West Windsor-Plainsboro Regional School District
AP Calculus BC
Revised Summer 2023

Math Equity Statement
ALL learners should have access to rigorous, high-level mathematical content in an environment where risk-taking, deep conceptual understanding, and growth mindset are the norm.

Core Beliefs:
Our district's strategic goals prioritize teaching and learning from a productive standpoint. Building upon the principles of *Catalyzing Change in High School Mathematics*, we aim to cultivate equitable mathematics practices and shift from deficit-based to productive beliefs. According to the National Council of Teachers of Mathematics (NCTM, 2020), "Mathematics education must be equitable, ensuring that each and every student has access to high-quality mathematics teaching and learning opportunities." Our objective is for every student to perceive themselves as capable, knowledgeable, and meaning-makers in mathematics.

Drawing from *Catalyzing Change* and *Mathematical Mindsets* by Jo Boaler (2016), we embrace the following beliefs:

- All students are capable of learning mathematics at high levels.
- All students will progress on their mathematical journey.
- Developing a growth mindset is essential for learning.
- Visual and deep thinking enhance mathematical understanding.
- Mathematics learning is fostered through discourse and collaboration.
- Mistakes are integral to the learning process.

Math Workshop:
Catalyzing Change states that teaching should provide opportunities for each and every student to develop a positive mathematical identity, recognizing their own mathematical abilities and potential. The Math Workshop instructional model enables meaningful mathematics engagement, reflection, and the realization of students' potential as mathematicians. By incorporating student choice, problem-solving, targeted small group instruction, and deliberate practice of critical grade-level concepts (Lempp, 2017), Math Workshop creates an environment where students feel comfortable taking intellectual risks. Sienna (2009) outlines four values to support students in taking risks and fostering discourse, which include:

- Valuing the thinking process alongside correct answers.
- Valuing problems that allow for multiple solutions.
- Valuing inquisitive responses.
- Valuing tolerance for mistakes (Sienna, 2009, p. 68).

Math Workshop embraces these values and fosters a supportive, collaborative learning environment for all students. It is the instructional model employed by our dedicated teachers.

Unit 1: Limits & Continuity	
Content Area: Mathematics	
Course & Grade Level: AP Calculus BC, grades 11 and 12	
Summary and Rationale	
Limits are the foundational concept of calculus. This unit features a multi-representational approach to calculus, with limits, continuity, and their connected theorems expressed graphically, numerically, analytically, and verbally. Exploring connections among these representations builds understanding of how calculus applies limits to develop important ideas, definitions, formulas, and theorems. A sustained emphasis on clear communication of methods, reasoning, justifications, and conclusions is essential for 21st century learners.	
Recommended Pacing	
Approximately 6 days	
New Jersey Student Learning Standards for	
Standards for Mathematical Practice	
CPI #	**Cumulative Progress Indicator (CPI)**
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	**Cumulative Progress Indicator (CPI)**
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
New Jersey Student Learning Standards for Computer Science and Design Thinking	
CPI #	**Cumulative Progress Indicator (CPI)**
8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.
Interdisciplinary Standards Science	
HS.LS1	Interpreting Functions (F-IF) and Building Functions (F-BF). 20 Science example: Use a spreadsheet or other technology to simulate the doubling in a process of cell division; graph the results; write an expression to represent the number of cells after a division in terms of the number of cells beforehand; express this in closed form as a population size in terms of time. Discuss real-world factors in the situation that lead to deviation from the exponential model over time. *page 30 NGSS appendix L
Instructional Focus	

Unit Enduring Understandings

- Calculus is the study of the rate of change of values and allows us to find length, area, and volume.
- A limit is the foundation of both differential and integral calculus.
- Continuity is defined by limits and is a prerequisite for many applications in calculus.

Unit Essential Questions

- Why are limits the foundation of calculus and how are they useful?
- How do limits relate to various features of a function and its graph?
- How is continuity used to identify the existence of important values of a function?

Content Understandings

- A limit at a value is defined when the left and right side limits are equal.
- The limit of a function is the value the output of that function approaches as the input approaches some constant.
- A function is continuous when the function value is defined, the limit exists, and the function value equals the limit value.
- The slope of a tangent line at a point is defined as a limit.
- The difference between average rate of change (over a time interval) and instantaneous rate of change (at a single moment).

Content Questions

- How is a limit defined?
- What are the three implied criteria for continuity at a point?
- How do limits help determine the slopes of tangent lines?
- What does it mean for a limit to not exist?
- What information is necessary to guarantee that a function will pass through a specific y-value?

