Unit 08 - Polynomials and Factoring

Content Area: **Mathematics**
Course(s): **Algebra I**
Time Period: **January**
Length: **28 days**
Status: **Published**

Unit Overview

In this unit, students will learn how to add, subtract, and multiply polynomial expressions. They will use the Communtative and Associative Properties to manipulate polynomial expressions. Also included in this unit will be factoring polynomials.

Enduring Understandings

- Monomials can be used to form larger expressions called polynomials. Polynomials can be added or subtracted.
- Some trinomials of the form ax^2+bx+c and some polynomials of a degree greater than 2 can be factored to equivalent forms which are the product of two binomials.
- The properties of real numbers can also be used to factor some trinomials of the form ax^2+bx+c and some polynomials of a degree greater than 2.
- The properties of real numbers can be used to multiply a monomial by a polynomial or simplify the product of binomials.
- There are several ways to find the product of two binomials, including models, algebra, and tables.

Essential Questions

- Can two algebraic expressions that appear to be different be equivalent?
- How are properties of real numbers related to polynomials?
- What rules must be followed to multiply polynomials?

Standards/Indicators

MA.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
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-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.

Student Learning Objectives (SLOs)

- To classify, add, and subtract polynomials
- To factor a monomial from a polynomial
- To factor higher degree polynomials by grouping
- To factor perfect square trinomials and the difference of two squares
- To factor trinomials of the form ax^2 + bx + c
- To factor trinomials of the form x^2 + bx + c
- To find the square of a binomial and to find the product of a sum and a difference
- To multiply a monomial by a polynomial
- To multiply two binomials or a binomial by a trinomial

Lesson Titles

- Adding and Subtracting Polynomials
- Factoring ax^2+bx+c
- Factoring by Grouping
- Factoring Special Cases
- Factoring x^2+bx+c
- Multiplying and Factoring
- Multiplying Binomials
- Multiplying Special Cases

Career Readiness, Life Literacies & Key Skills

TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
TECH.9.4.2.DC.1	Explain differences between ownership and sharing of information.
TECH.9.4.2.DC.2	Explain the importance of respecting digital content of others.
TECH.9.4.2.DC.3	Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).
TECH.9.4.2.TL.2	Create a document using a word processing application.
TECH.9.4.2.TL.3	Enter information into a spreadsheet and sort the information.

Inter-Disciplinary Connections

LA.RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly

	fresh, engaging, or beautiful. (e.g., Shakespeare as well as other authors.)
LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.W.9-10.2.A	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
LA.WHST.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LA.W.9-10.6	Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
9-12.HS-ETS1-4.5	Using Mathematics and Computational Thinking
9-12.HS-PS1-7.5	Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK

- Explain how to simplify fractional exponents
- Introduction, notes, and examples of multiplying monomials and polynomials
- students will work as a team and explain their work
- Summarize the rules of exponents for addition, subtraction, multiplication, and division
- #1- Blooms Knowledge - Remember previously learned information
- #2 - Blooms Comprehension - Demonstrate an understanding of facts
- #3 - Blooms Application - Apply Knowledge to actual situations
- #4 - Blooms Analysis - Break down objects or ideas into simpler parts and find evidence to support generalizations
- #5 - Blooms Synthesis - Compile component ideas into a new whole or propose alternative solutions
- #6 - Blooms Evaluation - Make and defend judgments based on internal evidence or external criteria
- Apply the rules of exponents to multiply polynomials
- Compare the methods of multiplying polynomials
- Discussion of vocabulary including monomials, binomials, polynomials
- Introduction, notes, and examples on adding and subtracting polynomials
- Introduction, notes, and examples on factoring including GCF, special cases, and solving by factoring
- Introduction, notes, and examples on multiplying polynomials including multiplying binomials
- review homework if need - answers posted on Google Classroom
- review warm up

- students will work individually
- tutoring during Delsea One

Modifications

This unit includes: Solving systems by graphing, solving systems by substitution, solving systems using elimination, applications of linear systems, linear inequalities, and systems of linear inequalities.

