Name_____

Algebra 2

Lesson 5-4

Factoring Quadratic Expressions

Factoring is a way we break down a number or expression into a product of smaller numbers or **factor pairs**.

Example: write the factor pairs for 12: $1 \cdot 12,\ 2 \cdot 6,\ and\ 3 \cdot 4.$

In a quadratic equation we can often simplify it by factoring out the greatest common factor, GCF. **Example:** Factor the quadratic: $5x^2 + 20x - 25 = 5(x^2 + 4x - 5)$

You can also factor out variables: $s^3 + 2s^2 - 7s = s(s^2 + 2s - 7)$

Factoring a quadratic is also possible. Given a trinomial quadratic in the form of $ax^2 + bx + c$, it is possible to break it down into two binomial expressions. To do this we must determine and consider the following:

1. the factor pairs of the third term *c*.
2. if *c* and *b* are positive, the look at the factor pairs of *c* that sum up to equal *b*.
3. if *c* is positive and *b* is negative, then the factors of *c* will be negative
4. if *c* is negative, then the factors will have mixed signs. The larger factor will carry the sign of *b*.

Examples:

$x^2 + 8x + 7$

factors of 7	1,7	rewrite to get factored quadratic:
sum of the factors	8	(x+1) (x+7)

$x^2 - 17x + 72$

factors of 72	-1, -72; -2, 36; -3, -34; -4, -24; -6, -12;-8, -9	rewrite to get factored quadratic:
sum of factors = -17	-17	(x-8) (x-9)

$x^2 - 4x - 12$

factors of - 12	1, -12; -1,12; 2,-6;-2, 6; 3,-4; -3,4	rewrite to get factored quadratic:
sum of factors = - 4	-4	(x+2) (x-6)