CCGPS Adv Alg – 206: Factoring by ac Method Name: ___________________________

The "ac method" of factoring is primarily used for factoring quadratic expressions where *a*, or the coefficient of the second-degree term, is not equal to 1. Since quadratics don't really count as "higher-order" polynomials, you won't have many questions this unit where you just have to apply the ac method, but you may need the ac method to finish factoring an expression.

This method is called the ac method because of the coefficients of the standard form of a quadratic. You should recall the standard form of a quadratic is $ax^2 + bx + c$, and that is where the *a* and *c* come from. Now here comes the key statement…

Any quadratic expression can be factored if there are two numbers whose product equals *ac* and sum equals *b*.

Let's look at an example… $6x^2 + 7x + 2$. In this case, *a* = 6, *b* = 7, and *c* = 2, so *ac* = 12. Now, think of two numbers whose product is 12 and sum is 7: ___________________. Now that we know what the two magic numbers are, can factor this expression by grouping.

$6x^2 + 7x + 2$	Initial expression
$6x^2 + 3x + 4x + 2$	Replace the middle term with the two
$(6x^2 + 3x) + (4x + 2)$	magic numbers. The order does not
$3x(2x+1) + 2(2x+1)$	matter. Then proceed with factoring by
$(3x+2)(2x+1)$	grouping.

You can see that the reason the two magic numbers must add to equal *b* is because they are going to replace *b* in the solving process. Another nice thing to note is that the order you write the two magic numbers does not matter.

Factor the expressions below and then we will do them as a class.

1. $10x^2 + 4x - 6$
2. $3x^2 - 11x + 10$
3. $3x^2 + 4x - 4$
4. $10x^2 + 33x - 7$

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Factor these expressions on your own. In some cases, it may help to factor out a GCF first.

5. $6x^2 + x - 12$

6. $5x^2 - x - 18$

7. $3x^3 - 5x^2 + 2x$

8. $2x^2 + 17x + 21$

9. $2x^2 - 3x - 5$

10. $9x^2 + 4x - 5$

11. $-6x^2 - 16x - 8$

12. $2x^2 + 21x + 49$

13. $4x^2 - 12x + 5$

14. $56x^2 - 15x + 1$

15. $2x^2 - 9x + 10$

16. $-5x^2 - 44x + 9$

17. $3x^2 - 7x - 6$

18. $-6x^2 - 13x - 2$