Objectives

We are learning to/that:

- The informal definition of a limit, definition of continuous.
- Translate among verbal, visual, and algebraic definitions of limits and continuity.
- Evaluate limits using the squeeze theorem.
- Apply the intermediate value theorem.
- Estimate the slope of a line tangent to a given point.
- Estimate the average velocity and instantaneous velocity at a given time.
- Determine the limit of a function by applying the limit laws.
- Evaluate limits approaching infinity.
- Evaluate indeterminate limits, particularly those of difference quotients.
- Apply the definition of continuity.
- Calculate slopes of tangents, velocities, and other rates of change by applying the learned techniques to compute limits.

Evidence of Learning

- ☑ Formative Assessment
- ☑ Summative Assessment
- ☑ Alternative Assessment
- ☑ Benchmark

Assessment plan includes teacher-designed formative and summative assessments, a district common assessment, self-assessments, and performance tasks. During each common, formative, and summative assessment, teachers will provide alternative assessment opportunities that adhere to 504 and IEP requirements. Alternative assessments are individualized for the needs of all students. Accommodations

Resources

Core Text: Calculus for the AP® Course, Sullivan & Miranda, 2020 and AP Classroom

Unit 2: Differentiation	
Content Area: Mathematics	
Course & Grade Level: AP Calculus BC, grades 11 and 12	
Summary and Rationale	
Differentiation is the mathematical study of change and is a fundamental operation of calculus. This unit features a multi-representational approach to calculus, with limits, derivatives, and their associated theorems expressed graphically, numerically, analytically, and verbally. Exploring connections among these representations builds understanding to describe rates of change of one variable with respect to another and will lead to using definite integrals to describe the net change in one variable over an interval of another. This allows students to understand change in a variety of contexts. A sustained emphasis on clear communication of methods, reasoning, justifications, and conclusions is essential for 21st century learners.	
Recommended Pacing	
Approximately 23 days	
New Jersey Student Learning Standards for	
Standards for Mathematical Practice	
CPI #	**Cumulative Progress Indicator (CPI)**
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	**Cumulative Progress Indicator (CPI)**
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
New Jersey Student Learning Standards for Computer Science and Design Thinking	
CPI #	**Cumulative Progress Indicator (CPI)**
8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.
Instructional Focus	
Unit Enduring Understandings	
● A derivative is the instantaneous rate of change of a function. ● Derivatives can be used to identify key features of a function and its graph. ● Derivative concepts help explain phenomena in the physical world by examining them in multiple representations.	
Unit Essential Questions	

- How is an instantaneous rate of change useful?
- How can a derivative be interpreted?
- How can we use derivatives to understand the behavior of functions?

Content Understandings

- Derivatives of multiple types of functions exist (i.e., polynomial, rational, trigonometric, radical, exponential, logarithmic, and inverse).
- Differentiation techniques (product, quotient, and chain rules) can be used in evaluating the derivative of compositions of functions.
- A derivative is a function that represents the instantaneous rate of change of another function.
- Higher order derivatives can be used to analyze functions and sketch curves (including max and min).
- The Mean Value Theorem follows from differentiability and can be used to further interpret functions.
- Derivatives help to identify and interpret key features of a graph or function.
- Derivatives have real-world applications including related rate and optimization problems.

Content Questions

- What is a derivative and how do we find one?
- What does the Mean Value Theorem state, and when is it applied?
- How does one interpret and solve applications of differentiation, specifically related rate and optimization problems?
- How do the first and second derivatives of a function determine the shape of its graph?
- What is the difference between average and instantaneous rates of change?
- How do students identify which rule to apply when calculating derivatives?

Objectives

We are learning to/that:

- Apply the definition of derivative as a function.
- Interpret the derivative as a rate of change and find the average & instantaneous rate of change.
- Apply the power rule, product rule, quotient rule, and chain rule to evaluate derivatives of functions.
- Differentiate polynomial, rational, trigonometric, exponential, logarithmic, inverse trigonometric, and radical functions.
- Apply the method of implicit differentiation.
- Evaluate the derivative of an inverse function at a given point.
- Apply the method of logarithmic differentiation.
- Evaluate higher order derivatives.
- Solve related rate applications.
- Find the linearization of a function and use it to approximate values.
- Apply calculus to find the relative and absolute extrema of a function.
- Apply L'Hospital's rule in evaluating limits.
- Apply the Mean Value Theorem.
- Apply the Extreme Value Theorem.
- Analyze and make connections between a function and its derivative graphically.
- Connect and interpret position, velocity, and acceleration using derivatives for 1-dimensional motion.
- Solve real world optimization problems.

