**Math 9 – Unit 5: Algebra II**

Name: Mr. Hagen

**Lesson #4b: Factoring Trinomials**

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**Learning Goal**: We are learning to factor more complicated trinomials.

Let's add another wrinkle to our lesson and try factoring some more complicated trinomials. Maybe some of these can't even be factored at all! <duh duh duh!!!!>

**Factor each completely.**

1) $5n^2 + 47n - 30$

M: -150 A: 47

-1, 150
-2, 75
-3, 50

$= 5n^2 - 3n + 50n - 30$

$n \qquad +10$

$= n(5n-3) + 10(5n-3)$

$= (5n-3)(n+10)$

2) $9k^2 + 8k + 8$

A B C

A×C B

M: 72 A: 8

1, 72
2, 36
3, 24
4, 18
6, 12
8, 9

Not factorable.

3) $3a^2 - 18a - 48$

First, look for a GCF.

$= 3(a^2 - 6a - 16)$

M: -16
A: -6

1, -16
2, -8

$= 3(a^2 + 2a - 8a - 16)$

$a \qquad -8$

$= 3[a(a+2) - 8(a+2)]$

$= 3(a+2)(a-8)$

4) $24k^2 - 100k + 56$

$= 4(6k^2 - 25k + 14)$

$= 4(3k-2)(2k-7)$

Difference of Squares.

5) $9a^2 - 16$

M: -144
A: 0
+12, -12

$= 9a^2 + 0a - 16$

$= \underbrace{9a^2 + 12a}_{3a} \underbrace{-12a - 16}_{-4}$

$= 3a(3a + 4) - 4(3a + 4)$

$= (3a + 4)(3a - 4)$

square numbers

6) $25b^2 - 90b + 81$

M: 2025
A: -90
-45, -45

$= \underbrace{25b^2 - 45b}_{5b} \underbrace{-45b + 81}_{-9}$

$= 5b(5b - 9) - 9(5b - 9)$

$= (5b - 9)(5b - 9) \Rightarrow (5b - 9)^2$

Now for a trick! First, factor $x^2 + 7x + 12$. What do you notice about the factor pair you chose and the numbers in the bracket? Once you have a number greater than 1 in front of $x^2$, that's when factoring requires more effort. However, let's use a trick.

M: 12
A: 7
3, 4

$1x^2 + 7x + 12$

$= \underbrace{x^2 + 3x}_{x} \underbrace{+4x + 12}_{+4}$

$= x(x + 3) + 4(x + 3)$

$= (x + 3)(x + 4)$

M: -28
A: +12
-2, 14

$4x^2 + 12x - 7$

$= \frac{(4x - 2)}{2}\frac{(4x + 14)}{2}$

Divide out the common factor.

$= (2x - 1)(2x + 7)$

M: 108 A: -31
-1, -108
-2, -54
-3, -36
-4, -27 ✓

$12x^2 - 31x + 9$

$= (12x - 4)(12x - 27)$

÷4 ÷3

$= (3x - 1)(4x - 9)$

**Success Criteria**

- I can set up my factoring by finding a factor pair that multiplies to the first and last terms (A×C), but adds to the middle term (B).
- I can use "Factoring by Decomposition" to factor a trinomial