Intermediate algebra

Class notes

Multiplying and Dividing Rational Expressions (section 14.2)

Whenever you get stuck, think back to how you deal with normal fractions like $\frac{2}{3}\cdot\frac{1}{4}$.

Recall fractions:

Multiply $\frac{2}{3}\cdot\frac{1}{4}$.

Recall this is done by multiplying across, top and bottom separately. It is usually easier to cancel common factors (from top and bottom) before you actually multiply. I do it below.

$$\frac{2}{3}\cdot\frac{1}{4}=\frac{2\cdot 1}{3\cdot 4}=\frac{\cancel{2}^{1}\cdot 1}{3\cdot\cancel{4}_{2}}=\frac{1}{6}$$

Cancel 2 on top and bottom before multiplying through.

We'll do the same thing with rational expressions except we will have variables thrown in.

Divide $\frac{2}{3}\div\frac{1}{4}$ (sometimes written as $\frac{\frac{2}{3}}{\frac{1}{4}}$).

Do you remember "flip and multiply"? Do it now.

So we multiply and divide rational expressions the same way. It is even more important to cancel common factors before you get too far along. That means you will want all the tops and bottoms to be in factored form.

expl 1: Multiply.

$$\frac{x^2+8x+16}{x^2+14x+48}\cdot\frac{x^2+4x-60}{x^2+x-12}$$

Factor everything.

Cancel common factors.

Write final answer as one fraction.

expl 2: Multiply.

$$\frac{x^2-6x-55}{36-x^2}\cdot\frac{x^2-4x-12}{x^2+15x+50}$$

Save yourself grief. Check your factoring as you go.

Remember $\frac{x-6}{6-x}$ is not just 1. What is it?

expl 3: Divide.

$$\frac{x^2-12x+20}{x^2+6x+5}\div\frac{x^2-11x+18}{x^2-3x-40}$$

"Flip and multiply"

expl 4: Multiply.

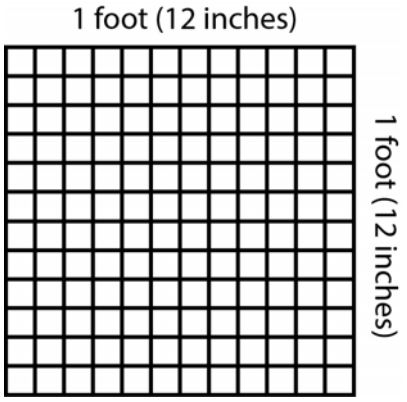
$$\frac{x^3-27}{x^2-2x-15}\cdot\frac{2x^2-9x-5}{2x^2-5x-3}$$

Ooh! Difference of cubes!

Conversion among Units of Measurement:

How many square inches are in a square foot? If there are 12 inches in a linear foot, then how many square inches would we find in a square foot?

Check out the scale drawing to the right to verify your answer.



expl 5: Convert the following.

15 square feet = _____ square inches

expl 6: Draw a scale drawing of a square yard. Use it to determine the number of square feet in a square yard. Write an equivalent statement with the information.

We can use unit analysis to convert more complicated problems. It is a matter of writing the units alongside each number so that we can "cancel" them to be sure of the units we end up with. It also helps us understand when we need to multiply versus divide our numbers.

expl 7: Convert the following using unit analysis.

45 miles per hour = _____ feet per second

There are 5,280 feet in 1 mile. How many seconds in an hour?