Multiplying and Dividing Rational Expressions Notes

1) Factor if you can or if needed.
2) Simplify what the numerator and denominator have in common.

   **Remember it must be EXACTLY THE SAME.

3) Multiply any remaining terms.
4) Check to make sure it is still FULLY simplified!

Example:

$$\frac{5(x^2-25)}{10x^2+50x} = \frac{5(x+5)(x-5)}{10x(x+5)} = \frac{x-5}{2x}$$

Simplify.

1) $\frac{27x^2-75}{4x^2+2x} \bullet \frac{20x^2+10x}{3x+5}$ $= \frac{3(3x+5)(3x-5)}{2x(2x+1)} \cdot \frac{5}{\frac{10x(2x+1)}{3x+5}} = \boxed{15(3x-5)}$

$\frac{3(9x^2-25)}{2x(x+2)}$ $\frac{10x(2x+1)}{3x+5}$

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

2) $\frac{14x^2y^4}{24ab^3} \bullet \frac{28a^2b^3}{35xy^4}$ $= \boxed{\frac{7ax}{15}}$

$\frac{7x^2y^4}{3\cdot 8ab^3} \cdot \frac{4a^2b^3}{5xy^4}$

3) $\frac{x+4}{6x^3-24x} \bullet \frac{2x^3-8x}{x^2+4x} =$ $\boxed{\frac{1}{3x}}$

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

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

$\frac{(x+3)(x+2)}{(x+2)(x-2)} \cdot \frac{x-2}{x+3} = \boxed{1}$

Dividing: Flip the second expression and follow the same rules for multiplication.

Example:

$\frac{12x^2-4xy}{35z} \div \frac{4x^2y^2-8x^2y}{7z^2} = \frac{12x^2-4xy}{35z} \bullet \frac{7z^2}{4x^2y^2-8x^2y}$ and then simplify.

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

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

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

2) $\frac{2x^2+15x+18}{x^2+5x-6} \div \frac{4x+6}{x-1}$

$2x^2+12x+3x+18$

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

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

3) $\frac{9x^2+6x}{x^2+6x} \div \frac{x^2-4}{2x-4}$

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

4) $\frac{x^2-x-12}{x^2+11x+24} \div \frac{x^2-2x-8}{x^2+8x}$

$\frac{(x-4)(x+3)}{(x+3)(x+8)} \cdot \frac{x(x+8)}{(x-4)(x+2)} = \frac{x}{x+2}$