Factoring a Trinomial in the form $x^2 + bx + c$

If c is Positive	If c is Negative

-Find 2 numbers that:
      Multiply to c
      Add up to b
 	
-Their signs will be the same
	-Find 2 numbers that:
	      Multiply to c
	      Have difference of b
	
	-Their signs will be different.

Examples:

1.) Factor $x^2 + 9x + 18$

C is positive (+15) so we are looking for 2 numbers that *multiply to 18* and *add up to 9*. We also know that the numbers will have the *same sign*. Since the b value is positive (9) both signs will be addition. So we can fill in our parentheses as follows: (x +)(x +)

Numbers that multiply to 18:
          1, 18 → add up to 19
          2, 9 → add up to 11
          3, 6 → add up to 9

Since 3 and 6 multiply to 18 and add up to 9, these are the number we need to factor $x^2 + 9x + 18$, so we can fill them in our parentheses that we started above: (x + 3)(x + 6)

If you factor $x^2 + 9x + 18$ your final answer will be $(x + 3)(x + 6)$

2.) Factor $x^2 - 4x - 12$

C is negative (-12) so we are looking for 2 number that *multiply to 12* and have a *difference of 4*. We also know that the numbers will have *different signs*. So we can fill in our parentheses as follows: (x +)(x -)

Numbers that multiply to 12:
          1, 12 → have difference of 11
          2, 6 → have difference of 4
          3, 4 → have difference of 1

Since 2 and 6 multiply to 12 and have difference of 4, these are the numbers we need to factor $x^2 - 4x - 12$. Since b is negative, the larger number (6) will have the negative sign. So we can fill in our parentheses as follows: (x + 2)(x − 6)

If you factor $x^2 - 4x - 12$ your final answer will be $(x + 2)(x - 6)$

Try Some:

1.) $x^2 + 4x + 3$

2.) $a^2 - 2a - 3$

3.) $c^2 - 9c + 14$

4.) $b^2 + 3b - 10$

5.) $z^2 - z - 56$

6.) $n^2 + 18n + 30$

7.) $a^2 - 3a - 40$

8.) $x^2 - 14x + 45$

9.) $w^2 - 19wv - 20v^2$

10.) $a^2 + 7ab + 6b^2$