Unit 4- Factoring

Content Area: **Mathematics**
Course(s): **Algebra, Math 8**
Time Period: **October**
Length: **35 Days (throughout the year)**
Status: **Published**

Unit Summary

This unit starts with an introductory exploration of the world of polynomials. Working fluently with polynomials is required for all advanced math classes, as well as, building number sense through generalized arithmetic. All students will add, subtract, and multiply polynomials by using properties of exponents and combining like terms. All students will develop the vocabulary to describe and classify polynomials and to solve polynomial equations in factored form using the zero product property. Based on a formative assessment of pre-requisite skills, students will progress through various factoring topics on an individual basis. Students start with factoring the greatest common factor and then work on when the coefficient of the quadratic term is 1. Extension topics continue into when x^2 is not 1, special cases in factoring, and simplifying rational expressions.

Standards

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.A-SSE.A	Interpret the structure of expressions
MA.K-12.2	Reason abstractly and quantitatively.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.A-SSE.B	Write expressions in equivalent forms to solve problems
MA.A-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
MA.A-SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.A-APR.A	Perform arithmetic operations on polynomials
MA.A-APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
MA.A-APR.B	Understand the relationship between zeros and factors of polynomials
MA.A-APR.B.3	Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
MA.A-APR.D	Rewrite rational expressions
MA.A-APR.D.7	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.

Student Learning Objectives

- Students will learn to factor out the greatest common factor.
- Students will learn to factor quadratic binomials and trinomials when a = 1.
- Students will learn to factor quadratic binomials and trinomials when a is not 1.
- Students will learn to solve quadratic equations by factoring and applying the zero product property.
- Students will learn to multiply polynomials including the square of a binomial and sum and difference of the same two terms.
- Students will learn to factor perfect square trinomials and the difference of two squares.
- Students will learn to simplifying rational expressions.
- Students will learn to multiplying and dividing rational expressions.

Essential Questions

- What does it mean to simplify in the language of algebra?
- How can patterns be used to simplify mathematical expressions?

Enduring Understandings

- Students will understand that mathematical models of complex, real-life scenarios require polynomials and factoring is used to simplify and manipulate those polynomials.

Application

- Students will be able to independently: use their learning to identify when an expression can be factored into parts.
- Students will be able to independently: use their learning to identify and explain the patterns and rules of factoring.
- Students will be able to independently: use their learning to analyze a situation for the best way to factor.
- Students will be able to independently: use their learning to solve equations using zero product property.

Skills

Students will be skilled at:

- Factoring a polynomial to write an expression as the product of 2 or more expressions.
- Solving nonlinear equations using factoring and the zero product property.

- Factoring to simplify and perform mathematical operations on rational expressions.