FACTORING QUADRATICS: $X^2 + BX + C$

LEARNING GOALS

- Discover the relationship between the coefficients and constants in a trinomial and the coefficients and constants in its factors.
- Factor quadratic expressions of the form $ax^2 + bx + c$, where $a = 1$.

KEEP YOUR MINDS ON …

- Remember expanding?

  - $(x + 10)(x + 3)$

  - $x^2 + 3x + 10x + 30$

  - $x^2 \quad + 13x \quad + 30$

FACTORING IS UNDOING Expanding

ITS MAGICAL!

Magic Number #1	Magic Number #2	Sum	Product
3	4	7	12
-2	3	1	-6
6	-8	-2	-48
-4	-2	-6	8
4	5	9	20
-2	5	3	-10
-3	1	-2	-3
-7	-3	-10	21
9	6	15	54
5	5	10	25
4	-4	0	-16

EXAMPLES

sum product

- Factor: $x^2 + 14x + 45$ $= (x+9)(x+5)$

  $x^2 - 11x + 28$ $= (x-7)(x-4)$

  $x^2 - x - 30$ $= (x-6)(x+5)$

  $x^2 + 9x - 22$ $= (x+11)(x-2)$

  $x^2 - 100$ $= (x+10)(x-10)$

  $x^2 + 12x + 36$ $= (x+6)(x+6)$

Special cases that we'll talk about later!

BIG IDEAS

- If a quadratic expression of the form $x^2 + bx + c$ can be factored,
- it can be factored into two binomials, $(x + r)$ and $(x + s)$, where $r + s = b$ and $r \times s = c$, r and s are integers.

BIG IDEAS (CONTINUED)

- Sometimes you will need to common factor the trinomial first.
- For example, factor $3x^2 - 18x - 48$.

$$3x^2 - 18x - 48$$

$$= 3\left(\frac{3x^2}{3} - \frac{18x}{3} - \frac{48}{3}\right)$$

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

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

What if I get stuck?

ex) $x^2 - 5x - 24$ use a chart

$= (x-8)(x+3)$

FACTORS	Sum	Prod
$-2, 12$	10 ✗	
$2, -12$	-10 ✗	
$6, -4$	-2	
$3, -8$	-5 ✓	-24 ✓

Check:

$$(x-8)(x+3)$$

$$= x^2 \underbrace{+3x - 8x} - 24$$

$$= x^2 - 5x - 24$$ ✓

CONSOLIDATION

$$x^2 + bx + c$$

REINFORCEMENT

- Pages 211 – 213
  - #4 – 9, 12, 16, 19*, 20*

#4, 6-9, 12, 16