NOTES: SECONDARY 2 HONORS

FACTOR A QUADRATIC EXPRESSION OF THE FORM ax^2+bx+c (3.2)

STARTER

Factor by find the GCF.

1. $3v+15$ 2. $4y^2-12y$ 3. $-7x-4$ 4. $-6m^2+20m$

5. $x^2+16x-17$ 6. $y^2+7y+12$ 7. $x^2-14y-15$

Vocabulary

- Polynomial:
- Monomial:
- Binomial:
- Trinomial:

FACTOR BY GROUPING

You want to factor by grouping when there are 4 or more terms. (REMEMBER to have to the polynomial in standard form)

Example: Factor $5x^2+x+10x+2$

Practice Exercises

1. $y(y+3)+4(y+3)$ 2. $5u^2+u+10u+2$ 3. $2x^2+x-6x-3$

FACTOR BY USING THE "AC" METHOD

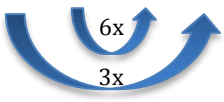
Factor $7x^2+15x+2$	
	Multiply the leading coefficient and the constant (the "a" term and the "c" terms)
	Identify the coefficient of the middle term (the "b" term)
	Find two numbers that multiply to the leading coefficient and the constant term ("ac") but add to the coefficient of the middle term. ("b")
	Rewrite the original polynomial be replacing the middle term ("b") with the two numbers found above. Your statement must be *equivalent*.
	Group the first two terms and the second two terms
	Factor out the Greatest Common Factor from each group.
	Are the parentheses identical? If so, factor out the terms in the parenthesis. Write the remaining factor together in parenthesis to complete your answer.

Examples: Factor by using the "ac" method.

1. $3x^2-4x-4$ 2. $2x^2+5x+3$ 3. $5y^2-3y-2$

FACTOR BY USING THE "GUESS AND CHECK" METHOD

Factor $6x^2+19x+3$

Factors of $6x^2$	Factors of 3	Possible Binomial Factors	Sum of Outer and Inner Products
<u>3x, 2x</u> (3x)(2x) *or* (2x)(3x) *or* <u>6x, x</u> (6x)(x) *or* (6x)(x)	<u>3, 1</u> (3)(1) *or* (1)(3) *or* <u>3, 1</u> (3)(1) *or* (1)(3)	(3x + 3) (2x + 1)  (3x + 1) (2x + 3) (6x + 3) (x + 1) (6x + 1) (x + 3)	3x + 6x = 9x 9x + 2x = 11x 6x + 3x = 9x 18x + x = **19x** *desired middle term.*
So, $6x^2+19x+3=(6x+1)(x+3)$. Check by multiplying.			

Examples: Factor by using the "guess and check" method.

1. $3x^2 - 4x - 7$

2. $4y^2 - y - 5$

3. $5b^2 + b - 4$

Factor using whatever method you choose. Some problems are *not* factorable. Write prime if problems are not factorable.

1. $2j^2 + 9j + 9$

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

3. $4w^2 - 4w - 3$

4. $8k^2 + 14x + 5$

5. $2d^2 - 7df + 6f^2$

6. $5x^2 - 13x - 6$

7. $2m^2 + 7m + 5$

8. $2x^2 + 9x - 11$

9. $3x^2 - 22x - 1$

10. $3x^2 - x - 5$

11. $4y^2 - 16y - 9$

12. $20z^2 + 49z + 30$

13. $26p^2 + 29p - 15$

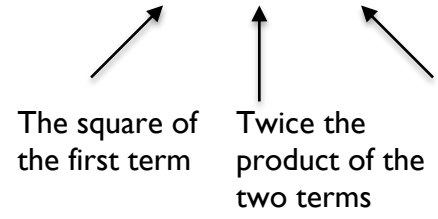
14. $3a^2 - ab - 2b^2$

15. $4x^2 - 18x + 9$

FACTOR A PERFECT SQUARE TRINOMIAL

A **perfect square trinomial** is the result when you square a binomial.

$$(x+4)^2 = (x+4)(x+4) = x^2 + 8x + 16$$



The square of the first term

Twice the product of the two terms

The square of the last term

Identifying a perfect square trinomial can make factoring easier, since all perfect square trinomials follow the same pattern, which is:

$$a^2 + 2ab + b^2 = (a+b)^2$$
$$a^2 - 2ab + b^2 = (a-b)^2$$

Again, notice that the first and last terms of the trinomial are always the square of *a* and square of *b* (first and last terms of the factors). The middle term is always twice the product of the two terms or **2**×a×b. If the polynomial doesn't follow this pattern, it is not a perfect square trinomial.

Example: Is the polynomial a perfect square trinomial? Explain your reasoning.

1. $x^2 + 14x + 49$ 2. $4x^2 - 12x + 9$ 3. $9x^2 + 12x + 16$

Example: Factor. If not factorable, write *prime*.

1. $x^2 + 12x + 144$ 2. $9x^2 - 30x + 25$ 3. $x^2 + 4x - 4$

4. $64p^2 - 16p + 1$ 5. $81x^2 - 36x + 4$ 6. $4x^2 - 18x + 9$

7. $x^2 + 2x + 1$ 8. $4x^2 - 18x + 9$ 9. $9x^2 - 24xy + 19y^2$

Explain why the last term of every perfect square trinomial is a positive value.