Multiplying and Dividing Rational Expressions

Learning Goal: By the end of today,

I will be able to multiply and divide two rational expressions together and simplify accordingly.

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When we multiplied fractions together, we multiplied across the top and across the bottom to determine the product, this sometimes results in very large numbers being created, that then need to be reduced for lowest terms.

$$\frac{16}{25} \times \frac{100}{48}$$

If we break up the multiplying terms into their factors first, we can cancel common factors and when we eventually multiply across the top and bottom, the results will be smaller.

$$\frac{16}{25} \times \frac{100}{48}$$

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Simplifying Rational Expressions

Case 1 - NO addition or subtraction is present in the expression

$$\frac{14a^3b^6}{7a^2b^4}\times\frac{21a^4b^5}{35a^2b^3}$$

*everything is already in a multiplying or dividing state - cancel where appropriate

Case 2 - addition or subtraction is present in the expression

$$\frac{4m-16}{5m-30}\times\frac{3m-9}{8m-32}$$

*factor first to create a multiplication situation, then cancel

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Simplify the following and state restrictions

$$\frac{(x-5)(x-4)}{(x+2)(x-5)}\times\frac{3(x+2)}{6(x-5)}$$

$$\frac{x^2-16}{7(x-4)}\times\frac{10x+50}{x^2+9x+20}$$

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Simplify the following:

$$\frac{m^2+7m+10}{6m+12}\times\frac{m^2-7m+12}{m^2-9}$$

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Division of Fractions - to divide fractions we developed the short of multiplying by the reciprocal.

$$6\div\frac{1}{2}=$$

$$6\times\frac{2}{1}=$$

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Simplifying Rational Expressions

Case 1 - NO addition or subtraction is present in the expression

$$\frac{10a^3}{18b^4} \div \frac{20a^4}{36b^3}$$

*everything is already in a multiplying or dividing state - cancel where appropriate

Case 2 - addition or subtraction is present in the expression

$$\frac{4m-16}{5m-25} \div \frac{3m-12}{8m-40}$$

*factor first to create a multiplication situation, then cancel

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Divide the following:

$$\frac{\left(\frac{6a-12}{a^2+6a+8}\right)}{\left(\frac{a^2-4}{a^2+3a-4}\right)}$$

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