QUADRATIC FUNCTIONS – Factoring Trinomials

Week of October 26 – 30, 2020

A **quadratic trinomial** has two important properties:

- The highest exponent is 2. In other words, a quadratic trinomial is a second-**degree polynomial**.
- It has three terms. The first has a squared variable (x^2), the second has a variable (x), and the third is a constant.

Before going further, it's helpful to review some of the terms that are used to describe a quadratic trinomial. If you are unfamiliar with any of the terms below, take a minute to read the definition and example.

Term	Definition	Example
Exponent	The small number that appears in the upper right	2 is the exponent of x in $3x^2 + 7x - 8$.
Coefficient	The number that appears before a variable	3 and 7 are coefficients of $3x^2 + 7x - 8$.
Leading coefficient	The number that appears before the first variable in a polynomial	3 is the leading coefficient of $3x^2 + 7x - 8$.
Factors	Numbers or expressions that can be multiplied together to get another number or expression	• 2 and 7 are factors of 14. • 6 and $(x + 3)$ are factors of $6x + 18$.
Second-degree polynomial	A polynomial whose highest exponent is 2	$3x^2 + x + 7$ is a second-degree polynomial.
Terms	The numbers, variables, or products of numbers and variables in a polynomial	$3x^2$, x, and 7 are the terms of $3x^2 + x + 7$.
Constant	The term in a polynomial without a variable	7 is the constant of $3x^2 + x + 7$.

FACTORING BINOMIALS

Factor $3x - 12$

$3x - 12$

↓

$3(x) - 3(4)$

↓

$3(x - 4)$

Factor $14x - 42$

$14x - 42$

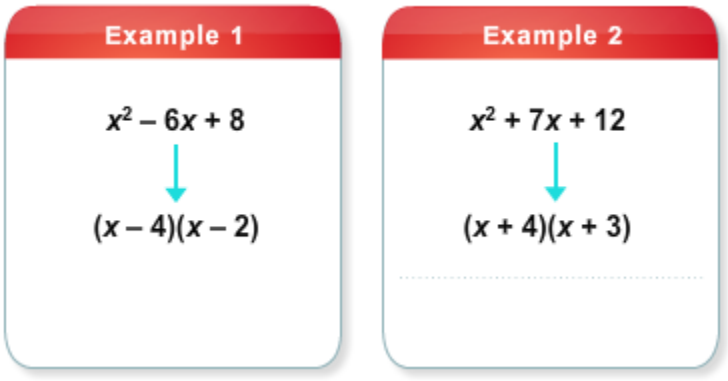
↓

$14(x) - 14(3)$

↓

$14(x - 3)$

FACTORING QUADRATIC TRINOMIALS



Rule #1 for Multiplying Binomials

READING SUPPORT REDISCOVER CHECK IT OUT

There are two important rules to consider when multiplying **binomials**. These will help you with **factoring**.

The first rule applies when the constants in the binomials have the same signs, such as in the following examples.

$$(x + 3)(x + 9)$$

$$(x - 4)(x - 1)$$

Rule #1 for Multiplying Binomials

When p and q are *both* positive OR *both* negative:

$$(x + p)(x + q) = x^2 + (p + q)x + pq$$

$$(x - p)(x - q) = x^2 + (-p + -q)x + pq$$

- The product of p and q is the constant term of the trinomial.
- The sum of p and q is the coefficient of the x-term in the trinomial.

Rule #2 for Multiplying Binomials

READING SUPPORT REDISCOVER CHECK IT OUT

You use a different rule when the constants in the **binomials** have different signs, such as in the following examples.

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

$$(x-5)(x+5)$$

Rule #2 for Multiplying Binomials

When p and q have *different* signs:

$$(x+p)(x-q) = x^2+(p-q)x-pq$$

$$(x-p)(x+q) = x^2+(q-p)x-pq$$

- The product of p and q is the constant term of the trinomial.
- The difference of p and q is the coefficient of the x-term in the trinomial.

FACTOR the following trinomials

Examples

Trinomial	Factors
$x^2+12x-28$	$(x-6)(x-2)$
$x^2-15x+36$	$(x+6)(x+6)$
$x^2+11x+28$	$(x-6)(x+2)$
$x^2+7x+12$	$(x-2)(x+18)$

Trinomial	Factors
$x^2-4x-12$	$(x+14)(x-2)$
$x^2+16x-36$	$(x+7)(x+4)$
$x^2+12x+36$	$(x+3)(x+4)$
$x^2-8x+12$	$(x-12)(x-3)$

PRACTICE

Trinomial	
$x^2 + 12x + 20$	$x^2 + x - 12$
$x^2 + 7x + 10$	$x^2 - 11x + 28$
$x^2 - 2x - 48$	$x^2 + 13x - 30$
$x^2 - 7x - 44$	$x^2 - 10x + 9$