Algebra 1 Notes...

Date: _____

9.6 Factor Quadratic Equations When the Leading Coefficient IS NOT 1

VOCABULARY:

- ***Standard Form of a Quadratic Equation*** $Ax^2+Bx+C=0$;

  Where A, B, C are real numbers ; ***and*** $A \neq 0$

- ***Factoring is a lot more work when a≠1***

Example 1 *Factor when a and c are prime number other than 1*

Steps to Factor : $2x^2 + 15x + 7 =$ $(2x+1)(x+7)$ OR $(x+7)(2x+1)$

A B C

1·2 1·7

$2x \cdot 7 = 14x$, $1 \cdot x = x$

$14x + x = 15x = B$

1) Identify a, b, and c. a= 2 b= 15 and c= 7
2) Write 2 sets of ( )'s. One for each factor.
3) What are the first terms in both factors? Why? $2x \cdot x = 2x^2$ (the 1st term)
4) What are the **signs** for each factor? Both positive since B + C are positive
5) What are the factors of 2 and 7? Put them under the numbers
6) Draw brackets (multiply INNER TERMS, OUTER TERMS, and their sum must be "B"
7) **CHECK** by Multiplying the factors

$(2x+1)(x+7) = 2x^2+14x+x+7 = 2x^2+15x+7$ ✓

CHECK POINT: Factor and Check by mentally multiplying

2) $2x^2 - 11x + 5 = (2x-1)(x-5)$ OR $(x-5)(2x-1)$

1·2 1·5

$2x \cdot 5 = 10x$, $1 \cdot x$

3) $5x^2 + 2x - 3 = (5x-3)(x+1)$ OR $(x+1)(5x-3)$

1·5 1·3

$5x \cdot 1 = 5x$, $-3 \cdot x = -3x$

SIGNS +, −

4) $3x^2 - 8x - 3 = (3x+1)(x-3)$ OR $(x-3)(3x+1)$

1·3 1·3

$3x \cdot -3 = -9x$, $1 \cdot x$

SIGNS +, −

TIP: FACTOR GCF

5) $5x^2 + 55x + 150$ $5(x^2+11x+30)$

KEEP FACTORING → $5(x+5)(x+6)$

MUST INCLUDE THE GCF(S)

1 30
2 15
3 10
5 6

Algebra 1 Notes...

Example 6 ***Factor when the leading coefficient is negative (-a)***

Steps to Factor : $-2x^2 - 11x - 5 =$ $-1(2x^2+11x+5)$

1.2 · 1.5 ; $2x \cdot 5 = 10x$; $1x$

$-1(2x+1)(x+5)$

$10x + x = 11x$ ✓

1) Identify a, b, and c. a= -2 b= -11 and c= -5
2) Always factor out -1 when the leading coefficient is negative.
3) Factor
4) Always **CHECK** by Mentally multiplying the factors !!!!!!!!!!!!!!!!!!!

OR $-1(x+5)(2x+1)$

$(x+5)(2x+1) = (2x^2+11x+5)\cdot -1 = -2x^2-11x-5$ ✓

Example 7 ***Factor when a and c are NOT prime numbers***

Steps to Factor : $10x^2 + 19x + 6 =$ $(5x+2)(2x+3)$

1.10 · 2.5 ; 1.6 · 2.3

START W/ 1ST TERM → $5x \cdot 3 = 15x$; (5·2) ; $2 \cdot 2x = 4x$

$15x + 4x = 19x$ ✓

1) Write 2 sets of ( )'s. One for each factor. FILL IN WHAT YOU KNOW
2) What are the factors of 10 and 6? Put them under the numbers
3) Draw brackets
4) Factor by guess and check.
5) Always **CHECK** by Mentally multiplying the factors !!!!!!!!!!!!!!!!!!!

Example 8 ***Solve Quadratic Equation by Factoring***

Factor: $5x^2 - 6x - 8 =$ $(5x+4)(x-2)$

1.5 ; 1·8, 2·4 ; $5x \cdot -2 = -10x$; $4x$

$-10x + 4x = -6x$ ✓

Solve:

$5x+4=0$

$-4 \quad -4$

$\frac{5x}{5} = \frac{-4}{5}$

$x = -4/5$ OR $-.8$

Use calc to check

$x-2=0$

$x=2$

Check:

C: $5\left(\frac{-4}{5}\right)^2 - 6\left(\frac{-4}{5}\right) - 8 = 0$

$0=0$ ✓

C: $5(2)^2 - 6(2) - 8 = 0$

$20 - 12 - 8 = 0$

$0=0$ ✓