Evidence of Learning

- ☑ Formative Assessment
- ☑ Summative Assessment
- ☑ Alternative Assessment
- ☑ Benchmark

Assessment plan includes teacher-designed formative and summative assessments, a district common assessment, self-assessments, and performance tasks. During each common, formative, and summative assessment, teachers

will provide alternative assessment opportunities that adhere to 504 and IEP requirements. Alternative assessments are individualized for the needs of all students. Accommodations
Resources
Core Text: Calculus for the AP® Course, Sullivan & Miranda, 2020 and AP Classroom

Unit 3: Integration	
Content Area: Mathematics	
Course & Grade Level: AP Calculus BC, grades 11 and 12	
Summary and Rationale	
Along with limits and differentiation, integration is a fundamental operation of calculus. This unit features a multi-representational approach to calculus, with integrals and their related theorems expressed graphically, numerically, analytically, and verbally. Exploring connections among these representations builds understanding to solve problems in mathematics and physics involving the area of an arbitrary shape, the length of a curve, and the volume of a solid, among others. A sustained emphasis on clear communication of methods, reasoning, justifications, and conclusions is essential for 21st century learners.	
Recommended Pacing	
Approximately 28 days	
New Jersey Student Learning Standards for	
Standards for Mathematical Practice	
CPI #	**Cumulative Progress Indicator (CPI)**
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	**Cumulative Progress Indicator (CPI)**
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
New Jersey Student Learning Standards for Computer Science and Design Thinking	
CPI #	**Cumulative Progress Indicator (CPI)**
8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.
Instructional Focus	
Unit Enduring Understandings	
● Integral calculus allows for the derivation of length, area, and volume of function-defined objects through infinite sums. ● Integral concepts help explain phenomena in the physical world across different fields by examining them in multiple representations. ● Integrals are connected to derivatives through the Fundamental Theorem of Calculus.	
Unit Essential Questions	
● How are estimation techniques and limits used to develop the idea of an infinite sum?	

- How can an integral be interpreted?
- How are derivatives and integrals related?
- How can we use integrals to understand the behavior of functions?

Content Understandings

- Integrals are an infinite sum.
- A definite integral allows us to find the area between a curve and an axis, and can be interpreted as total and net change of a value.
- A definite integral can be approximated using a finite number of geometric shapes.
- Antiderivatives are solutions to differential equations which can be general or particular.
- Fundamental Theorem of Calculus connects derivatives and integrals.
- Integrals exist in both definite and indefinite forms.
- Indefinite integrals result in a constant of integration which has both graphical and algebraic importance.
- First order differential equations can sometimes be solved using integration and are graphed as slope fields to help visualize their family of solutions.
- Integrals can be used to find the area and volume of geometric shapes and figures.

Content Questions

- Why are rectangles used to approximate area in the cartesian plane?
- What methods can be used to integrate different types of functions and how does the integrand form indicate the best integration technique?
- What is the Fundamental Theorem of Calculus?
- How are derivatives and integrals connected?
- How is integration used to find total and net change?
- How is integration used to calculate length, area, and volume?

Objectives

We are learning to/that:

- Determine the antiderivative of a function.
- Approximate definite integrals using Riemann sums or Trapezoidal sums.
- Approximate the displacement or total distance traveled by a particle moving along a line.
- Apply the Fundamental Theorem of Calculus to evaluate definite integrals and take derivatives of integrals.
- Solve applications involving the Total Change Theorem.
- Evaluate definite and indefinite integrals by applying the substitution rule, integration by parts, and partial fraction decomposition.
- Use limit notation to evaluate convergent and divergent improper integrals.
- Determine the average value of a function.
- Find the area of a region bounded by two curves.
- Find the volume of a solid obtained by a rotation, using the disk and/or washer method.
- Find the volume of a solid with known cross-sections.
- Solve application problems involving length, area, and volume.
- Construct a slope field and sketch a solution curve according to an initial condition.
- Solve a differential equation by using separation of variables.
- Analyze exponential growth and decay examples, including logistic models.
- Approximate the value of a function using Euler's method.
- Match equations and differential equations with slope fields and solution curves.

