FOILing to FACTORing Name_____

Expand by foiling the first two columns and notice the patterns. Use these patterns to factor the 3rd column.

	Multiply or Expand	Multiply (Expand the Product)	Factor each Polynomial
1	$(3x-5)(3x+5)$ $=$	**Difference of Squares** $(a-b)(a+b)$ $=$	$16x^2-49$
2	$(2x-3)^2$ $=(2x-3)(2x-3)$ $=$	**Square of Difference** $(a-b)^2$ $=(a-b)(a-b)$ $=$	$36x^2-60x+25$
3	$(4x+3)^2$ $=(4x+3)(4x+3)$ $=$	**Square of Sum** $(a+b)^2$ $=(a+b)(a+b)$ $=$	$64x^2+48x+9$
4	$(x+5)(x^2-5x+25)$ $=$	**Sum of Cubes** $(a+b)(a^2-ab+b^2)$ $=$	x^3+64
5	$(x-5)(x^2+5x+25)$ $=$	**Difference of Cubes** $(a-b)(a^2+ab+b^2)$ $=$	$8x^3-27$
6	$(x+2)(y+3)$ $=(x+2)(y)+(x+2)(3)$ $=$	**Factor by Grouping** $(a+b)(c+d)$ $=(a+b)(c)+(a+b)(d)$ $=$	$x^3-3x^2-4x+12$
7	$(x+3)^3$ $=(x+3)(x+3)(x+3)$	**Cube of Sum** $(a+b)^3$ $=(a+b)(a+b)(a+b)$	$x^3+6x^2+12x+8$
8	$(x-2)^3$ $=(x-2)(x-2)(x-2)$	**Cube of Difference** $(a-b)^3$ $=(a-b)(a-b)(a-b)$	$x^3-15x^2+75x-125$

FACTORING PATTERNS & PRACTICE part 1 & 2

OBJECTIVE: Students will recognize and be able to factor using patterns.

Factor Patterns Practice includes four pages of practice.

Part 1 and Part 2 include exercises for all of the patterns listed above.

Students will use the patterns to factor quadratic and cubic expressions:
* difference of squares
* square of a sum
* square of a difference
* greatest common factor
* common factor binomial
* trinomial with leading coefficient of 1
* trinomial with leading coefficient not 1
* sum of cubes
* difference of cubes

Factoring Patterns for Practice Name_____

Part 1

Write each polynomial as a product of linear factors. Generalize the pattern for each type.

1. DIFFERENCE OF SQUARES $a^2 - b^2 =$ _____

$25x^2 - 144$	$121x^2 - 36$	$16x^2 - 49$	$x^2 - 5$

PERFECT SQUARE TRINOMIALS:

2. SQUARE OF SUM $a^2 + 2ab + b^2 =$ _____

$25x^2 + 120x + 144$	$9x^2 + 6x + 4$	$16x^2 + 56xy + 49y^2$	$x^2 + 2\sqrt{5}x + 5$

PERFECT SQUARE TRINOMIALS:

3. SQUARE OF DIFFERENCE $a^2 - 2ab + b^2 =$ _____

$25x^2 - 20x + 4$	$121x^2 - 66x + 9$	$49x^2 - 140xy + 100y^2$	$x^2 - 2\sqrt{3}x + 3$

4. GREATEST COMMON FACTOR $a(b) + a(c) =$ _____

$25x^2 + 5x$	$28x^3 - 56x^2 + 7x$	$36x^2w - 12x^2y + 24x^2$	$81x^3y + 36x^2y - 9xy$

5. COMMON FACTOR BINOMIAL $c(a+b) + d(a+b) =$ _____

$3x(x+9) + 2(x+9)$	$x(x-8) + 1(x-8)$	$4x^2(x+3) - 1(x+3)$ ***	$x(x^2-1) + 5(x^2-1)$ ***

**** Factor the perfect squares****

6. Leading Coefficient is ONE *X-Factor:* $1x^2 + Bx + C$ *find factors of C that add to B*

$x^2 - 2x - 3$	$x^2 + 4x - 5$	$x^2 - 8x + 7$	$x^2 + 14x + 13$
$x^2 - 1x - 12$	$x^2 + 3x - 10$	$x^2 - 10x + 21$	$x^2 + 12x + 35$

7. Leading Coefficient is NOT ONE *Rewrite to use "Factor by Grouping" technique*

$2x^2 - 7x + 3$	$2x^2 + 9x - 5$	$3x^2 - 22x + 7$	$5x^2 + 34x - 7$
$2x^2 - 5x - 12$	$3x^2 + 28x - 20$	$5x^2 - 33x + 18$	$14x^2 + 37x + 5$
$4x^2 + 9x + 5$	$6x^2 + 7x - 5$	$12x^2 - 13x + 3$	$8x^2 - 10x + 3$

8. SUM OF CUBES $a^3 + b^3 =$ _____

$x^3 + 8$	$x^3 + 27$	$64x^3 + 1$	$125x^3 + 8$

9. DIFFERENCE OF CUBES $a^3 - b^3 =$ _____

$x^3 - 8$	$x^3 - 27$	$64x^3 - 1$	$125x^3 - 27$

Factoring Patterns for Practice Name_____

Part 2

PRACTICE ALL OF THESE PATTERNS ON YOUR OWN…PRACTICE MAKES IT EASIER!

1. DIFFERENCE OF SQUARES

$9x^2-4$	$169x^2-100$	$64x^2-81$	$121x^2-49$

2. Perfect Square Trinomials: SQUARE OF SUM

$81x^2+108x+36$	$4x^2+40x+100$	$9x^2+42x+49$	$16x^2+40x+25$

3. Perfect Square Trinomials: SQUARE OF DIFFERENCE

$36x^2-48x+16$	$4x^2-52x+169$	$121x^2-176x+64$	$25x^2-90x+81$

4-5. COMMON FACTOR ** factor again for linear factors**

$12x^3-36x^2$	$x(x+2)+3(x+2)$	$16x^2+24x-4$ *	$x^2(x+7)-4(x+7)$ *

8. SUM OF CUBES

x^3+125	x^3+1000	x^3+y^3	x^3+27y^3

9. DIFFERENCE OF CUBES

x^3-64	x^3-8	x^3-y^3	x^3-64y^3

6. Leading Coefficient is ONE $1x^2 + Bx + C$ *so find factors of C that add to B*

$x^2 - 18x + 17$	$x^2 + 1x - 2$	$x^2 + 20x + 19$	$x^2 - 22x - 23$
$x^2 - 5x + 6$	$x^2 - 6x - 16$	$x^2 + 18x + 77$	$x^2 - 3x - 54$

7. Leading Coefficient is NOT ONE *Rewrite to use "Factor by Grouping" technique*

$2x^2 - 1x - 3$	$5x^2 + 9x - 2$	$3x^2 + 10x + 7$	$7x^2 + 12x + 5$
$5x^2 - 17x + 6$	$3x^2 + 10x - 8$	$3x^2 + 16x + 21$	$5x^2 - 4x - 12$
$4x^2 - 4x - 3$	$12x^2 + 4x - 1$	$6x^2 + 7x + 2$	$15x^2 + 7x - 2$