



Marietta City Schools
2023–2024 District Unit Planner

Honors Geometry: Concepts & Connections

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

Notation Sum versus product i.e. $(x+3)+(x+3)$ 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		
<p>Factual—</p> <ul style="list-style-type: none"> ● 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? <p>Conceptual—</p> <ul style="list-style-type: none"> ● 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? <p>Debatable-</p> <ul style="list-style-type: none"> ● What is the best method for finding the area of a figure where a piece is missing? 		
MYP Objectives	Assessment Tasks	
<i>What specific MYP objectives will be addressed during this unit?</i>	<i>Relationship between summative assessment task(s) and statement of inquiry:</i>	
MYP A Knowledge and Understanding	Students will apply their knowledge of operations of polynomials to real world applications.	<p style="text-align: center;"><u>Formative Assessment(s):</u> MYP A CFA - Sum, Difference, Product Single Variable</p> <p style="text-align: center;"><u>Summative Assessment(s):</u> Unit 1 Assessment</p>

Approaches to learning (ATL)

K-12 School Building: Culminating Task - Apply

Category: Thinking Skills

Cluster: Transfer

Skill Indicator: Combine knowledge, understanding & skills to create products or solutions

Learning Experiences

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
G.PAR.2.1 G.PAR.2.2 G.PAR.2.3 Students will find area of a specific wing of a K-12 school to determine value of x for certain cost	K-12 School Building: Culminating Task (DOE) Diagnostic, Explore Part 1, Apply, Reflect	- Modify appropriate vocabulary - Algebra Tiles - Explore Part 2 as support for differentiation - Scaffold as necessary

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

Exploring Polynomials in Geometric Contexts - Diagnostic Assessment could be used as a class-wide activity during the first few days of school before the unit 'officially' starts

Classroom Floor Planning with Polynomials - Task that takes the design from "Innovative Classroom Activity" and applies area instead of just perimeter

Outdoor Learning Space - Task that incorporates volume. Would need to be scaffolded to fit time constraints but a great extension task.