Evidence of Learning

- ☑ Formative Assessment
- ☑ Summative Assessment
- ☑ Alternative Assessment
- ☑ Benchmark

Assessment plan includes teacher-designed formative and summative assessments, a district common assessment, self-assessments, and performance tasks. During each common, formative, and summative assessment, teachers will provide alternative assessment opportunities that adhere to 504 and IEP requirements. Alternative assessments are individualized for the needs of all students. Accommodations
Resources
Core Text: Calculus for the AP® Course, Sullivan & Miranda, 2020 and AP Classroom

Unit 4: Infinite Series	
Content Area: Mathematics	
Course & Grade Level: AP Calculus BC, grades 11 and 12	
Summary and Rationale	
Polynomials are much simpler to work with in many mathematical contexts than other types of functions. In this unit, students will learn how to use calculus to create polynomials that approximate various functions. Students will also learn different ways of assessing the accuracy of their approximations and, for infinite polynomials, determine the convergence and divergence of those infinite series. Using the tests of convergence and divergence, students will learn to identify the interval of convergence for these infinite series representations. This unit features a multi-representational approach to calculus, with series expressed numerically, graphically, analytically, and verbally. Exploring connections among these representations builds understanding to solve problems in mathematics. A sustained emphasis on clear communication of methods, reasoning, justifications, and conclusions is essential for 21st century learners.	
Recommended Pacing	
Approximately 21 days	
New Jersey Student Learning Standards for	
Standards for Mathematical Practice	
CPI #	**Cumulative Progress Indicator (CPI)**
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	**Cumulative Progress Indicator (CPI)**
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
New Jersey Student Learning Standards for Computer Science and Design Thinking	
CPI #	**Cumulative Progress Indicator (CPI)**
8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.
Instructional Focus	
Unit Enduring Understandings	
● Infinite series help to simplify computations and perform calculus on different functions. ● Different tests are required to determine the convergence or divergence of an infinite series due to the unique characteristics of each series.	
Unit Essential Questions	

- Why can functions be represented as infinite series and how does this representation benefit us as students of calculus?
- How can you identify the best test of convergence or divergence for a given infinite series?

Content Understandings

- Functions can be represented by an infinite series.
- Geometric series are closely related to power series.
- A Taylor series is a power series that uses the derivatives of a function at a specific point to create a polynomial with infinite terms to represent the function centered around that point.
- Common Maclaurin series, which are Taylor series centered around 0, can be used as the foundation for a transformed function of the same family.
- The ratio test is derived from the convergence and divergence of a geometric series.
- The integral test determines convergence by comparing the area under a curve to its Reimann sum approximation, which is the value of the infinite series.
- The harmonic series is a special p-series that can be used in conjunction with comparison tests to determine the divergence of many series.
- Alternating series may converge conditionally or absolutely.
- Taylor polynomials can be used to approximate the value of functions and the error of these approximations can be bounded.
- The tests of convergence can be used to determine the intervals on which Taylor and power series converge on the functions they represent.

Content Questions

- How can one test the convergence of an infinite series?
- How is the Taylor series formula derived and what is the connection between this derivation and the series' intended purpose?
- What does it mean for an infinite series to diverge, absolutely converge, or conditionally converge?
- How can a series be used to approximate a function?
- What is the relationship between geometric, power, Taylor, and Maclaurin series?
- For what kinds of infinite series can the sum to which the series converges be found?

Objectives

We are learning to/that:

- A series is the sum of the terms in a sequence.
- Find the general term of a sequence.
- Apply the ratio, integral, nth term, alternating series, limit comparison, and direct comparison tests.
- Analyze different types of series including geometric, harmonic, p-series, alternating, and more.
- Determine whether an infinite series converges or diverges.
- Find the interval of convergence of a power series.
- Determine the sum of a convergent infinite geometric series.
- Determine if a convergent infinite series is either absolutely convergent or conditionally convergent.
- Define a function using a power series.
- Write the Taylor or Maclaurin series for a provided function.
- Approximate the value of a function using a Taylor polynomial.
- Determine the error bound for Taylor polynomial approximations.

