Unit 3: Polynomials and Factoring

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 9**
Length: **5 Weeks**
Status: **Published**

Unit Overview

In this unit, students will identify, classify, add, subtract and multiply polynomials. To find products, they will use the distributive property and patterns (including the FOIL model, first, outer, inner, last), the square of a binomial pattern and the sum and difference patterns). Students will write polynomials to describe and solve real-world problems, and solve polynomial equations. Students will factor polynomials and use factoring to solve equations, to find the zeros of functions, and the roots of equations. They will factor polynomials completely using a variety of techniques. Students will compare polynomial functions with linear and exponential functions.

Standards

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.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.

Essential Questions

- How do we know which factoring method(s) to use to solve a problem?
- How can factoring polynomials assist in solving real-world problems?

Application of Knowledge and Skills...

Students will know that...

- 1. a polynomial is a monomial or sum of monomials
- 2. polynomials can be multiplied using a vertical or horizontal model
- 3. the FOIL pattern (first, outer, inner, last) can be used to multiply two binomials

- 4. the first step to factoring polynomials is to factor out the greatest common factor (if necessary).
- 5. the AC method, crisscross method, and guess and check method can be used to factor polynomials in the form ax2+bx+c
- 6. polynomials that are prime cannot be factored
- 7. polynomial equations can be solved by using the zero-product property

Students will be able to:

- a. identify polynomials by type and degree
- b. add and subtract polynomials
- c. multiply polynomials
- d. use special product patterns to multiply polynomials
- e. solve polynomial equations in factored form
- f. factor trinomials with a leading coefficient of 1
- g. factor trinomials with a leading coefficient greater than 1 or negative
- h. factor special products
- i. factor polynomials by grouping
- j. factor polynomials completely
- k. use polynomials to find perimeter, area and dimensions of 2 dimensional figures
- l. compare polynomial functions with linear and exponential functions

Assessments

- Communicator Practice Diagnostic: Other written assessments Students will solve practice problems on communicators to receive immediate feedback
- Daily Warm-up Problems Diagnostic: Other written assessments Students will complete daily warm-up problems to assess readiness
- Factoring Quiz Formative: Written Test Topics will include factoring trinomials by using different methods
- Polynomials Quiz Formative: Written Test Topics will include adding, subtracting, and multiplying polynomials, and solving polynomial equations in factored form
- Ticket to Leave Problems Formative: Other written assessments Students will complete one or two problems to assess knowledge and skills learned during the class period
- Unit Test Summative: Written Test Unit Test will include all topics covered in the unit

Activities

Graph Polynomial Functions

Students will graph polynomial functions using paper and pencil and the graphing calculator.

Real-Life Problem Solving using Polynomials: Cutting the Lawn

Investigation: Solving Factored Equations

Factoring Puzzle

Key Vocabulary Crossword Puzzle

Pythagoras Enrichment Activity

Manufacturing Enrichment Project

- Classifying Polynomials Activity
- Pre-Factoring Puzzles

Activities to Differentiate Instruction

Mixed-ability grouping

Interactive Smart Board activities

Multi-Step Problem Solving

Math stations

Cooperative learning

Study guides (teacher and student completed)

Modify tests and homework as needed

Modified grading rubrics

Graphic organizers (Factoring Methods Chart)

Communicator response boards

Extended response questions

Challenge and enrichment homework, worksheets, and enrichment activity and project

Optional weekly challenge problems

Integrated/Cross-Disciplinary Instruction

Resources

McDougal Littell Algebra 1 textbook and resource materials

Website: www.classzone.com (see link)

Kuta Software

Algebra with Pizzazz

Punchline Algebra

Smart Exchange Website (see link)

Grade 8 Ask Math

American Diploma Project Algebra 1 End-of-Course Exam Workbook

- www.classzone.com
- exchange.smarttech.com/

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.