



Mount Pleasant Central School District

AP Calculus BC, Math

We believe that students should learn the mathematical practice standards by showing the connections between real world problems and mathematical solutions by modeling, explorations and discovery.

How can we precisely model and analyze continuous change and accumulation, extending those methods to more complex functions and motion in space? In this class, students will develop a deeper understanding of mathematical principles to investigate the concept of change, building upon the concepts covered in AP Calculus AB. Our main goal is to develop a rich understanding of limits, derivatives, integrals, the Fundamental Theorem of Calculus, and series. We emphasize connecting mathematical concepts through multiple representations (graphical, numerical, analytical, and verbal), justifying reasoning and solutions, and using correct notation and language to communicate such solutions. Assessment will primarily be through summative assessments that model the AP exam, as well as performance-based assessments, such as projects that enable students to connect mathematical concepts.

Unit Title	Month	Content	Vocabulary	Standards	Skills	Big Ideas	Assessments
Limits and Continuity	September	*Evaluating limits using different modalities. *Determining if a function is continuous using the definition of continuity.	Limit Continuous Removable discontinuity Infinite discontinuity Jump discontinuity	Identify mathematical information from graphical, numerical, analytical, and/or verbal representations. (CBAPAB-2.B)	Students will be able to evaluate limits given a graph, function, or table using a variety of methods. Students will be able to determine if a function is continuous and to identify types of discontinuities.	Limits describe the behavior of functions and underpin all of calculus.	In class, multiple-choice and short-answer questions. AP questions and formatting. (Half calculator, half without)
Geometric Interpretation of Derivatives	October	*Writing the equation of a tangent line and a normal line. *Using technology to support tangent line approximations.	Rate of change Instantaneous rate of change Tangent line Secant line Indeterminate expression	Identify an appropriate mathematical definition, theorem, or test to apply. (CBAPAB-3.B)	Students will be able to evaluate a limit using L'Hospital's rule. Students will be able to write the equation of a tangent line to a function, and use this to make a linear approximation.	Derivatives measure how quantities change instantaneously.	Take-home quiz with short answer questions.
Curve Sketching	October	*Using the first and	Critical point	Provide reasons or	Students will be able to	Derivatives reveal	In class, multiple-choice

Educating Each Student Today for Endless Possibilities Tomorrow

Mount Pleasant Central School District

AP Calculus BC, Math



We believe that students should learn the mathematical practice standards by showing the connections between real world problems and mathematical solutions by modeling, explorations and discovery.

How can we precisely model and analyze continuous change and accumulation, extending those methods to more complex functions and motion in space? In this class, students will develop a deeper understanding of mathematical principles to investigate the concept of change, building upon the concepts covered in AP Calculus AB. Our main goal is to develop a rich understanding of limits, derivatives, integrals, the Fundamental Theorem of Calculus, and series. We emphasize connecting mathematical concepts through multiple representations (graphical, numerical, analytical, and verbal), justifying reasoning and solutions, and using correct notation and language to communicate such solutions. Assessment will primarily be through summative assessments that model the AP exam, as well as performance-based assessments, such as projects that enable students to connect mathematical concepts.

Unit Title	Month	Content	Vocabulary	Standards	Skills	Big Ideas	Assessments
		second derivative tests to further analyze a function. *Determining behavior of original function based on first and second derivative graphs	Point of inflection Concavity Extrema Increasing/decreasing	rationales for solutions and conclusions. (CBAPAB-3.E)	conduct the first and second derivatives tests to analyze a function. Students will be able to make inferences about f given the graph of f' or f'' .	structure and behavior of functions.	and short answer questions. AP questions and formatting. (Half calculator, half without)
Implicit Differentiation and Applications	November	*Finding first and second derivatives implicitly. *Applying results of implicit derivatives to write tangent lines and solve related rate word problems.	Related rate Constant Implicit Explicit Change	Apply appropriate mathematical rules or procedures, with and without technology. (CBAPAB-1.E)	Students will be able to find the first and second derivative of a relation implicitly. Students will be able to use the concept of implicit differentiation to solve related rates problems.	Differential equations describe patterns of change and accumulation.	Unit project on related rates. Students are to create a unique word problem using a provided formula. The problem requires the use of implicit differentiation and related rates concepts to solve.
Straight Line Motion	November	*Analyzing rectilinear motion problems.	Position Velocity	Apply appropriate mathematical rules or	Students will be able to apply concepts of velocity,	Derivatives model real-world change and	Take home quiz with short answer questions. Project

