Marietta City Schools

2024–2025 District Unit Planner

Geometry: Concepts & Connections

Unit title	Unit 1: Polynomial Expressions	**MYP year**	*5*	**Unit duration (hrs)**	11 hours

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): ***What will students learn?***

GA DoE Standards

Standards

G.PAR.2: Interpret the structure of and perform operations with polynomials within a geometric framework.

G.PAR.2.1 Interpret polynomial expressions of varying degrees that represent a quantity in terms of its given geometric framework.

Fundamentals

- In Grade 8, students begin to interpret algebraic expressions and parts of an expression in context.
- Students should be able to interpret parts of an expression, such as terms, factors, leading coefficient, coefficients, constant and degree in context.
- Given mathematically applicable situations, which utilize formulas or expressions with multiple terms and/or factors, students should be able to interpret the meaning of individual terms or factors within the given framework.

Relevance and Application

- Students should have opportunities to use polynomial expressions within the context of geometric shapes.

Example

- Jax wants to buy a frame for an 8in x 10in photo. The frame will be the same thickness on all four sides. Write an expression to represent the perimeter and area of the frame. Possible solution: A=(2x+8)(2x+10), where x represents the width of the frame.
- Students should be able to discuss the meaning of the variable in context, the degrees of the expressions and the sums/products.

G.PAR.2.2 Perform operations with polynomials and prove that polynomials form a system analogous to the integers in that they are closed under these operations.

Fundamentals

- Students should understand that polynomials, like integers, are "closed" when it comes to addition, subtraction, and multiplication.
- Through investigation and exploration, students should be given opportunities to discover that the sum and/or difference of two or more polynomials is a polynomial and the product of two polynomials is a polynomial.
- Students should have opportunities to perform operations with binomials, trinomials, and other polynomials.

Terminology

- A polynomial is any expression that is a combination of one or more monomials connected via addition or subtraction.

G.PAR.2.3 Using algebraic reasoning, add, subtract, and multiply single variable polynomials.

Fundamentals

- Students should be able to use algebraic reasoning to show and explain how integers and polynomials are similar in that they both are closed under addition, subtraction, and multiplication.

• Students should have opportunities to perform operations with first, second, third, fourth, and fifth degree polynomials.

G.MM.1: Apply mathematics to real-life situations; model real-life phenomena using mathematics.

G.MM.1.1 Explain mathematically applicable problems using a mathematical model.

Fundamentals

• Students should be provided with opportunities to learn mathematics through the exploration of real-life problems.

• Mathematically applicable problems are those presented in context where the context makes sense, realistically and mathematically, and allows for students to make decisions about how to solve the problem (model with mathematics).

G.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.

Fundamentals

• Students should be able to use the content learned in this course to create a mathematical model to explain real-life phenomena.

G.MM.1.3 Using abstract and quantitative reasoning, make decisions about information and data from a mathematically applicable situation.

Fundamentals

• Students should be able to connect learning of geometric shapes and their properties to describe objects.

• Students should be able to apply geometric methods and data to make decisions about structures and solve real-world problems.

G.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

Fundamentals

• Students should be able to construct a model by selecting and creating algebraic and geometric representations that describe relationships between variables in context.

Concepts/Skills to support mastery of standards

- Sum versus difference
- Like terms
- Perimeter and area
- Expressions
- Identification of polynomials

Vocabulary

Binomial Expression	Constant Term	Coefficient	Difference	Expression	Factor
Greater Than	Integer	Less Than	Monomial Expression	Perimeter	Polynomial
Quotient	Ratio	Standard Form of a Polynomial	Sum	Term	(number #) times (Example: two times, three times, …
Trinomial Expression	Twice	Variable	Area	Distribute	Degree
Like Terms	Parallelogram	Polygon	Product	Quadrilateral	

Notation

Sum versus product Ie. (x+3)+(x+3) versus (x+3)(x+3)		
Key concept	**Related concept(s)**	**Global context**
Logic.	Simplification, equivalence, models	Globalization & Sustainability - Urban planning, strategy & infrastructure

Statement of inquiry

Logic can help us understand modeling and equivalence when determining a strategy for urban planning & infrastructure.

Inquiry questions

Factual—

- How does the area differ from the perimeter of a quantity?
- What process can be used to determine the area of a shape?
- What process do you use to find the simplest form of an algebraic expression?

Conceptual—

- How can manipulatives be used to justify combining like terms?
- How can polynomials be used to express realistic situations?
- How do I interpret parts of an algebraic expression in terms of context?

Debatable-

- What is the best method for finding the area of a figure where a piece is missing?

MYP Objectives	**Assessment Tasks**	
*What specific MYP **objectives** will be addressed during this unit?*	***Relationship** between summative assessment task(s) and statement of inquiry:*	*List of common formative and summative assessments.*
No MYP objectives will be assessed for this unit.	Students will apply their knowledge of operations of polynomials to real world applications.	**Formative Assessment(s):** Quiz Polynomials Operations **Summative Assessment(s):** Unit 1 Test

Approaches to learning (ATL)
Category: Thinking Skills **Cluster:** Transfer **Skill Indicator:** Combine knowledge, understanding & skills to create products or solutions **Learning Activity:** K - 12 School Building from GaDOE

Learning Experiences		
Objective or Content	**Learning Experiences**	**Personalized Learning and Differentiation**
● **G.PAR.2.2** Perform operations with polynomials and prove that polynomials form a system analogous to the integers in that they are closed under these operations. ● **G.PAR.2.3** Using algebraic reasoning, add, subtract, and multiply single variable polynomials.	**K-12 School Building: Diagnostic, Explore, and Apply** In this learning plan, students will explore adding and multiplying polynomials through the context of the construction of a K-12 school building. 1. Students can interpret the structure of polynomials within a geometric context. 2. Students can perform operations with monomials, binomials, trinomials, and other polynomials in geometric contexts. 3. Student can use algebraic reasoning to add and multiply single variable polynomials.	On - Level: Complete diagnostic, explore and part of apply Honors: Will extend applications Vocabulary Organizer with synonyms for operations Algebra Tiles Modify appropriate language to provide access to content, provide scaffolding, Vocabulary resources (glossary) ● Activation activities for accessing prior knowledge ● Extension activities - “An Amazing Fact a Day Making Pyramids” Task (Building Thinking Classrooms in Mathematics)
Content Resources		
Textbook Correlation: enVision A|G|A - Algebra 1 **G.PAR.2.1** - Lesson 7-1 **G.PAR.2.2** - Lesson 7-1, 7-2, 7-3 **G.PAR.2.3** - Lesson 7-1, 7-2, 7-3 **GaDOE Unit Resources**		