

Factoring Review

Common Factoring

When factoring, the first thing to check for is whether there is a common factor – a term that divides evenly into all the terms.

Example: $2x^2 - 8x = 2x(x - 4)$

Difference of Squares

Binomials that are made up of two perfect squares, with a subtraction between them, can be factored in this way:

Example: $x^2 - 9 = (x - 3)(x + 3)$

Trinomial Factoring

The trinomials we will factor in our class are in this form: $ax^2 + bx + c$

Leading Coefficient = 1

If a trinomial has a leading coefficient of 1 ($a = 1$), one can factor quite simply:

$x^2 - 4x - 5$ Here we have $a = 1, b = -4, c = -5$

To factor, we find two numbers that

- multiply to produce the c value

AND

- add to make the b value

Here the two numbers are -5 and $+1$.

Place the numbers in the brackets, and the factoring is done: $x^2 - 4x - 5 = (x - 5)(x + 1)$

Leading Coefficient not equal to 1

When the leading coefficient is not 1, there are different methods you can use – including decomposition, “guess and check,” and the box method. Below is an example factoring question, done by the decomposition method and the box method. In class I will use the decomposition method.

Decomposition Method

$$3x^2 - 19x - 14$$

$$a = 3, b = -19, c = -14$$

1. Multiply “a” and “c” together:

$$ac = (3)(-14) = -42$$

2. Find two numbers that multiply to produce the ac value and add to make the b value.

For this question, -21 and $+2$ are the numbers.

3. Replace the middle term with two separate terms, using these numbers as coefficients:

$$3x^2 - 21x + 2x - 14$$

4. Factor the first two terms, then factor the second terms:

$$\begin{aligned} 3x^2 - 21x + 2x - 14 \\ = 3x(x - 7) + 2(x - 7) \end{aligned}$$

5. The final answer: $(x - 7)(3x + 2)$

Box Method

$$3x^2 - 19x - 14$$

$$a = 3, b = -19, c = -14$$

1. Multiply “a” and “c” together:

$$ac = (3)(-14) = -42$$

2. Find two numbers that multiply to produce the ac value and add to make the b value.

For this question, -21 and $+2$ are the numbers.

3. Place the first and last terms in the box, as shown:

$3x^2$	
	-14

4. Place the two numbers found in step 2, along with “x” in the remaining squares of the box:

$3x^2$	$-21x$
$2x$	-14

5. Find the common factor of each row, and of each column. Collect these into two brackets to create the final factored form of the trinomial.

$3x^2$	$-21x$	$3x$
$2x$	-14	2
x	-7	

6. Final answer: $(x - 7)(3x + 2)$