Marietta City Schools

2025 - 2026 District Unit Planner

Enhanced Advanced Algebra and AP Precalculus

Unit title	Unit 1: AA Unit 1: Investigating Descriptive & Inferential Statistics (DOE Unit 1) APPC Unit 1: Modeling Polynomial and Piecewise Functions (DOE Units 3 and 4)	**Unit duration (hours)**	*25 hours*

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

GA DoE Standards

Standards

AA.DSR.2: Communicate descriptive and inferential statistics by collecting, critiquing, analyzing, and interpreting real-world data.

AA.DSR.2.1 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. Distinguish between primary and secondary data and how it affects the types of conclusions that can be drawn.

AA.DSR.2.2 When collecting and considering data, critically evaluate ethics, privacy, potential bias, and confounding variables along with their implications for interpretation in answering a statistical investigative question. Implement strategies for organizing and preparing big data sets.

AA.DSR.2.3 Distinguish between population distributions, sample data distributions, and sampling distributions. Use sample statistics to make inferences about population parameters based on a random sample from that population and to communicate conclusions using appropriate statistical language.

AA.DSR.2.4 Calculate and interpret z-scores as a measure of relative standing and as a method of standardizing units.

AA.DSR.2.5 Given a normally distributed population, estimate percentages using the Empirical Rule, z-scores, and technology.

AA.DSR.2.6 Model sample-to-sample variability in sampling distributions of a statistic using simulations taken from a given population.

AA.DSR.2.7 Given a margin of error, develop and compare confidence intervals of different models to make conclusions about reliability.

AA.DSR.2.8 Summarize and evaluate reports based on data for appropriateness of study design, analysis methods, and statistical measures used.

AP PC 1.1 - 1.6

1.1 Changes in Tandem
1.2 Rates of Change
1.3 Rates of Change in Linear and Quadratic Functions
1.4 Polynomial Functions and Rates of Change
1.5 Polynomial Functions and Complex Zeros
1.6 Polynomial Functions and End Behavior

AA.FGR.5: Extend exploration of quadratic solutions to include real and non-real numbers and explore how these numbers behave under familiar operations and within real-world situations; create polynomial expressions, solve polynomial equations, graph polynomial functions, and model real-world phenomena.

AA.FGR.5.1 Graph and analyze quadratic functions in contextual situations and include analysis of data sets with regressions.

AA.FGR.5.2 Define complex numbers i such that $i^2 = -1$ and show that every complex number has the form a + bi where a and b are real numbers and that the complex conjugate is a - bi.

AA.FGR.5.3 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

AA.FGR.5.4 Use the structure of an expression to factor quadratics.

AA.FGR.5.5 Write and solve quadratic equations and inequalities with real coefficients and use the solution to explain a mathematical, applicable situation.

AA.FGR.5.6 Solve systems of quadratic and linear functions to determine points of intersection.

AA.FGR.5.7 Create and analyze quadratic equations to represent relationships between quantities as a model for contextual situations.

AA.FGR.5.8 Identify the number of zeros that exist for any polynomial based upon the greatest degree of the polynomial and the end behavior of the polynomial by observing the sign of the leading coefficient.

AA.FGR.5.9 Identify zeros of polynomial functions using technology or pre-factored polynomials and use the zeros to construct a graph of the function defined by the polynomial function. Analyze identify key features of these polynomial functions.

AA.FGR.5.10 Use the structure of an expression to factor polynomials, including the sum of cubes, the difference of cubes, and higher-order polynomials that may be expressed as a quadratic within a quadratic.

AA.FGR.5.11 Using all the zeros of a polynomial function, list all the factors and multiply to write a multiple of the polynomial function in standard form.

PC.FGR.2: Analyze the behaviors of rational and piecewise functions to model contextual mathematical problems.

PC.FGR.2.1 Graph piecewise-defined functions, including step functions and absolute value functions.

PC.FGR.2.2 Describe characteristics by interpreting the algebraic form and graph of a piecewise-defined function.

PC.FGR.2.3 Represent the limit of a function using both the informal definition and the graphical interpretation in the context of piecewise-defined functions; interpret limits expressed in analytic notation.

PC.FGR.2.4 Divide polynomials using various methods.

<u>Concepts/Skills to be Mastered by Students</u>

- Sample surveys, experiments, observational studies
- Population and Sample Distributions
- The Normal distribution
- Empirical Rule
- Z-scores
- Margin of Error and Confidence Intervals
- Sampling Methods
- Measures of center and variability
- Conceptual understanding of standard deviation

1.A Solve equations and inequalities represented analytically, with and without technology.
1.B Express functions, equations, or expressions in analytically equivalent forms that are useful in a given mathematical or applied context.

1.C Construct new functions, using transformations, compositions, inverses, or regressions, that may be useful in modeling contexts, criteria, or data, with and without technology.
2.A Identify information from graphical, numerical, analytical, and verbal representations to answer a question or construct a model, with and without technology.
2.B Construct equivalent graphical, numerical, analytical, and verbal representations of functions that are useful in a given mathematical or applied context, with and without technology.
3.A Describe the characteristics of a function with varying levels of precision, depending on the function representation and available mathematical tools.
3.B Apply numerical results in a given mathematical or applied context.
3.C Support conclusions or choices with a logical rationale or appropriate data.

