

Sections 5.3 – 5.7 deal with factoring.

The text tries to divide factoring into various categories but this approach does not seem to be very effective.

We need to be able to identify the factoring situation at hand and know what to do with it.

Common Factors – we look for the largest number that is a factor of all numbers. When we factor a common factor from an expression **with 4 terms**, we will have the factor on the outside and we will have **exactly 4 terms** inside the parentheses. The most common error in this regard is:

$$2 + 4x^2 - 6xy + 8y^3$$

$$2(2x^2 - 3xy + 4y^3)$$

What is wrong with this? Original had 4 terms. We have 3 terms inside the parentheses.

Properly done, you should get:

$$2 + 4x^2 - 6xy + 8y^3$$

$$2(1 + 2x^2 - 3xy + 4y^3)$$

Remember that you should check your factoring after you have done it. You should be able to multiply (clear the parentheses) and get what you started with.

unFOIL – Make lists of *all* factors for the leading coefficient and for the constant. Make your selection from those lists trying to get the middle terms to work.

$$\begin{array}{ccc}
 1 \cdot 12 & & 1 \cdot 15 \\
 2 \cdot 6 & 12x^2 - 8x - 15 & 3 \cdot 5 \\
 3 \cdot 4 & &
 \end{array}$$

Because the constant is negative, the signs will be different.

Had the constant been positive, the signs would have been the same as the sign of the middle term.

Sub cases in unFOIL include “difference of squares” and “perfect squares”. (Although one wonders what an “imperfect” square might be.) Both of these have important uses throughout algebra and we will see them before we finish the semester.

Sum/Difference of Cubes – This is another area where factoring is nearly automatic.

I use this formula for the Sum/Difference of Cubes: $(a^3 \pm b^3) = (a \pm b)(a^2 \mp ab + b^2)$ and

I translate it into English as:

A first number cubed plus or minus a second number cubed equals

“first agree second times first squared disagree product of the two always a plus second number squared.”

As was the case when we were working with clearing parentheses, practice is the only thing that makes this really easy. And, I should point out, that the practice must be done very quickly. You need to work fast, to force those combinations into your mind and to allow yourself to recognize the various situations.

Remember: *No equal signs!*