Evidence of Learning

- ☑ Formative Assessment
- ☑ Summative Assessment
- ☑ Alternative Assessment
- ☑ Benchmark

Assessment plan includes teacher-designed formative and summative assessments, a district common assessment, self-assessments, and performance tasks. During each common, formative, and summative assessment, teachers will provide alternative assessment opportunities that adhere to 504 and IEP requirements. Alternative assessments are individualized for the needs of all students. Accommodations
Resources
Core Text: Calculus for the AP® Course, Sullivan & Miranda, 2020 and AP Classroom

Unit 5: Parametric and Polar Equations	
Content Area: Mathematics	
Course & Grade Level: AP Calculus BC, grades 11 and 12	
Summary and Rationale	
In addition to rectangular form, equations and graphs can be represented using parametric and polar functions. In this unit, students will learn to convert between these representations and apply their knowledge of calculus in the cartesian system to the polar system. This unit features a multi-representational approach to polar calculus and two dimensional motion expressed graphically, numerically, analytically, and verbally. Exploring connections among these representations builds understanding to solve problems in mathematics and physics involving the equation of tangent lines, the area of an arbitrary shape, and the motion along a curve, among others. A sustained emphasis on clear communication of methods, reasoning, justifications, and conclusions is essential for 21st century learners.	
Recommended Pacing	
Approximately 8 days	
New Jersey Student Learning Standards for	
Standards for Mathematical Practice	
CPI #	**Cumulative Progress Indicator (CPI)**
1	Make sense of problems and persevere in solving them.
2	Reason abstractly and quantitatively.
3	Construct viable arguments and critique the reasoning of others.
4	Model with mathematics.
5	Use appropriate tools strategically.
6	Attend to precision.
7	Look for and make use of structure.
8	Look for and express regularity in repeated reasoning.
New Jersey Student Learning Standards for English Language Arts Companion Standards	
Standard: Science Key Ideas and Details	
CPI #	**Cumulative Progress Indicator (CPI)**
RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
CPI #	**Cumulative Progress Indicator (CPI)**
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
New Jersey Student Learning Standards for Computer Science and Design Thinking	
CPI #	**Cumulative Progress Indicator (CPI)**
8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.
Instructional Focus	
Unit Enduring Understandings	
● Calculus can be represented in multiple coordinate systems and each one has a particular advantage. ● Calculus can be applied to all plane curves, even when not interpreted as a function *y* in terms of *x*. ● Concepts in polar and parametric systems offer an alternative approach to explaining phenomena in the physical world by examining them in multiple representations.	

Unit Essential Questions

- Why would it be useful to represent curves in different coordinate systems?
- How do you use vectors to describe motion in two dimensions?
- What are the similarities and differences in interpreting derivatives of rectangular, parametric, and polar curves?

Content Understandings

- There are many different coordinate systems, such as polar, that represent the same two-dimensional plane.
- While the concepts of calculus remain the same in different coordinate systems, the approach to solving problems in each coordinate system will be different.
- While derivatives are rates of change, this rate of change is not always the same as the slope of the line tangent to a curve.
- Vectors can describe position and motion of an object in the plane.

Content Questions

- What are vectors and how are they connected to parametric equations?
- How does one convert between rectangular and polar coordinates and how does this relate to calculus?
- How is the length of a plane curve calculated?
- How can derivatives and integrals be calculated for polar equations?
- What are the similarities and differences in finding area between rectangular curves and finding area between polar curves?
- How can you use calculus of polar and parametric equations to interpret motion of an object?
- What shape makes most sense when evaluating definite integrals of polar functions?

Objectives

We are learning to/that:

- Recognize that the procedural aspects are different for various coordinate systems, though the underlying concepts remain the same.
- Find an equation of a tangent line at a point on a polar or parametric curve.
- Find the area of a region bounded by the graphs of polar equations.
- Determine the position, velocity, and/or acceleration vectors in 2D motion problems.
- Determine the speed of an object moving in a 2D plane.
- Find the distance traveled, or arc length, along a plane curve.
- Interpret the motion of a particle whose movement is defined by polar or parametric equations.
- The slope of the tangent line represented by dy/dx is the ratio of the derivatives of y(t) and x(t).
- Find the second derivative of a parametrically defined curve and use it to interpret concavity.

Evidence of Learning

- ☑ Formative Assessment
- ☑ Summative Assessment
- ☑ Alternative Assessment
- ☑ Benchmark

Assessment plan includes teacher-designed formative and summative assessments, a district common assessment, self-assessments, and performance tasks. During each common, formative, and summative assessment, teachers will provide alternative assessment opportunities that adhere to 504 and IEP requirements. Alternative assessments are individualized for the needs of all students. Accommodations

Resources

Core Text: Calculus for the AP® Course, Sullivan & Miranda, 2020 and AP Classroom