$

$$\frac{\boldsymbol{3x^2-7x-6}}{\boldsymbol{x^2+2x-15}} = \frac{(3x+2)(x-3)}{(x-3)(x+5)} = \frac{(3x+2)}{(x+5)}$$

Why does this work? Try writing the problem below as factors, to see how canceling out common factors smplifies the problem.

$$\frac{4}{9} \cdot \frac{15}{28} =$$

Watch out for this:

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

Example A:

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

Example B:

$$\frac{x^2-5x-6}{x^2-1}$$

Example C:

$$\frac{x-3}{x+2} \bullet \frac{x^2+5x+6}{x^2-9}$$

Example D:

$$\frac{4x-2x^2}{x^2-5x+6} \bullet \frac{x^2-4x+3}{2x}$$

To tackle division of rational expressions, change to _______________, while you _____________ the second expression.

Example E:

$$\frac{8x^2+10x-3}{4x^2} \div (4x^2-x)$$

Example F:

$$\frac{2x+6}{x^2+x-2} \div \frac{x+3}{x^2+3x+2}$$

This is a _________________ fraction, meaning that it is a fraction within a fraction. It's just another way to show division, so treat it like the above examples.

$$\frac{\frac{a+b}{4}}{\frac{a^2-b^2}{4}}$$

Application: The length and width of a rectangle are provided in terms of v. Find the area of the rectangle.