Educating Each Student Today for Endless Possibilities Tomorrow

Mount Pleasant Central School District

AP Calculus BC, Math



We believe that students should learn the mathematical practice standards by showing the connections between real world problems and mathematical solutions by modeling, explorations and discovery.

How can we precisely model and analyze continuous change and accumulation, extending those methods to more complex functions and motion in space? In this class, students will develop a deeper understanding of mathematical principles to investigate the concept of change, building upon the concepts covered in AP Calculus AB. Our main goal is to develop a rich understanding of limits, derivatives, integrals, the Fundamental Theorem of Calculus, and series. We emphasize connecting mathematical concepts through multiple representations (graphical, numerical, analytical, and verbal), justifying reasoning and solutions, and using correct notation and language to communicate such solutions. Assessment will primarily be through summative assessments that model the AP exam, as well as performance-based assessments, such as projects that enable students to connect mathematical concepts.

Unit Title	Month	Content	Vocabulary	Standards	Skills	Big Ideas	Assessments
		*Connecting calculus to kinematics such as first and second derivatives equating to velocity and acceleration, respectively.	Acceleration Displacement Optimization	procedures, with and without technology. (CBAPAB-1.E)	speed, acceleration, etc. to analyze straight line motion of an object. Students will be able to maximize or minimize a function through the process of optimization.	optimization.	on optimization where students have to determine efficiency of wrapping paper using the process of optimization.
Integration	December	*Integrating functions using different methods to determine anti-derivative functions. *Applying methods of integration to solve differential equations.	U-substitution Anti-derivative Indefinite integral Definite integral Constant of integration	Identify a re-expression of mathematical information presented in a given representation. (CBAPAB-2.C)	Students will be able to take the integral of a variety of different functions using various methods (power rule, substitution, etc.). Students will be able to solve differential equations through separation of variables, and slope fields to determine the general	Integrals represent accumulated change over an interval.	Mid-unit quiz on integration techniques. End of unit exam. In class, multiple choice and short answer questions. AP questions and formatting. (Half calculator, half without)

Educating Each Student Today for Endless Possibilities Tomorrow

Mount Pleasant Central School District

AP Calculus BC, Math



We believe that students should learn the mathematical practice standards by showing the connections between real world problems and mathematical solutions by modeling, explorations and discovery.

How can we precisely model and analyze continuous change and accumulation, extending those methods to more complex functions and motion in space? In this class, students will develop a deeper understanding of mathematical principles to investigate the concept of change, building upon the concepts covered in AP Calculus AB. Our main goal is to develop a rich understanding of limits, derivatives, integrals, the Fundamental Theorem of Calculus, and series. We emphasize connecting mathematical concepts through multiple representations (graphical, numerical, analytical, and verbal), justifying reasoning and solutions, and using correct notation and language to communicate such solutions. Assessment will primarily be through summative assessments that model the AP exam, as well as performance-based assessments, such as projects that enable students to connect mathematical concepts.

Unit Title	Month	Content	Vocabulary	Standards	Skills	Big Ideas	Assessments
					solution and particular solution.		
Integration Application - Area	January	*Calculating Riemann sums to approximate the area under a curve. *Using the Fundamental Theorem of Calculus (parts 1 and 2) to calculate area.	Left Riemann sum Right Riemann sum Midpoint Riemann sum Trapezoidal Riemann sum	Identify mathematical information from graphical, numerical, analytical, and/or verbal representations. (CBAPAB-2.B)	Students will be able to compute a riemann sum for a given function to approximate the area under the curve. Students will be able to compute the area under a curve, between two curves, with and without the calculator.	Integration connects geometric ideas to physical quantities.	Mid unit project on Riemann sums. Students drive a planned route. They approximate miles driven by conducting 4 Riemann sums. Quiz with short answer questions on area under the curve.
Integration Application - Volume	February	*Finding the volume of a solid of revolution using disk or washer methods. *Finding the volume of the solid generated by non-circular cross sections.	Disk method Washer method Cross-section Volume of revolution Average value	Apply an appropriate mathematical definition, theorem, or test. (CBAPAB-3.D)	Students will be able to apply the appropriate method (disk or washer) to find the volume of a solid of revolution. Students will be able to	Integration connects geometric ideas to physical quantities.	Unit project on solids of revolution. Students have to approximate the volume of a glass using circumference measurements and integration.

