



Curriculum & Instruction

SUMMIT PUBLIC SCHOOLS

Content Area: Mathematics
Course: Pre-Calculus (H251)
Grade(s): 10-12

Course Overview

Pre-Calculus is a full-year course offered as part of the mathematics curriculum. This course develops the ideas associated with polynomial, rational, exponential, logarithmic, and trigonometric functions. The various functions are applied to real world situations. Additional topics include conic sections, parametric and polar equations, sequences and series, and a brief introduction to limits. Students will also have the opportunity to explore data using technologic resources such as Desmos, as well as their graphing calculators. Students will receive a graphing calculator for their use throughout the course. They are responsible for the calculator just as for their textbook.

This course is for the student who has successfully completed Algebra 2/Trigonometry, maintained at least a "B-" average and wishes to continue the study of mathematics at a more demanding level. Students who have taken the Precalculus Essentials course and have maintained a B average may also enroll in this course. The course develops the ideas associated with circular, polynomial, exponential, logarithmic, and trigonometric functions. The various functions are applied to real world situations. Additional topics are rational functions, conic sections, polar coordinates, sequences and series, and an introduction to limits.

Prerequisite: Algebra 2/Trigonometry or PreCalculus Essentials

New Jersey State Learning Standards

Summit Public Schools curriculum aligns with the [New Jersey Student Learning Standards](#).

Content Area Standards:

- 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
 - a. Interpret parts of an expression, such as terms, factors, and coefficients.
- A-APR.A.2. Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
- A-APR.B.2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a , the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.

Date Revised: August 2025

- A-APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
- A-APR.C.4+. Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples.
- A-CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
- A-REI.A.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
- A-SSE.A.1. Interpret expressions that represent a quantity in terms of its context.
 - a. Interpret parts of an expression, such as terms, factors, and coefficients.
 - b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P .
- A-SSE.A.2. Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
- A-SSE.B.4+. Derive and/or explain the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.
- F-BFA.1. Write a function that describes a relationship between two quantities.
 - a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
 - c+. Compose functions.
- F-BFA.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
- F-BFB.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
- F-BFB.4. Find inverse functions.
 - a. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.
 - b+. Verify by composition that one function is the inverse of another.
- F-BFB.5+. Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
- F-IFA.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
- F-IFA.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

- F-IF.A.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.
- F-IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
- F-IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
- F-IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
- F-IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
 - a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
 - b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
 - c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
 - d+. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
 - e. Graph exponential and logarithmic functions, showing intercepts and end behavior.
 - f. Graph trigonometric functions, showing period, midline, and amplitude.
- F-IF.C.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
 - a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
- F-IF.C.8b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.
- F-IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
- F-LE.A.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.
 - a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
 - b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.

- c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
- F-LE.A.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- F-LE.A.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
- F-LE.A.4. Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to $ab^{(ct)} = d$ where a , c , and d are numbers and the base b is 2, 10, or e ; evaluate the logarithm using technology.
- F-LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context.
- F-TFA.1+. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
- F-TFA.2+. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
- F-TFA.3+. Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for x , $\pi + x$, and $2\pi - x$ in terms of their values for x , where x is any real number.
- T-TFA.4+. Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. Model periodic phenomena with trigonometric functions.
- F-TFB.5+. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
- F-TFB.6+. Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
- F-TFB.7+. Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.
- F-TFC.8+. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.
- F-TF-C.9 Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.
- F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
 - e. Graph exponential and logarithmic functions, showing intercepts and end behavior; and trigonometric functions, showing period, midline, and amplitude.
- F-TFC.8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.
- G-GPE.A.1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
- G-GPE.A.2. Derive the equation of a parabola given a focus and directrix.
- G-GPE.A.3+. Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.
- N-CN.A.1. Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.
- N-CN.A.2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

