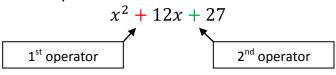
A trinomial is in the form  $ax^2 + bx + c$ . Do you remember how to factor a trinomial?

## Example 1

 $\overline{\text{Factor } x^2 + 12x + 27}$ 

# **Step 1**- Set up ( ) ( )

Look at the second operator.



The second operator is +, so we will need will put the first operator (which is +) in the middle of both ( ) ( ).

$$( + )( + )$$

Step 2- Fill in the first spots in both ( ) ( )

This one is pretty easy. They will both be x.

$$(x + )(x + )$$

**Step 3**- Fill in the second spots in both ( ) ( )

We need two numbers that multiply to equal 27 and will add up (since the operators in our parentheses are the same) to equal 12.

Our choices appear to be 1 & 27 or 3 & 9. The winner is... 3 & 9!

$$(x + 3)(x + 9)$$

Step 4 (Optional)- Use FOIL to check your answer

$$x^2 + 9x + 3x + 27 = x^2 + 12x + 27$$

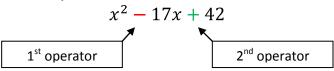
$$\left( (x + 3)(x + 9) \right)$$

Example 2

 $\frac{-}{-}$  Factor  $x^2 - 17x + 42$ 

**Step 1**- Set up ( ) ( )

Look at the second operator.



The second operator is +, so we will need will put the first operator (which is -) in the middle of both ( ) ( ).

$$( - )( - )$$

Step 2- Fill in the first spots in both ( ) ( )

Again, this is pretty easy. They will both be x.

$$(x-)(x-)$$

Step 3- Fill in the second spots in both ( ) ( )

We need two numbers that multiply to equal 42 and will add up (since the operators in our parentheses are the same) to equal 17.

Our choices appear to be 1 & 42 or 3 & 14 or 6 & 7. The winner is... 3 & 14!

$$(x-3)(x-14)$$

Step 4 (Optional)- Use FOIL to check your answer

$$x^2 - 3x - 14x + 42 = x^2 - 17x + 42$$

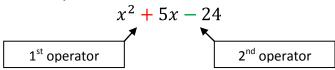
$$(x-3)(x-14)$$

### Example 3

Factor  $x^2 + 5x - 24$ 

## **Step 1**- Set up ( ) ( )

Look at the second operator.



The second operator is -, so we will need will put a + in the middle of one ( ) and a - in the middle of the other ( ). Right now, we don't care about the first operator.

Step 2- Fill in the first spots in both ( ) ( )

Once more, this is pretty easy. They will both be x.

$$(x + )(x - )$$

**Step 3**- Fill in the second spots in both ( ) ( )

We need two numbers that multiply to equal 42 and will subtract (since the operators in our parentheses are different) to equal 5.

Our choices appear to be 1 & 24 or 2 & 12 or 3 & 8 or 4 & 6. The winner is... 3 & 8! But this time it matters which one goes by the + sign and which one is by the – sign. <u>TIP</u>- Put the bigger number by the sign that is the same as the first operator. In our problem, the first operator is +, so we'll put the 8 beside it.

$$(x + 8)(x - 3)$$

Step 4 (Optional)- Use FOIL to check your answer

$$x^2 - 3x + 8x - 24 = x^2 + 5x - 24$$

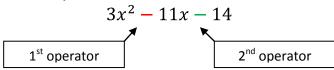
$$(x+8)(x-3)$$

### Example 4

Factor  $3x^2 - 11x - 14$ 

## **Step 1**- Set up ( ) ( )

Look at the second operator.



The second operator is -, so we will need will put a + in the middle of one ( ) and a - in the middle of the other ( ). Right now, we don't care about the first operator.

$$( + )( - )$$

**Step 2**- Fill in the first spots in both ( ) ( ) The only choice this time is x and 3x.

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

**Step 3**- Fill in the second spots in both ( ) ( )

We need two numbers that multiply to equal 14 and will work with the numbers we already have to subtract equal 11.

Our choices appear to be 1 & 14 or 2 & 7. We'll have to try them out to see what happens. We use the O and I parts of FOIL.

$$(x + 2)(3x - 7)$$
  $-7x + 6x = -x$  NO  
 $(x + 7)(3x - 2)$   $-2x + 21x = 19x$  NO  
 $(x + 14)(3x - 1)$   $42x - x = 41x$  NO  
 $(x + 1)(3x - 14)$   $-14x + 3x = -11x$  YES!

**TIP-** If you ever get the opposite of what you want, just switch the operators.

$$(x-1)(3x+14)$$
  $14x-3x=11x$  NO, but it's the opposite!

$$(x+1)(3x-14)$$