Educating Each Student Today for Endless Possibilities Tomorrow

Mount Pleasant Central School District

AP Calculus BC, Math



We believe that students should learn the mathematical practice standards by showing the connections between real world problems and mathematical solutions by modeling, explorations and discovery.

How can we precisely model and analyze continuous change and accumulation, extending those methods to more complex functions and motion in space? In this class, students will develop a deeper understanding of mathematical principles to investigate the concept of change, building upon the concepts covered in AP Calculus AB. Our main goal is to develop a rich understanding of limits, derivatives, integrals, the Fundamental Theorem of Calculus, and series. We emphasize connecting mathematical concepts through multiple representations (graphical, numerical, analytical, and verbal), justifying reasoning and solutions, and using correct notation and language to communicate such solutions. Assessment will primarily be through summative assessments that model the AP exam, as well as performance-based assessments, such as projects that enable students to connect mathematical concepts.

Unit Title	Month	Content	Vocabulary	Standards	Skills	Big Ideas	Assessments
					find the volume of a solid with a non-circular cross section.		
Parametric, Polar, and Vector Functions	February	*Differentiating parametrics, vectors, and polar curves. *Determining position, velocity, speed, acceleration, displacement, and distance of parametric or vector-defined objects.	Parametric equations Polar equations Vector-valued functions Length of curve $r(\theta)$	Identify how mathematical characteristics or properties of functions are related in different representations. (CBAPBC-2.D)	Students will be able to find the slope of a tangent line to a curve, the concavity, and length of a curve for parametric/vector and polar curves. Students will be able apply concepts of motion to parametric/vector-valued functions.	Alternate coordinate systems and parametric/vector forms model motion and geometry effectively.	In class, multiple choice and short answer questions. AP questions and formatting. (Half calculator, half without)
Infinite Sequences and Series	March - June	*Determining if a series converges or diverges. *Approximating functions through the creation of a Taylor/Maclaurin	Convergence/divergence Interval of convergence Power series Improper integral, Taylor/Maclaurin series,	Apply an appropriate mathematical definition, theorem, or test. (CBAPAB-3.D)	Students will be able to determine if an infinite series converges or diverges.	Functions can be approximated and analyzed using infinite series, summation, and Taylor series.	Take home quiz with multiple choice and short answer questions.

Educating Each Student Today for Endless Possibilities Tomorrow

Mount Pleasant Central School District

AP Calculus BC, Math



We believe that students should learn the mathematical practice standards by showing the connections between real world problems and mathematical solutions by modeling, explorations and discovery.

How can we precisely model and analyze continuous change and accumulation, extending those methods to more complex functions and motion in space? In this class, students will develop a deeper understanding of mathematical principles to investigate the concept of change, building upon the concepts covered in AP Calculus AB. Our main goal is to develop a rich understanding of limits, derivatives, integrals, the Fundamental Theorem of Calculus, and series. We emphasize connecting mathematical concepts through multiple representations (graphical, numerical, analytical, and verbal), justifying reasoning and solutions, and using correct notation and language to communicate such solutions. Assessment will primarily be through summative assessments that model the AP exam, as well as performance-based assessments, such as projects that enable students to connect mathematical concepts.

Unit Title	Month	Content	Vocabulary	Standards	Skills	Big Ideas	Assessments
		polynomial.			Students will be able to create Taylor or Maclaurin polynomials to approximate functions.		
		-	-		-		