

Lesson 1.4: Factoring Trinomials of the Form $x^2 + bx + c$ (Simple Trinomials)

Specific Outcome: 5.2 – Model factoring of a trinomial, concretely or pictorially, and record the process symbolically. 5.4 – Identify and explain errors in a polynomial factorization. 5.5 – Factor a polynomial, and verify by multiplying the factors. 5.8 – Express a polynomial as a product of its factors.

FACTOR USING ALGEBRA TILES

Consider: $x^2 + 5x + 6$

We can place these algebra tiles into a rectangle:

Solution: _____

Practice: Factor $a^2 + 7a + 10$

FACTOR USING SUM/PRODUCT METHOD

The following are examples of trinomials that have been factored into two binomial factors.

$$x^2 + 7x + 6 = (x + 6)(x + 1)$$

$$x^2 + 7x + 12 = (x + 4)(x + 3)$$

$$x^2 - 9x + 20 = (x - 5)(x - 4)$$

$$x^2 + 4x - 12 = (x + 6)(x - 2)$$

Label all of the numbers: $x^2 + bx + c = (x + m)(x + n)$. How are m and n related to b and c ?

****We use this sum and product relationship to factor simple trinomials.**

1. Factor. $x^2 + 8x + 12$: S: _____
P: _____

Practice: Factor.
a) $x^2 + 13x + 12$

S: _____
P: _____

b) $a^2 + 16a + 64$ S: _____
P: _____

c) $2y^2 + 20y + 48$

d) $-3a^2 - 51a - 216$

2. Factor. $x^2 - 11x + 10$:

Practice: Factor.
a) $a^2 - 11a + 30$

b) $y^2 - 10y + 25$

c) $x^2 - 11x + 28$

d) $4a^2 - 48a + 80$

******HELPFUL HINT:** When the *product is a positive number*, both integers have the same sign!!!!

3. Factor: $x^2 - 2x - 24$

$x^2 + 2x - 24$

Practice: Factor.

a) $y^2 - 3y - 54$

b) $x^2 + 7x - 30$

c) $x^2 - 4x - 32$

d) $5x^2 - 5x - 60$

e) $-4a^3 - 4a^2 + 168a$

f) $-10a^4 + 100a^3 - 240a^2$

******HELPFUL HINT:** When the *product is a negative number*, the integers have opposite signs!!!!

More Practice:

a) $15 - 20x + 5x^2$

b) $-2a^2 - 30a - 108$

c) $4a^2 - 16a - 84$

d) $3x^3 + 21x^2 + 30x$

Problem Solving:

1. The expression $x^2 - 4x - 45$ cm² can be written in the form $(x + a)(x - b)$. The value of $a + b$ is _____.

--	--	--	--

A rectangle has an area of $x^2 - 2x - 63$ cm². What are the dimensions of the rectangle?

2. When factored, the trinomials $x^2 - 10x + 21$ and $x^2 - 4x - 21$ have one binomial factor in common. This factor is
- A. $x - 7$ B. $x + 7$
C. $x - 3$ D. $x + 3$

3. The expression $x^2 - 4x + c$ **cannot** be factored if c has the value
- A. -5
B. 0
C. 4
D. 5

4. Find all possible integers for k so that each trinomial can be factored.
- a) $x^2 + kx + 20$ b) $x^2 + kx - 8$