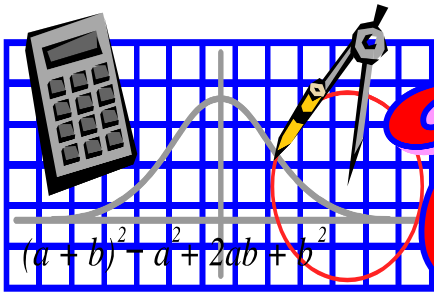

Algebra Connections

Mr. Breitsprecher's Edition March 15, 2005 Web: www.clubtnt.org/my_algebra

Factoring Trinomials In the Form x^2+bx+c

The following steps can be used to factor trinomials in the form x^2+bx+c:

1. If possible, factor out any greatest common factor (other than 1 or –1)
2. Look at each possible sets of 2 factors that will result in "*c*"
3. Add each of those 2 factors and identify which set sums to "*b*"
4. Write our binomial factors by filling in the missing terms: (x+?)(x+?)

Patterns in the Signs

In many ways, algebra is all about seeing patterns in numbers. When factoring trinomials in the form of x^2+bx+c, look at the signs of "*b*" and "*c*" and notice:

- **If "*c*" is positive**, then the numbers we need to complete our factorization [(x=?)(x+?)] have the same sign – they are both positive or negative. We see:
  - **If "b" is positive**, then both factors of "c" must be positive.
  - **If "b" is negative**, then both factors of "c" must be negative.
- **If "c" is negative**, then one of the numbers we need to complete our factorization [(x=?)(x+?)] must be positive and the other must be negative (two opposite signs).

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negative (-11), we know that we are looking at two factors of "*c*" (or 10) that have to be negative.

We now know our choices are (-2*-5) or (-1*-10). Now we need to look at which of these factors (if any) will sum to "*b*," in this case, -11. Note that (-2 + -5 = -7) and (-1 + -10 = -11). We now know that this trinomial is factorable and our solution is (x + -1)(x + -10). We would rewrite this. **Our solution is (x-1)(x-10)**

Example: x^2-3x-10

Here we see that "*c*" is negative (-10). This tells us (if the trinomial is factorable) that the numbers needed to complete our factorization [(x+?)(x+?)] must have different or opposite signs (one positive, the other negative). We now know that our choices are (-1 * 10), (1*- 10), (-2*-5), or (-2*5). Now we look at each of these factors to see which (if any) will sum to "*b*," in this case –3. The only pair of these factors that will sum to –3 is (2+ -5). Therefore, this trinomial is factorable as (x+2)(x+ -5). We would rewrite this. **Our solution is (x+2)(x-5).**

Example: $2x^3$-$24x^2$+64x

Note that this one, at first glance, does not look like a trinomial in the form x^2+bx+c; but it is! Remember to always look for a greatest common factor **BEFORE** attempting any other factorization of a polynomial. In this case, we have a GCF of 2x. We would start by rewriting this polynomial as 2x(**x^2-12x+32**). Now we can factor it like the other examples.

Note that "*c*" is positive (32). This tells us (if the trinomial is factorable) that the numbers needed to complete our factorization [(x+?)(x+?)] must have the same sign. Because "*b*" is negative (-12), we know that we are looking at two factors of "c" (or 32) that have to be negative.

Our choices are (-1 * -32), (-2* -16) or (-4 * -8). Only the last of these three choices will sum to our "*b*" term (-4 + -8 = -12) Therefore, this trinomial is factorable **(DON'T FORGET OUR GCF)** as 2x(x+ -4)(x+ -8). We would rewrite this. **Our solution is 2x(x-4)(x-8).**

Example: $4x^2$+36x+80

Again, at first glance, this does not look like a trinomial in the form x^2+bx+c; but it is! Remember to always look for a greatest common factor **BEFORE** attempting any other factorization of a polynomial. In this case, we have a GCF of 4. We would start by rewriting this polynomial as 4(**x^2+9x+20**). Now we can factor it like the other examples.

Note that "*c*" is positive (20). This tells us (if the trinomial is factorable) that the numbers needed to complete our factorization [(x+?)(x+?)] must have the same sign. Because "*b*" is positive (9), we know that we are looking at 2 factors of "*c*" (or 20) that have to be positive.

We know our choices are (1*20), (2*10) or (4*5). Only the last of these three choices will sum to our "b" term (4+5=9) Therefore, this trinomial is factorable (don't forget our GCF) and **our solution is 4(x+4)(x+5).**

Not Just "x"

Just because we illustrate the form of a trinomial with a degree of 2 and "leading coefficient of 1" as: x^2+bx+c, any variable can be replace the "x," (i.e. "*w*" or "*z*") just as any number can be the coefficient of our 2nd term (we called it "*b*") and any number can be our constant (we called it "*c*").

Online Resources

In most cases, you can go to the "domain" (i.e. http://domainname.ext) and follow links to the pages identified. **ASK ME TO SEND THEM TO YOU VIA EMAIL AS LINKS IF YOU HAVE ANY PROBLEMS!**

Factoring Power Points

http://students.loyola.ca/classes/powellt/Math4_5/factring.ppt

http://www.tcc.edu/vml/Mth03/Trinom/documents/FactoringTrinomials.pps

Simple Trinomials as Product of Binomials (Many examples, printable)

http://www.math.bcit.ca/competency_testing/testinfo/testsyll11/basicalg/basops/factoring/trinom/trinom.doc

Factoring Trinomials (Some presentations do not treat trinomials in the form of x^2+bx+c, or leading coefficient of 1, as different from ax^2+bx+c. We have started with the simplest form, before introducing other trinomials.

http://www.mathmax.com/introalg/chapter/bk3c5im.html

http://www.coolmathalgebra.com/Algebra1/10FactDivPolys/04_undoingFOIL.htm

http://www.wtamu.edu/academic/anns/mps/math/mathlab/int_algebra/int_alg_tut28_facttri.htm

http://www.jamesbrennan.org/algebra/polynomials/factoring_polynomials.htm

Online Factoring Solutions (Enter exponents as x^2)

http://www.webmath.com/factortri.html

http://www.hostsrv.com/webmab/app1/MSP/quickmath/02/pageGenerate?site=quickmath&s1=algebra&s2=factor&s3=basic (**Note:** Domain for this one is http://www.quickmath.com/)

Getting Back to the Basics: Factoring Polynomials