- N-CN.B.4+. Represent complex numbers on the complex plane in rectangular and polar form (including real and imaginary numbers), and explain why the rectangular and polar forms of a given complex number represent the same number.
- N-CN.B.5+. Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. For example, $(-1 + \sqrt{3}i)^3 = 8$ because $(-1 + \sqrt{3}i)$ has modulus 2 and argument 120° .
- N-CN.C.7. Solve quadratic equations with real coefficients that have complex solutions.
- N-CN.C.8+. Extend polynomial identities to the complex numbers. For example, rewrite $x^2 + 4$ as $(x+2i)(x-2i)$.
- N-CN.C.9+. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
- N-VM.A.1+. Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., $\mathbf{v}$, $|\mathbf{v}|$, $\|\mathbf{v}\|$, v).
- N-VM.A.2+. Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
- N-VM.A.3+. Solve problems involving velocity and other quantities that can be represented by vectors.
- N-VM.B.4+. Add and Subtract Vectors
 - a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.
 - b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.
 - c. Understand vector subtraction $\mathbf{v} - \mathbf{w}$ as $\mathbf{v} + (-\mathbf{w})$, where $-\mathbf{w}$ is the additive inverse of $\mathbf{w}$, with the same magnitude as $\mathbf{w}$ and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise
- N-VM.B.5+. Multiply a Vector by a Scalar
 - a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as $c(v_x, v_y) = (cv_x, cv_y)$.
 - b. Compute the magnitude of a scalar multiple $c\mathbf{v}$ using $\|c\mathbf{v}\| = |c|\mathbf{v}|$. Compute the direction of $c\mathbf{v}$ knowing that when $|c|\mathbf{v}| \neq 0$, the direction of $c\mathbf{v}$ is either along $\mathbf{v}$ (for $c > 0$) or against $\mathbf{v}$ (for $c < 0$).

Interdisciplinary Standards:

- RI.MF.9–10.6. Analyze, integrate, and evaluate multiple interpretations (e.g., charts, graphs, diagrams, videos) of a single text or text/s presented in different formats (visually, quantitatively) as well as in words in order to address a question or solve a problem.
- RST.9-10.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Date Revised: August 2025

Career Readiness, Life Literacies and Key Skills Standards:

- 9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas
- 9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option
- 9.4.8.DC.7: Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.
- 9.2.12.CAP.10: Identify strategies for reducing overall costs of postsecondary education
- 9.1.12.CDM.2: Compare and contrast the advantages and disadvantages of various types of mortgages.
- 9.1.12.CDM.6: Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit. (e.g., student loans, credit cards, auto loans, mortgages, etc.).
- 9.1.12.PB.2: Prioritize financial decisions by considering alternatives and possible consequences.
- 9.1.12.PB.6: Describe and calculate interest and fees that are applied to various forms of spending, debt and saving.
- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

Computer Science and Design Thinking Standards:

- 8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.

Career Readiness Practices

- CRP 1. Act as a responsible and contributing citizen and employee.
- CRP 2. Apply appropriate academic and technical skills.
- CRP 3. Attend to personal health and financial well-being.
- CRP 4. Communicate clearly and effectively and with reason.
- CRP 5. Consider the environmental, social and economic impacts of decisions.
- CRP 6. Demonstrate creativity and innovation.
- CRP 7. Employ valid and reliable research strategies.
- CRP 8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP 9. Model integrity, ethical leadership and effective management.
- CRP 10. Plan education and career paths aligned to personal goals.

- CRP 11. Use technology to enhance productivity.
- CRP 12. Work productively in teams while using cultural global competence.

New Jersey Curriculum Mandates:

This curriculum integrates lessons that address the following interdisciplinary New Jersey Curriculum Mandates:

- [Diversity and Inclusion](#) (Grades K - 12)
 - C.18A:35-4.36a: Curriculum to include instruction on diversity and inclusion.
 - (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs.

Learning Objectives

Learning objectives are clear, specific statements that define what students should know, understand, and be able to do by the end of a lesson or course.

Students will be able to...

- Determine which relations are functions algebraically and graphically.
- Find and express domain and range utilizing interval notation.
- Analyze function characteristics such as extrema, symmetry, asymptotes, continuity, boundedness, and end behaviors, with and without the use of a graphing calculator.
- Algebraically and graphically represent translations, reflections, stretches and compressions (both vertical & horizontal) of functions.
- Recognize and apply transformations to specific functions, not utilizing the graphing calculator.
- Add, subtract, multiply, divide and create composite functions.
- Find inverses of functions and relations.
- Identify appropriate basic functions with which to model real-world problems.
- Use the limit notation to describe the end behavior of functions.
- Recognize and graph linear and quadratic functions, and use these functions to model situations and solve problems.
- Divide polynomials using long division or synthetic division.
- Apply the Remainder, Factor, and Rational Zeros Theorem.
- Find upper and lower bounds for zeros of polynomials.
- Factor polynomial with real coefficients using factors with complex coefficients.
- Describe graphs of rational functions by identifying
 - Horizontal, vertical and slant asymptotes.
 - Predict the behavior of rational functions.
- Solve inequalities involving polynomial and rational functions by using both algebraic and graphical techniques.
- Evaluate exponential expressions
- Identify and graph exponential and logistic functions.
- Use exponential growth, decay, and regression equations to model real-world scenarios.
- Convert equations between logarithmic form and exponential form.

