Unit 9: Polynomials

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 35**
Length: **3 weeks**
Status: **Published**

Unit Overview

Polynomials will be the focus of this unit. Students will learn how to identify monomials, binomials, and trinomials. They will also learn how to write polynomials in ascending or descending order. During the unit, students will be introduced to adding and subtracting polynomials. They will learn how to multiply a monomial and a binomial and to multiply a binomial with a binomial using a box model. The FOIL method for these calculations also will be introduced. Students will be complete to apply these skills to geometry problems. Finally, students will be introduced to factoring polynomials. They will factor out the greatest common factor of polynomials as well as factor polynomials of the form $ax^2 + bx + c$ when $a = 1$.

Standards

MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
MA.A-SSE.B.3a	Factor a quadratic expression to reveal the zeros of the function it defines.
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.

Essential Questions

- Why is it important to have a strong foundation of knowledge about integer and exponent rules before learning about polynomials?
- What visual aides are available to assist with multiplying polynomials?
- How is factoring polynomials related to multiplying polynomials?

Application of Knowledge: Students will know that...

- a binomial is an expression with two terms.
- a monomial is an expression with only one term.
- a polynomial cannot contain negative exponents.
- a trinomial is an expression with three terms.
- factoring out a greatest common factor from a polynomial requires undoing the distributive property.

- FOIL is an acronym used to multiply binomials together.
- in order to add and subtract polynomials you must line up the like terms, and combine them.
- in order to put a polynomial in descending order you must order the exponents from greatest to least.
- when factoring polynomials of the form ax^2 + bx + c when a = 1 one needs to find two factors that multiply to "c" and add to "b".

Application of Skills: Students will be able to...

- add and subtract polynomials.
- classify polynomials.
- factor a polynomial of the form ax^2 + bx + c when a = 1.
- factor out a greatest common factor from a polynomial.
- multiply a binomial by a binomial.
- multiply a monomial by a polynomial.
- rewrite polynomials in either ascending or descending order.

Assessments

- Do-Now: These daily assessments will be used to check for prior knowledge and to determine mastery of particular topics. If needed, remediation will be completed on an as needed basis.
- Communicator practice: This will be used as a quick whole-class assessment tool to check for complete comprehension.
- Exit Tickets: These will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic.
- Polynomials Gallery Walk: An activity that can be used as a formative assessment (see description in activity section).
- Polynomials Puzzle: An activity that can be used as a formative assessment (see description in activity section).
- Practice using IXL
- Mid-Unit Quiz
- Unit Test
- Information from this unit will be included on a locally developed, mid-year or end of year benchmark assessment that may take the form of a test, performance based project, or other summative assessment.

Suggested Activities

- Student-centered SMART Board lessons: including features such as virtual manipulatives for adding, subtracting, and multiplying polynomials and sorting features for classifying polynomials
- Review games using Communicators
- Polynomials Puzzle: (from the Activity Generator) Students work with a partner to piece together a

puzzle containing polynomials using the FOIL method to multiply binomials.
- Polynomials Gallery Walk: Students will complete problems posted around the room that require students to add, subtract, and multiply polynomials. The answer to each poster will lead students to the next poster. This will create a sequence that students will complete in a specific order.
- Factoring "X" Puzzles: This is a teacher generated activity that is an introduction to factoring polynomials on the form $ax^2 + bx + c$ when a =1. Each puzzle has a "X" with a number written in the top section and a number written in the bottom section. Students must fill in the left and right sections of the "X" with the two numbers that multiply to give the top number and add together to give the bottom number.

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
  - Modifications & accommodations as listed in the student's IEP
  - Assign a peer to help keep student on task
  - Modified or reduced assignments
  - Reduce length of assignment for different mode of delivery
  - Increase one-to-one time
  - Working contract between you and student at risk
  - Prioritize tasks
  - Think in concrete terms and provide hands-on-tasks
  - Position student near helping peer or have quick access to teacher
  - Anticipate where needs will be
  - Break tests down in smaller increments

- Content specific modifications may include:
  - Provide personal handout for integer rules
  - Utilize different colored highlighters when identifying like terms for adding and subtracting polynomials
  - Draw in Punnett squares on questions for multiplying a binomial by a binomial
  - Draw in "X's" on questions for factoring polynomials when a = 1
  - Provide completed problems for practice work and homework

Differentiation for ELL's:

- General modifications may include:
  - Strategy groups
  - Teacher conferences
  - Graphic organizers
  - Modification plan
  - Collaboration with ELL Teacher

- Content specific vocabulary important for ELL students to understand include: terms, exponent, ascending, descending, same change change, like terms, distribute, factors, greatest common factor,

Differentiation to extend learning for gifted students may include:

- Investigate how to find the degree of a polynomial
- Investigate and complete problems that require multiplying a binomial by a trinomial
- Provide problems involving multiple variables for factoring out a greatest common factor from a polynomial
- Investigate and complete problems for factoring polynomials of the form $ax^2 + bx + c$ when $a \neq 1$

Technology Integration

- iPads or Chromebooks as appropriate to the activity.
- Online learning components including use of the Digits digital textbook and resources.
- Teacher integration of the SMART board to facilitate active student engagement throughout the course of the lesson.
- Software or online programs that teachers may use to create students materials or generate problems such as Kuta software.
- Additional practice provided through the use of IXL.

Integrated/Cross-Disciplinary Instruction

- **ELA:** Practice formulating complete and grammatically correct responses to open-ended questions.
- **Science:** The box method for multiplying a binomial by a binomial will be compared to Punnett squares and predicting genetic outcomes

Resources

- Digits student access and support: www.MyMathUniverse.com
- Digits teacher materials and support: www.pearsonrealize.com
- IXL: www.ixl.com
- SMART Exchange: http://exchange.smarttech.com/index.html#tab=0
- SMART Board lessons
- McDougel Littell Activity Generator CD-ROM
- Punchline/Pizzazz worksheets (self-correcting)
- Kuta software generated worksheets

21st Century Skills

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.