

Factoring Trinomials - Part II

★ Tricky Trinomials ★

We have already learned how to factor trinomials in the form of $ax^2 + bx + c$ where $a = 1$. Today we will focus on factoring trinomials in the form $ax^2 + bx + c$ where $a \neq 1$.

a > 1

Examples: Factor each trinomial. Use FOIL to check your answers.

1) $2x^2 + 7x + 6 =$

*multiply by 2
 +
 dividing by 2
 doesn't change
 it's value*

$$\frac{2x^2 + 4x}{2} + \frac{2x + 6}{2} =$$

$$(x + 2)(2x + 3)$$

2) $2x^2 + 5x + 2 =$

Dividing by coeff

$$\frac{2x^2 + 4x}{2} + \frac{x + 2}{2} =$$

$$(x + 2)(2x + 1)$$

3) $3x^2 + 10x + 8 =$

which is the coeff

$$\frac{3x^2 + 6x}{3} + \frac{2x + 8}{3} =$$

$$(x + 2)(3x + 4)$$

4) $4x^2 - 12x + 5 =$

*2 · 2 = 4
 which is the coeff*

$$\frac{4x^2 - 10x}{2} + \frac{-2x + 5}{2} =$$

$$(2x - 5)(2x - 1)$$

5) $16x^2 + 8x + 1 =$

*4 · 4 = 16
 which is the coeff*

$$\frac{16x^2 + 4x}{4} + \frac{2x + 1}{4} =$$

$$(4x + 1)(4x + 1)$$

6) $10a^2 - 9a + 2 =$

*5 · 2 = 10
 which is the coeff*

$$\frac{10a^2 - 5a}{5} + \frac{-4a + 2}{2} =$$

$$(2a - 1)(5a - 2)$$

7) $-23y^2 - 6 + 18y^2 = -108$

Must be in D.P.O.

$$\frac{18y^2 - 27y}{9} + \frac{4y + 4}{2} =$$

$$(2y - 3)(9y + 2)$$

8) $4x^2 - 5xy + 6y^2 =$

Must be

$$\frac{4x^2 - 8xy}{4} + \frac{3y^2}{1} =$$

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

Procedure for factoring trinomials of the form $ax^2 + bx + c$ where $a \neq 1$:

- 1) Make two sets of empty parenthesis. ()()
- 2) Determine what signs should be put inside the parenthesis.
 - (a) If the last sign is "+" the signs should be the same. (The same as the middle sign.)
 - (b) If the last sign is "-" the signs should be different.
- 3) Put the first term of the trinomial, without the exponent, in the first position in each parenthesis.
- 4) Multiply the first and last numbers and use that product to determine what factors go into the second position in the parenthesis.
 - (a) If the signs are the same, the factors should add to give you the middle number.
 - (b) If the signs are different, the factors should subtract to give the middle number. (The larger factor goes with the middle sign.)
- 5) Divide each of the resulting binomials by the GCF of the terms in each parenthesis. The final results are the factors of the trinomial.
- 6) Check your answer by using **FOIL**.

Extra Practice:

1) The following trinomial represents the area of a rectangle. Find two binomials that could be expressions for the dimensions of the rectangle.: $2x^2 + x - 6$

Handwritten work for problem 1:

$2x^2 + x - 6$

coeff. $\rightarrow 2$

$(2x + 4)(2x - 3)$

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

2) The following trinomial represents the area of a square. Find a binomial that could be an expression for the measure of each side of the square.: $25x^2 + 20x + 4$

Handwritten work for problem 2:

$25x^2 + 20x + 4$

$(25x + 10)(25x + 10)$

$(5x + 2)(5x + 2)$

$(5x + 2)^2$

Final answer

3) The area of a poster board is $3y^2 + 2y - 5$ inches. The width is $y - 1$ inches.

A. Write an expression for the length of the poster board.

Handwritten work for problem 3A:

Diagram: $\text{Length} = y - 1$

$A = 3y^2 + 2y - 5$

$A = L \cdot w$

$3y^2 + 2y - 5 = L \cdot (y - 1)$

$(3y + 5)(y - 1) = L$

B. Find the dimensions of the poster board when $y = 7$.

Handwritten work for problem 3B:

$w = y - 1$

$w = 7 - 1$

$w = 6 \text{ inches}$

$L = 3y + 5$

$L = 3(7) + 5$

$L = 21 + 5$

$L = 26 \text{ inches}$