- Evaluate and graph common and natural logarithms
- Apply the properties of exponential and logarithmic functions to evaluate, solve and graph, with and without a graphing calculator.
- Use exponential functions and equations to solve business and finance applications.
- Convert between radians, degrees, and DMS.
- Find arc lengths, and sector areas
- Use linear and angular speed to solve real-world problems.
- Define the six trigonometric functions using the lengths of the sides of a right triangle.
- Draw an angle in standard position and find coterminal angles.
- Relate right triangle trigonometry with the coordinate plane and Unit Circle.
- Generate graphs of the trigonometric functions and explore various transformations.
- Evaluate inverse trigonometric functions.
- Solve real-world problems using right triangle trigonometry, navigation, and sinusoids.
- Use key terms and vocabulary appropriately
- Use the Law of Sines to solve oblique triangles
- Find areas of oblique triangles
- Use the Law of Sines to model and solve real-life problems
- Use the Law of Cosines to solve oblique triangles (SSS or SAS)
- Use the Law of Cosines to model and solve real-life problems
- Use Heron's Area Formula to find areas of triangles
- Use trigonometric ratios and angles to solve problems
- With navigation and simple harmonic motion.
- Represent vectors as directed line segments
- Write the component forms of vectors
- Perform basic vector operations and represent vectors graphically
- Write vectors as linear combinations of unit vectors
- Find the direction angles of vectors
- Use vectors to model and solve real-life problems.
- Find the dot product of two vectors and use the properties of the dot product.
- Find the angle between two vectors and determine whether two vectors are orthogonal.
- Write vectors as sums of two vector components
- Use vectors to solve word problems.
- Plot complex numbers in the complex plane and find absolute values of complex numbers.
- Write the trigonometric forms of complex numbers
- Multiply and divide complex numbers written in trigonometric form
- Use DeMoivre's Theorem to find powers of complex numbers
- Find n th roots of complex numbers
- Use sequence notation to write the terms of sequences
- Finding a common difference or ratio is important to identify the type of sequence and its formula.
- Using the given formulas for the n th term, use the common difference or ratio to set up the formula.
- Use factorial notation
- Use summation notation to write sums.
- Using the formula for n th terms along with the provided formulas for arithmetic and geometric sums, the sum of a series can be found.

- Finding the sum of an arithmetic sequence can be done a variety of ways, such as using sigma notation in the calculator or with the provided formula derived by Gauss.
- Find the sums of infinite series
- Use sequences and series to model and solve real-life problems
- Recognize, write, and find the n th terms of arithmetic sequences
- Find n th partial sums of arithmetic sequences
- Use arithmetic sequences to model and solve real-life problems
- Recognize, write, and find the n th terms of geometric sequences
- Find n th partial sums of geometric sequences
- Find sums of infinite geometric series
- Use geometric sequences to model and solve real-life problems
- Recognize a conic as the intersection of a plane and a double-napped cone
- Write equations of parabolas in standard form and graph parabolas
- Use the reflective property of parabolas to solve real-life problems
- Write equations of ellipses in standard form and graph ellipses
- Use properties of ellipses to model and solve real-life problems
- Find the eccentricities of ellipses
- Write equations of hyperbolas in standard form
- Find asymptotes of and graph hyperbolas
- Use properties of hyperbolas to solve real-life problems
- Classify conics from their general equations
- Completing the square, factoring and putting equations into standard form for each type of conic section will reveal all the characteristics needed to graph it. There are specific major and minor axes, along with asymptotes and focal chords that create accurate graphs of each conic section.
- Identify symmetry, maximum values and zeros of a polar function help make graphing the function an easier task.
- Evaluate sets of parametric equations for given values of the parameter
- Sketch curves that are represented by sets of parametric equations and rewrite the equations as single rectangular equations
- Find sets of parametric equations for graphs
- Plot points on the polar coordinate system
- Convert points from rectangular to polar form and vice versa
- Convert equations from rectangular to polar form and vice versa . Substitution can help convert rectangular equations into parametric equations.
- Graph polar equations by point plotting Recognize special polar graphs
- Write and graph equations of conics in polar form
- Given a function for velocity, students can answer a variety of questions regarding the speed, angle, horizontal and vertical distance of a situation modeled with parametric equations
- Given several properties rooted in the vectors/complex numbers unit, students can convert polar equations into rectangular equations and vice versa.

