SM3-a Lesson 4-3
Multiplying and Dividing Rational Expressions

$$\frac{x+7}{7(x+9)}$$

No !!
Cannot use the Inverse Property of Multiplication on Addends.

Addition and Subtraction mean:

Combine the terms into one term (if you can)

If you can't combine them (unlike terms) they still are connected to each other.

Put binomials into a parentheses. $\frac{(x+7)}{7(x+9)}$

Multiplying Fractions

$$\frac{6}{7}*\frac{14}{9} \text{ multiply } =\frac{6*14}{7*9} =\frac{84}{63} \text{ simplify } =\frac{6*14}{7*9}$$

$$=\frac{2*\cancel{3}*2*\cancel{7}}{\cancel{7}*\cancel{3}*3} =\frac{4}{3}$$

$$\frac{6}{7}*\frac{14}{9} \text{ simplify } =\frac{2*\cancel{3}*2*\cancel{7}}{\cancel{7}*\cancel{3}*3} =\frac{4}{3}$$

Do you multiply first or do you simplify THEN multiply?

Multiplying Rational Expressions

Simplify before you multiply.

$$\frac{(x-1)}{2(x+3)}*\frac{x^2-9}{(x+1)} =\frac{(x-1)}{2(x+3)}*\frac{(x+3)(x-3)}{(x+1)}$$

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

DON'T multiply the simplified version of the product, just leave it in factored form.

Multiply the expressions

$$\frac{3(x-4)}{(x-3)}*\frac{(x-2)}{(x-4)}*\frac{(x-3)}{6(x-2)}$$

Multiply the expressions

$$\frac{x^2+x-12}{x^2-9} * \frac{x^2-2x-15}{x^2-16}$$

Multiply the expressions

$$\frac{2x^2-8x-24}{x^2+2x-3} * \frac{x^2+7x+12}{x^2-2x-24}$$

Divide Rational Expressions

$$\frac{2}{3} \div \frac{5}{7}$$

What do we do? Multiply by the reciprocal

$$\frac{2}{3} * \frac{7}{5} = \frac{14}{15}$$

Divide Rational Expressions

$$\frac{12xyz}{5mnp} \div \frac{4x^2z}{5mn}$$

Multiply by the reciprocal

$$\frac{12xyz}{5mnp} * \frac{5mn}{4x^2z} = \frac{12xy}{p} * \frac{1}{4x^2} = \frac{4*3xy}{p} * \frac{1}{4*x*x}$$

$$= \frac{3y}{p} * \frac{1}{x} = \frac{3y}{px}$$

Simplify:

$$\frac{6abz}{7mp^2} \div \frac{4b^3z}{14m^2p}$$

Dividing Rational Expressions

$$\frac{x+3}{x^2+x-6} \div \frac{x-8}{x-2} = ? \quad = \frac{x+3}{x^2+x-6} * \frac{x-2}{x-8}$$

simplify then multiply!

$$= \frac{x+3}{(x+3)(x-2)} * \frac{x-2}{x-8} \qquad = \frac{(x+3)(x-2)}{(x+3)(x-2)(x-8)}$$

$$\frac{1}{(x-8)} \quad \text{OR} \quad (x-8) \quad ?$$

Simplify:

$$\frac{x+3}{x^2+x-6} \div \frac{x-8}{x^2+x-6}$$

Simplify:

$$\frac{x^2+2x-35}{x^2-4x-12} \div \frac{x^2-2x-15}{x^2+9x+14}$$

$$\frac{x^2-x-20}{x^2+2x-15} \div \frac{x^2-5x+4}{x^2+5x}$$