Algebra I

Unit 3B Notes – Factoring Techniques

Quadratic Functions

Name _____

MGSE9-12.A.SSE.2 Use the structure of an expression to rewrite it in different equivalent forms. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$. Write expressions in equivalent forms to solve problems **MGSE9–12.A.SSE.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. **MGSE9–12.A.SSE.3a** Factor any quadratic expression to reveal the zeros of the function defined by the expression.	3B.5	How to break a quadratic down into its factors	

Important Dates:

GCF Skills Check 1: _____ Grade: _____

GCF Skills Check 2: _____ Grade: _____

Grouping Skills Check 1: _____ Grade: _____

Grouping Skills Check 2: _____ Grade: _____

M-A Chart Skills Check 1: _____ Grade: _____

M-A Chart Skills Check 2: _____ Grade: _____

QUIZ: _____ Grade: _____

RETAKE: _____ Grade: _____

Factoring GCF

What is factoring?

You are "_____" multiplication

· Lots of different _____ and _____.

· Should be put in _____ before factoring.

· You can **ALWAYS** check your work by _____.

VOCABULARY

GCF (Greatest Common Factor) - the largest _____ with the largest _____ that divides _____ into ALL TERMS.

Leading Coefficient – the coefficient on the term with the largest exponent.

Find the greatest common factor of the terms below.

Ex A) 21x, 28 ***GCF:_____***

Ex B) $10x^4$, $25x^2$ ***GCF:_____***

Ex C) $12x^3$, 35 ***GCF:_____***

Ex. D) $8x^5$, $24x^4$, $2x^3$ ***GCF:_____***

Factoring GCF - divide out the largest _____ with the largest _____ _____ that divides _____ into ALL TERMS.

Remember to put in **standard form** before factoring.

Ex. A) $21x + 28$

Ex. B) $40x^2 - 10x$

IF THE LEADING COEFFICIENT IS NEGATIVE, the GCF is also _____.

Ex. C) $-32x^2 - 18$

Ex. D) $-12x^2 + 18x$

Ex. E) $28x + 42x^2 + 14$

Ex. F) $9x^2 + 20$

Ex. G) $4x^2y + 10xy$

Ex. H) $12x + 9 - 3x^2$

Factoring by Grouping

How did we distribute binomials?

$(2x^2 - 1)(4x + 3)$

Factoring by grouping does the OPPOSITE!

Factoring by Grouping

1. Used when you have _____.
2. After the terms are put in standard form, group them into _____
3. Factor out the GCF of each group. Remember to factor out a negative if the first term of the group is negative.
4. It worked if the expressions in the parentheses _____.
5. Group the GCFs in one binomial and the parenthetical expression is the other binomial.

Ex. A $8x^3 + 6x^2 - 4x - 3$

Remember to look for a GCF for ALL THE TERMS before you start grouping.

Ex. B $3x^2 + 3x + 15x + 15$

Ex. C $x^2 - 3x + 7x - 21$

Ex. D $2x^2 - 3xy + 2xy - 3y^2$

Ex. E $-8x^3 - 12x^2 - 8x - 12$

You Try!

1. $3x^3 - 15x^2 + 5x - 25$

2. $8x^2 + 6x - 12x - 9$

3. $2x^2 + 4x - 14x - 28$

Factoring Quadratic Binomials and Trinomials

Standard form of a quadratic: f(x) =

a is always the _____

b is always the _____

c is always the _____

M-A CHART

Used to get from _____ to _____ for grouping.

Looking for 2 numbers that _____ and

_____.

From standard form $f(x) = ax^2 + bx + c$,

· "M" is the product of _____ and _____.

· "A" is the _____.

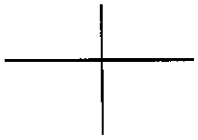
M = a ▪ c	A = b

Factoring a Trinomial or Binomial using an M-A chart

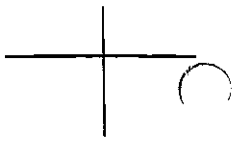
1. Factor out the GCF.
2. Label a, b, and c in your quadratic.
3. Multiply a and c together. Find 2 numbers that multiply to give you "ac" and add to give you "b". REMEMBER: SIGNS ARE IMPORTANT!
4. Using these numbers as your new coefficients, split your "x" term into 2 terms and factor by grouping.

Example: $2x^2 - 3x - 35$ a = b = c =

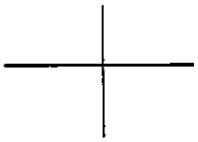
Ex. 1) $3x^2 - 4x - 4$



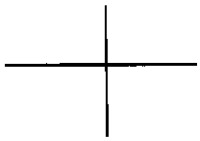
Ex. 2) $4x^2 + 11x - 3$



Ex. 3) $-10x^2 + 9x - 2$



Ex. 4) $x^2 - 36$



Ex. 5) $5x^2 + 50x + 80$

Ex. 6) $81 - 36x^2$

Factoring Special Products (DOTS)

What happens when we multiply binomials that have opposite signs?

1. $(x + 2)(x - 2)$

2. $(4x - 1)(4x + 1)$

3. $(3x + 4)(3x - 4)$

4. $(3x^2 + 4)(3x^2 - 4)$

What does DOTS stand for?

Factoring Special Products

1. Put in order and check for a GCF (including a negative).
2. Check for DOTS.
3. If DOTS, take a square root of each term and label a and b.
4. Put in the format (a + b)(a - b).

Example: $49x^2 - 100$

Special Patterns: Difference of Two Squares (DOTS)

$a^2 - b^2 \rightarrow$ factors to $(a + b)(a - b)$

Ex. 1 $x^2 - 16$

Ex. 2 $16x^2 - 25$

Ex. 3 $4x^2 - 9$

Ex. 4 $x^2 + 36$

Ex. 5 $81x^2 - 9$

Ex. 6 $3x^2 - 9$

*****NOTE: This pattern DOES NOT WORK for SUMS!*****