

Factoring using Reverse of FOIL

Vol. II No. 31(Notes)

January 3, 2018

But first, let's review multiplying Binomials

[1] using the distributive property.

[2] using the FOIL method

[3] using the Box method

1) Multiply $(2x + 3)(5x + 8)$

Using the distributive property, multiply

$$2x(5x + 8) + 3(5x + 8).$$

$$10x^2 + 16x + 15x + 24$$

Combine like terms.

$$10x^2 + 31x + 24$$

A shortcut of the distributive property is called the FOIL method.

The FOIL method is ONLY used when you multiply 2 binomials. It is an acronym and tells you which terms to multiply.

2) Use the FOIL method to multiply the following binomials:

$$(y + 3)(y + 7).$$

$$\overbrace{(y + 3)(y + 7)}.$$

F tells you to multiply the FIRST terms of each binomial.

$$y^2$$

$$(y + 3)(y + 7).$$

O tells you to multiply the OUTER terms of each binomial.

$$y^2 + 7y$$

$$(y + 3)(y + 7).$$

I tells you to multiply the INNER terms of each binomial.

$$y^2 + 7y + 3y$$

$$(y + 3)(y + 7).$$

L tells you to multiply the LAST terms of each binomial.

$$y^2 + 7y + 3y + \mathbf{21}$$

Combine like terms.

$$\mathbf{y^2 + 10y + 21}$$

Remember, FOIL reminds you to
multiply the:

First terms

Outer terms

Innner terms

Last terms

The third method is the Box Method.
This method works for every problem!

Here's how you do it.

Multiply $(3x - 5)(5x + 2)$

Draw a box. Write a polynomial on the top and side of a box. It does not matter which goes where.

This will be modeled in the next problem along with FOIL.

	$3x$	-5
$5x$		
$+2$		

3) Multiply $(3x - 5)(5x + 2)$

First terms: $15x^2$

Outer terms: $+6x$

Inner terms: $-25x$

Last terms: -10

Combine like terms.

$$15x^2 - 19x - 10$$

	$3x$	-5
$5x$	$15x^2$	$-25x$
$+2$	$+6x$	-10

You have 3 techniques. Pick the one you like the best!

4) Multiply $(7p - 2)(3p - 4)$

First terms: $21p^2$

Outer terms: $-28p$

Inner terms: $-6p$

Last terms: $+8$

Combine like terms.

$$21p^2 - 34p + 8$$

	$7p$	-2
$3p$	$21p^2$	$-6p$
-4	$-28p$	$+8$

Multiply $(y + 4)(y - 3)$

- ✓ 1. $y^2 + y - 12$
- 2. $y^2 - y - 12$
- 3. $y^2 + 7y - 12$
- 4. $y^2 - 7y - 12$
- 5. $y^2 + y + 12$
- 6. $y^2 - y + 12$
- 7. $y^2 + 7y + 12$
- 8. $y^2 - 7y + 12$

Multiply $(2a - 3b)(2a + 4b)$

1. $4a^2 + 14ab - 12b^2$

2. $4a^2 - 14ab - 12b^2$

3. $4a^2 + 8ab - 6ba - 12b^2$

✓ 4. $4a^2 + 2ab - 12b^2$

5. $4a^2 - 2ab - 12b^2$

5) Multiply $(2x - 5)(x^2 - 5x + 4)$

You cannot use FOIL because they are not BOTH binomials. You must use the distributive property.

$$2x(x^2 - 5x + 4) - 5(x^2 - 5x + 4)$$

$$2x^3 - 10x^2 + 8x - 5x^2 + 25x - 20$$

Group and combine like terms.

$$2x^3 - 10x^2 - 5x^2 + 8x + 25x - 20$$

$$2x^3 - 15x^2 + 33x - 20$$

5) Multiply $(2x - 5)(x^2 - 5x + 4)$

You cannot use FOIL because they are not BOTH binomials. You must use the distributive property or box method.

	x^2	$-5x$	$+4$
$2x$	$2x^3$	$-10x^2$	$+8x$
-5	$-5x^2$	$+25x$	-20

Almost
done!
Go to
the next
slide!

5) Multiply $(2x - 5)(x^2 - 5x + 4)$

Combine like terms!

	x^2	$-5x$	$+4$
$2x$	$2x^3$	$-10x^2$	$+8x$
-5	$-5x^2$	$+25x$	-20

$$2x^3 - 15x^2 + 33x - 20$$

Multiply $(2p + 1)(p^2 - 3p + 4)$

✓ 1. $2p^3 + 2p^3 + p + 4$

2. $y^2 - y - 12$

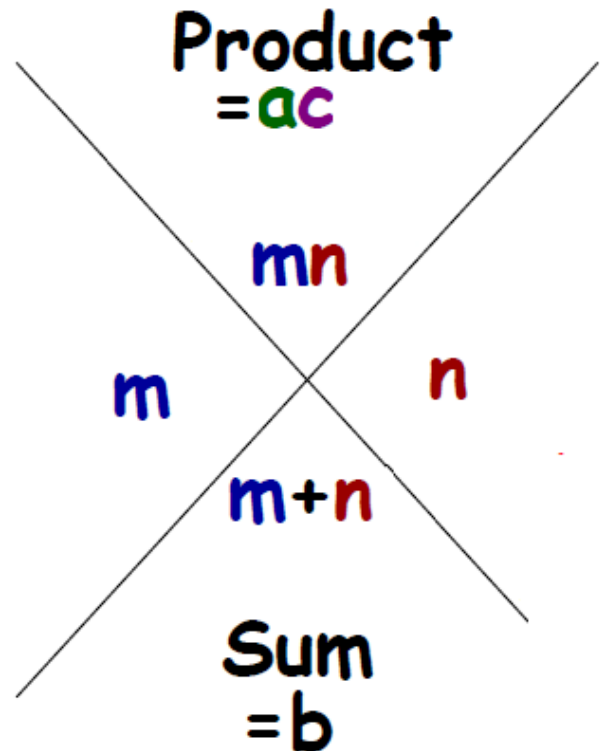
3. $y^2 + 7y - 12$

4. $y^2 - 7y - 12$

Factor

Factor the x-box way

$$y = ax^2 + bx + c$$



First Last
and
Middle

Coefficients

Factor

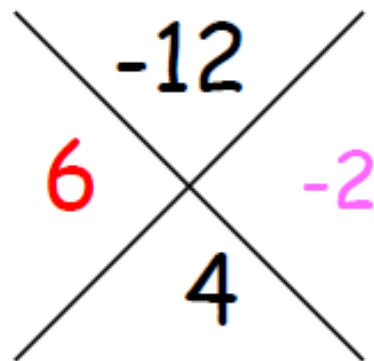
$$x^2 + 4x - 12$$

A diagram illustrating the factoring process for the quadratic expression $x^2 + 4x - 12$. It shows the numbers 6, -2, and 4 arranged around a central point, with two diagonal lines crossing at that point. The number -12 is positioned above the intersection, 6 is to the left, and -2 is to the right. The number 4 is positioned below the intersection.

Factor

Factor using the x-box method.

1) $x^2 + 4x - 12$



Solution:

$$x^2 + 4x - 12 = (x + 6)(x - 2)$$

Factor

$$x^2 - 9x + 20$$

$$\begin{array}{c} \diagdown \quad 20 \quad \diagup \\ -4 \quad \quad -5 \\ \diagup \quad -9 \quad \diagdown \end{array}$$

$$(x - 4)(x - 5)$$

Solution:

$$x^2 - 9x + 20 = (x - 4)(x - 5)$$

Factor

$$x^2 - 5x + 4$$