Units of Study

Units of study are organized collections of lessons and learning experiences focused on a specific topic and set of skills within a course. Each unit is guided by a set of essential questions.

Unit 1: Functions and Their Graphs (~9 Days)

- Why are functions important?
- How do different families of functions compare?
- How are graphs and functions connected?
- How can functions be used as models?
- What are real-life applications of functions?
- How can mathematical ideas be represented?
- How are symbols useful in mathematics?
- How can functions be used as models?
- How can functions and graphs be transformed?

Unit 2A: Polynomial Functions (~8 Days)

Unit 2B: Rational Functions, Expressions, Introduction to Limits (~12 Days)

- What are the relationships between the algebraic expression of a polynomial function and the characteristics of its graph?
- What are the relationships between the algebraic expression of a rational function and the characteristics of its graph?
- How and why are complex numbers used in the real world?
- Why is mathematics used to model real world situations?
- When could nonlinear functions be used to create a mathematical model for a real world situation?

Unit 3: Exponential & Logarithmic Functions (~9 Days)

- Why are exponential functions important?
- How are exponential functions and logarithmic functions related?
- How are exponential and logarithmic functions connected to real-world scenarios?
- What are the relationships between exponential and logarithmic functions and the characteristics of their graphs?

Unit 4: Trigonometric Functions (~15 Days)

Unit 5: Analytic Trigonometry (~11 Days)

Unit 6A: Law of Sines & Cosines (~5 Days)

- How are angles measured and why?
- How are trigonometric functions defined?
- What are real-life applications of trigonometric functions?
- What are the relationships between the algebraic expressions for trigonometric functions and the characteristics of its graph?

Unit 6B: Vectors and Trig Form of Complex Numbers (~12 Days)

- How do you find the magnitude and direction of a vector?
- How do you find the resultant of two vectors?
- How do you find the resultant navigational velocity of a plane affected by wind?

Unit 8: Sequences and Series (~7 Days)

- How do you identify what type of sequence it is?
- How do you find the formula for the n th term for an arithmetic and geometric sequence?

- How do you find the sum of an arithmetic and geometric sequence?
- How do you use sigma notation to find the sum of a sequence?
- How can we model a real-world situation using a formula for an arithmetic sequence?
- How do you decide when to use a sequence versus series?
- Why are arithmetic and geometric sequences and series used in real-world scenarios?
- When can a sequence or series be useful for modeling a real-life problem?

Unit 9A: Conic Sections (~10 Days)

- What are some applications involving conics eg. parabolic mirrors, satellite dish shapes etc?
- How do you know what type of conic section based on its equation?
- How do you graph a given conic section properly (correct eccentricity, parabola width, hyperbola asymptotes, etc)?

Unit 9B: Parametric and Polar Equations (~10 Days)

- How do you express a rectangular equation as a set of parametric equations?
- How do you find the vertical distance of an object modeled with a set of parametric equations?
- How do you express a rectangular equation as a polar equation?
- How do you graph polar functions?

Unit 11: Introduction to Limits (~7 Days) *time permitting based on state/AP testing calendars

Instructional Resources and Materials

Instructional resources are the information sources teachers utilize to guide their teaching and assessing. Instructional materials are the texts students read or review. The instructional resources and materials may vary in order to meet the learning needs of students.

- Guided Note Outlines
- [Google Classroom](#)
- [DeltaMath](#)
- [Desmos](#)
- [Khan Academy](#)
- [NJ Standardized Test Prep Resources](#)
- [Kuta Software](#)

Assessment Strategies

Assessment measures a student's mastery of a course standard and learning objective. Assessment can be used for both instructional purposes and for evaluative purposes. Teachers may choose one or more of the following ideas to assess learners. They may also modify these ideas to make the assessment more responsive to students' interests and needs.

Formative: Practice Problem Sets, Homework Exercises, Exit Tickets, Graded Check-Ins

Summative: Quizzes & Unit Tests

Date Revised: August 2025

Benchmark: Midterm and Final Exams

Alternative: Projects

Suggested Strategies for Modification & Differentiation

[Modifications Chart](#)