

## Advanced Algebra COURSE CONTENT

### Polynomial Functions:

- Determine the degree of the polynomial, the sign of the leading coefficient, and types of zeros (real or imaginary) from a graph or an equation.
- Calculate and use x- and y-intercepts and approximate maxima to sketch a polynomial function.
- Determine how degree, zeros, and leading coefficient affect the shape and end behavior of a polynomial
- Sketch a polynomial given in standard form that has at least one rational zero. Additional zeros can be rational, irrational or imaginary.
- Given key features or a graph, write the equation of the polynomial function.
- Use a polynomial function in a real-world application.

### Rational Functions and Equations:

- Perform operations on rational expressions
- Solve rational equations and identify extraneous solutions
- Find critical features of a rational function (asymptotes, intercepts, holes, domain restrictions)
- Accurately graph a rational function by finding critical features
- Apply knowledge of rational functions to solve an application problem

### Radical Functions and Equations:

- Perform operations on radical expressions (simplify, add, subtract, multiply, divide)
- Solve radical equations and identify restrictions on the domain.
- Find critical features of a radical function (intercepts, limits/asymptotes, domain restrictions)
- Accurately graph a radical function by finding critical features and identifying each transformation
- Apply knowledge of rational functions to solve an application problem

### Exponential and Logarithmic Functions and Equations:

- Given a logarithmic or exponential equation, find the inverse form
- Given a logarithmic or exponential graph, find the inverse form
- Apply definitions and properties of logarithms and exponents to solve logarithmic equations
- Apply definitions and properties of logarithms and exponents to solve exponential equations
- Identify, write, and solve exponential growth and decay equations
- Graph exponential and logarithmic functions showing intercepts, asymptotes and end behavior
- Extend the interpretation and solving of applications (e.g., Newton's Law of Cooling, logarithmic scales)

### Trigonometry

- Unit Circle
- Pythagorean Identity
- Graph sin, cos, tan with transformations

### Series and Patterns:

- Evaluate the sum of a series expressed in sigma notation.
- Find the sum of the first 'n' terms of a series.
- Find the sum of an infinite geometric series and determine when one can't be found.

### Probability:

- Apply the Fundamental Counting Principle graphically and numerically
- Calculate combinations and permutations
- Use combinations and permutations appropriately to calculate certain probabilities.
- Simplify factorial expressions.
- Differentiate between dependent and independent events.
- Calculate probabilities and conditional probabilities algebraically or by using a diagram.
- Pascal's Triangle
- Binomial Expansion

### Data Exploration:

- Create a histogram from data
- Compare data to a Normal distribution using mean, standard deviation, and histogram.
- Recognize that there are data sets for which a Normal approximation is not appropriate
- Use the Empirical rule to estimate Normal probabilities
- Calculate and interpret a z-score
- Produce a Normal Probability Plot
- Calculate a Margin of Error