ELL Modifications

- Acquire the help from the Foreign Language Department if possible
- Assess ELL students continuously using formative assessment methods
- Be flexible with time frames and deadlines
- During Delsea One - one on one with a student who speaks the same language
- Intentional scheduling/grouping with student/teacher who speaks the same language if possible
- Khan Academy offers lesson in several languages: https://es.khanacademy.org/
- Offer resources for specific topics in primary language (Youtube web resources)
- Repeat, reword, clarify
- The NEA Portal offers lessons in several languages: http://neaportal.k12.ar.us/index.php/algebra-1-en-espanol/
- tutoring during Delsea One
- Use google translator, especially for application problems
- Using technology, such as but not limited to: graphing calculator and desmos

Benchmark Assessment

Skills-based assessment- math practice

IEP & 504 Modifications

- Allow re-takes only after a tutoring session
- Assessments will allow for calculator use and/or other math tools
- Give assessments on mathxl that are from the interactive algebra 1; however, the homework/classwork on mathxl will be from algebra 1 to expose them to the material

- Higher level reasoning questions would have less weight than other questions or provide as extra credit questions to provide exposure to these questions but not something that will be a determinant to the student's ability to share knowledge of content
- if not in a co-teaching setting allowing time in the schedule for a special education teacher to consult with general education teachers on what specifically can be modified or how to paraphrase things in a different way specific to that lesson
- Keep updated videos on google classroom for reinforcement outside of the classroom
- Less questions overall or possibly break the test into two parts
- Modeling and showing several examples
- Scaffolded notes
- speaking to students privately when redirecting behaviors
- tutoring during Delsea One
- Upload several youtubes on the concepts that are in this specific unit

G&T Modifications

- Allow to go ahead on concepts on mathxl
- Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning
- Employ differentiated curriculum to keep interest high
- Encourage students to make transformations- use a common task or item in a different way
- Flip the lessons to push further ahead
- Flip the lessons using videos of more in depth work
- Include more in depth problems involving application
- Invite students to explore different points of view on a topic of study and compare the two
- Provide more rigorous problems; either off the NJ State website or from the Pearson Algebra 2 textbook (available on mathxl)
- tutoring during Delsea One
- Videos that offer extra practice and examples in all areas are posted on google classroom and taken from: mathispower4u

Alternate Assessment

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

At Risk Modifications

- Refer students to Organizational Management
- Require Delsea One tutoring
- Stay in contact with parents/guardians and guidance counselors on student progress
- tutoring during Delsea One

Formative Assessment

- Connecting previous lessons
- Connecting vocabulary with root words
- Discussion including vocab review/recall
- Evaluate understanding of the lesson
- Guided review
- Homework/classwork
- Mathxlforschool
- NJSLA Math type of question
- Pass out of class
- SAT question of the day
- Skill need for lesson
- Teacher Observation
- Think-pair-share
- Turn to your partner and discuss
- Use What You Know -type of question
- Video clip
- Warm up review
- White Boards

Summative Assessment

- Benchmark Assessment
- Marking Period Assessment
- Quiz on Adding and Subtracting Polynomials
- Quiz on Factoring ax^2 + bx + c
- Quiz on Factoring by Grouping
- Quiz on Factoring x^2 + bx +c
- Quiz on Multiplying Binomials

- Unit Test on Polynomials and Factoring

Resources & Materials

- Colored pencils/highlighters
- Google Slides
- Mathispower4u video clip to introduce or demonstrate concepts
- Pearson 2015 Algebra 1 Textbook
- Teacher generated worksheets
- White board paddles

Technology

- Chromebooks
- Desmos
- Edpuzzle
- Equatio
- Google Classroom
- Google Forms
- Graphing calculator
- Mathway
- Mathxlforschool
- PearDeck
- Remind
- Video Clips

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.