Factoring Notes Name_____

GCF – Greatest Common Factor

Divide out what each term has in common.
Look for common numerical factors.
Look for common variable factors.
Look for common negative signs.

Addition rules

positive + positive = positive
negative + negative = negative
positive + negative or negative + positive =
subtract and take the sign of the larger digit

Distributing

Multiply the factor in front of the parentheses by every term in the parentheses.

$$5x(3x^2 + 2x - 4) = 15x^3 + 10x^2 - 20x$$

Addition rules - variables

Only add like terms

ex. $2x + 5x = 7x$

ex. $9x^2 + 5x^3 + 2x^2 = 11x^2 + 5x^3$

Double Distributing

$$\begin{aligned}(x+2)(x-5) &= x(x-5)+2(x-5)\\ &= x(x-5)+2(x-5)\\ &= x^2-5x+2x-10\\ &= x^2-3x-10\end{aligned}$$

Multiplication rules

positive X positive = positive
negative X negative = positive
positive X negative = negative
negative X positive = negative

F O I L

First Outer Inner Last

$$(x+6)(x+7) = x^2+7x+6x+42$$
$$= x^2+13x+42$$

Multiplication rules - variables

When multiplying, multiply the coefficients (numbers in front) and add the exponents with the same base.

Ex. $2x \cdot 4x = 8x^2$

Ex. $5x^4 \cdot 2x^2 = 10x^6$

Squaring a binomial

Squaring is something times itself.

$$\begin{aligned}(3x+5)^2 &= (3x+5)(3x+5)\\ &= 9x^2+15x+15x+25\\ &= 9x^2+30x+25\end{aligned}$$

Perfect square trinomial

Trinomial that factors into a perfect square.

$$16x^2 - 24x + 9 = (4x-3)^2$$

Perfect square
Double those square roots.
Perfect square
Square root 1st term
Middle sign
Square root last term

$x^2 + bx + c$

$$x^2 + bx + c = (x + r_1)(x + r_2)$$

When c and bx are positive r_1 and r_2 are both positive.

Sentence for three terms

What multiplies to give you ____

But adds to give you _____

$x^2 - bx + c$

$$x^2 - bx + c = (x - r_1)(x - r_2)$$

When c is positive and bx is negative r_1 and r_2 are both negative.

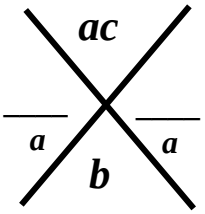
$x^2 \pm bx - c$

$$x^2 \pm bx - c = (x + r_1)(x - r_2)$$

When c is negative r_1 and r_2 are different signs, the bigger one has the sign of bx.

X factor $ax^2 + bx + c$

(x _____)(x _____)



What multiplies to give you *ac* but adds to give you *b*.
Divide by ***a,*** reduce, bottoms up.

Difference of two squares

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

Two squares subtracting, always factors into the same binomials with different middle signs.

Difference of two cubes

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

First parenthesis is the same without the cubes.
Second parenthesis, first term squared, opposite of product, second term squared.

Sum of two cubes

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

First parenthesis is the same without the cubes.
Second parenthesis, first term squared, opposite of product, second term squared.

Squares

$1^2 = 1$	$6^2 = 36$	$11^2 = 121$	$16^2 = 256$
$2^2 = 4$	$7^2 = 49$	$12^2 = 144$	$17^2 = 289$
$3^2 = 9$	$8^2 = 64$	$13^2 = 169$	$18^2 = 324$
$4^2 = 16$	$9^2 = 81$	$14^2 = 196$	$19^2 = 361$
$5^2 = 25$	$10^2 = 100$	$15^2 = 225$	$20^2 = 400$

Cubes

$1^3 = 1$	$6^3 = 216$
$2^3 = 8$	$7^3 = 343$
$3^3 = 27$	$8^3 = 512$
$4^3 = 64$	$9^3 = 729$
$5^3 = 125$	$10^3 = 1000$