Vocabulary

Central Limit Theorem	Confidence Interval	Confounding Variables	Descriptive Statistics	Error	Ethics
Experimental Study	Generalizable	Inferential Statistics	Law of Large Numbers	Margin of Error	Messy Data
Normal Distribution	Observational Study	Percentile	Population	Population Distribution	Potential Bias
Primary Data	Privacy	Probability	Randomization	Reliability	Sample
Sample Survey	Sample Data Distribution	Sampling Distribution	Sampling Variability	Secondary Data	Simulation
Standard Deviation	Standard Unit	Trial	Validity	Variability	z-score
Axis	Coefficient	Complex Number	Concave Down	Concave Up	Decreasing
Degree	End Behavior	Exponent	Extrema	Factor	Features
Fundamental Theorem of Algebra	Higher Order Polynomials	i (the number “i”)	Imaginary Number	Increasing	Intersection Point
Leading Coefficient	Limit	Maximum	Minimum	Multiple	Quadrant
Quartic	Polynomial	Root	Real Number	Regression	Zero

Notation

Standard deviation (**σ**)

Z score $Z = \frac{x - \mu}{\sigma}$

i

$y = ax^2 + bx + c, \quad y = a(x - h)^2 + k, \quad y = a(x - p)(x - q)$
$y = ax^n + bx^{n-1} + cx^{n-2} + \ldots + dx + k$
$\lim_{x \to \infty} p(x) = \infty$ OR $\lim_{x \to \infty} p(x) = -\infty$

Essential Questions

- What is the purpose and difference among sample surveys, experiments, and observational studies?
- How does randomization relate to sample surveys, experiments, and observational studies?
- What factors lead to bias in contextual situations?
- What is the difference between population distributions and sample distributions?
- What inferences can be made about population parameters based on a random sample?
- How can z scores be used to compare data?
- When is the empirical rule utilized?
- How can sample-to-sample variability be modeled?
- How do you compare confidence intervals using margin of error?
- What is the appropriate study design, analysis method, and statistical measure used when evaluating reports?
- How do we model the intensity of light from its source?
- How can I use data and graphs to figure out the best time to purchase event tickets?
- How can we adjust known projectile motion models to account for changes in conditions?
- What are polynomial functions and how are they different from other types of functions?
- How do we identify the degree and leading coefficient of a polynomial function?
- What are the different forms of polynomial functions and how are they interconnected?
- How do we use polynomial functions to model real-world situations or problems?
- What role do the roots, zeros, and factors play in understanding polynomial functions?
- How do we analyze and interpret the behavior of polynomial functions, including end behavior and turning points?
- What strategies and techniques can be employed to graph polynomial functions accurately?
- How do we apply transformations to basic polynomial functions to create more complex ones?
- What methods exist for solving polynomial equations, and how do we determine their solutions?

Assessment Tasks

List of common formative and summative assessments.

Formative Assessment(s):

Unit Quizzes

Unit Skill Checks

Summative Assessment(s):

Unit 1 Quest - Factoring

Unit 1 Test - Statistics

Unit 1 Test - Polynomials

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation All information included by PLC in the differentiation box is the responsibility and ownership of the local school to review and approve per Board Policy IKB.
AA.DSR.2.4 Calculate and interpret z-scores as a measure of relative standing and as a method of standardizing units. **AA.DSR.2.5** Given a normally distributed population, estimate percentages using the Empirical Rule, z-scores, and technology.	**Normal Distributions** In this learning plan, students will analyze the standard normal curve to make sense of population distributions. Students will also learn how to use the empirical rule and z-scores to extrapolate from a sample to a population and use statistical methodologies to make predictions regarding the full population. **Learning Goals:** ● I can use the mean and standard deviation to fit data to a normal distribution ● I can use calculators or tables to estimate areas under the normal curve. ● I can interpret areas under a normal curve in context ● I can calculate and interpret z-scores. ● I understand z-scores as a measure of relative standing and as a method of standardizing units. ● I can determine the percentile a data point falls into. ● I can conduct a sampling operation to gather data about a population. ● I can develop statistical parameters of the data that was gathered.	Students will be able to work at their own pace in collaborative groups where additional scaffolding is available as needed.

	• I can make predictions about the total population, based on the sample.	

Content Resources

Textbook Correlation: enVision A|G|A - Algebra 2

AA.DSR.2.1 - Lessons 11-2, Topic 11-Mathematical Modeling in 3 Acts
AA.DSR.2.2 - Lessons 11-2
AA.DSR.2.3 - N/A
AA.DSR.2.4 - Lesson 11-4
AA.DSR.2.5 - Lesson 11-4
AA.DSR.2.6 - Lessons 11-5, Topic 11-Mathematical Modeling in 3 Acts
AA.DSR.2.7 - Lesson 11-5
AA.DSR.2.8 - Lesson 11-6

Math Medic

AP Classroom

Bryan Passwater Notes

Textbook Correlation: enVision A|G|A - Algebra 2

AA.FGR.5.1 - Lessons 2-1, 2-2, 3-3, 3-6
AA.FGR.5.2 - Lesson 2-4
AA.FGR.5.3 - Lessons 2-4
AA.FGR.5.4 - Lessons 2-3, 2-4
AA.FGR.5.5 - Lesson 1-5, 2-3, 2-4, 2-5, 2-6, Topic 2-Mathematical Modeling in 3 Acts
AA.FGR.5.6 - Lessons 2-7
AA.FGR.5.7 - Lessons 2-1, 2-2, Topic 2-Mathematical Modeling in 3 Acts
AA.FGR.5.8 - Lessons 3-5, 3-6, Topic 3-Mathematical Modeling in 3 Acts
AA.FGR.5.9 - Lessons 3-1, 3-5, Topic 3-Mathematical Modeling in 3 Acts
AA.FGR.5.10 - Lesson 3-3
AA.FGR.5.11 - Lesson 3-6