10.5 Factoring Quadratics

To FACTOR a quadratic expression means to write it as the PRODUCT of two BINOMIAL expressions.

To factor, we can FOIL backwards. For a quadratic of the form,

$$x^{\boxed{2}} + bx + c$$

we need to find numbers ***p*** and ***q*** such that:

$$p+q=b \text{ and } pq=c$$

To factor a quadratic, look at ***b*** and ***c***.

1. Find two numbers whose PRODUCT is ***c*** and whose SUM is ***b***.

2. Look at the signs. If the second sign is positive, then the signs in factored form are positive. If the second sign is negative, then the signs in factored form are negative.

3. If the signs in factored form are the same, look at the first sign. This sign tells us what sign to use in both factors. If the signs in factored form are different, look at the first sign. This sign tells us to make the First number that sign.

4. Check the factoring using FOIL.

Factor: $x^2 \boxed{+7}x \boxed{+10}$

10 10

5 + 2 1 + 10

~~10~~ ~~10~~

~~−5 −2~~ ~~−1 −10~~

$\boxed{(x+5)(x+2)}$

$x^2+2x+5x+10$

$x^2+7x+10$

Factor: $x^2 \boxed{+2}x \boxed{-15}$

-15 $\quad$ -15

$\boxed{-3+5}$ $\quad$ $-5+3$

2 $\quad$ -2

-15 $\quad$ -15

-1 $\quad$ 15 $\quad$ -15 $\quad$ 1

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

Check: $x^2+5x-3x-15$

$x^2+2x-15$ ✓

Factor: $x^2 + 7x + 12$

12 12

2 6 3+4=7

12

12 1

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

Factor: $x^2 + 11x \boxed{-26}$

-26 -26

-1 26 -26 1

-26 -26

$\boxed{13 \quad -2}$ -13 2

$(x+13)(x-2)$

3) $t^2 - 10t \boxed{+21}$

21 21

$-7 \quad -3 \quad -1 \quad -21$

$(x-7)(x-3)$

If the last # is +
& the middle # is −
Then both Factors are −