

Unit	Lesson	Lesson Objectives
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Precalculus Review**Introduction to AP Calculus****Writing Two-Variable Linear Equations**

- Create linear equations given information about points, slope, and intercepts.
- Solve problems by writing two-variable linear equations.

Reading Lesson 1.1**Composition of Functions**

- Evaluate the composition of functions.
- Find the domain of the composition of functions.
- Write an expression for the composition of functions.

Symmetry

- Determine the symmetry of a function algebraically.
- Determine the symmetry of a relation from a graph.

Piecewise Defined Functions

- Determine the domain, range, and continuity of piecewise defined functions.
- Evaluate piecewise defined functions.
- Graph piecewise defined functions.

Reading Lesson 1.2**Graphing Exponential Functions**

- Determine the domain and range of exponential functions.
- Graph exponential functions.
- Identify exponential functions.

Base e

- Analyze exponential and logarithmic functions in base e to determine key features of the graph.
- Apply properties of logarithms and exponents to solve exponential and logarithmic equations having base e .
- Determine the domain and range of exponential and logarithmic functions in base e .

Modeling with Exponential and Logarithmic Equations

- Model and solve real-world problems using exponential and logarithmic functions.

Reading Lesson 1.3**Parametric Equations**

- Define curves parametrically.
- Determine the Cartesian equation that contains a given parametric equation.
- Graph parametric equations.

Reading Lesson 1.4

Unit	Lesson	Lesson Objectives
		Function Inverses <ul style="list-style-type: none">Find the inverse of a function.Use composition to verify that functions are inverses.
		Graphing Logarithmic Functions <ul style="list-style-type: none">Determine the domain and range of logarithmic functions.Identify and analyze the graphs of logarithmic functions.Identify logarithmic functions.
		Properties of Logarithms <ul style="list-style-type: none">Evaluate, expand, and simplify logarithmic expressions using properties of logarithms.
		Reading Lesson 1.5
		Radian Measure <ul style="list-style-type: none">Convert between degree and radian measure.Use the definition of radian measure to calculate arc lengths, radii, and angle measures.
		Evaluating the Six Trigonometric Functions <ul style="list-style-type: none">Evaluate the six trigonometric functions for angles in degrees or radians based on one or more given trigonometric function values.Evaluate the six trigonometric functions for angles in degrees or radians given a point on the terminal ray.
		Solving Trigonometric Equations <ul style="list-style-type: none">Analyze key features of inverse trigonometric functions from equations and graphs.Evaluate inverse trigonometric functions over a specified domain.Solve trigonometric equations over a specified domain.
		Modeling with Periodic Functions <ul style="list-style-type: none">Model and solve real-world problems using periodic functions.
		Reading Lesson 1.6
		Technology Corner
		Unit Test
		Limits and Continuity
		Introduction to Unit 2
		Rates of Change, Limits, and the Squeeze Theorem <ul style="list-style-type: none">Compare average speed to instantaneous speed.Define the limit of a function and the properties of limits.Determine average speed.Determine one-sided and two-sided limits of functions.Identify conditions under which a limit does and does not exist.Use the squeeze theorem to indirectly find limits.
		Reading Lesson 2.1

Unit	Lesson	Lesson Objectives
		<p>Limits Involving Infinity and Vertical and Horizontal Asymptotes</p> <ul style="list-style-type: none"> Calculate limits as x goes to positive and negative infinity. Determine end behavior of a function using limits. Find vertical and horizontal asymptotes using limits. <p>Reading Lesson 2.2</p> <p>Continuous Functions and Intermediate Value Theorem</p> <ul style="list-style-type: none"> Identify intervals of continuity and discontinuity over intervals of a function. Identify types of discontinuity, including jump, infinite, and oscillating. Modify or extend a function to remove discontinuities. Use properties of continuous functions to determine function continuity over algebraic combinations. Use the intermediate value theorem to verify continuity. <p>Reading Lesson 2.3</p> <p>Slope, Tangent Line, and Normal Line</p> <ul style="list-style-type: none"> Calculate the average rate of change of a function. Determine the equation of the normal line to a curve at a given point. Determine the equation of the tangent line to a curve at a given point. Determine the slope of the tangent line at a point using limits. <p>Reading Lesson 2.4</p> <p>Unit 2 Project</p> <p>Technology Corner</p> <p>Unit Test</p>

Derivatives

Introduction to Unit 3

Derivatives of Functions

- Approximate the derivative of a function from a given data set.
- Calculate the derivative of a function at a point.
- Determine if a function is differentiable on a closed interval.
- Determine the derivative of a function using the definition of a derivative.
- Sketch a graph of a function when given the graph of its derivative.
- Sketch a graph of the derivative of a function when given its graph.

Reading Lesson 3.1

Derivatives and Continuity

- Estimate derivatives using graphs and numerical approximation.
- Identify different types of non-differentiable points, including discontinuities, vertical tangents, corners, and cusps.

Reading Lesson 3.2

Unit	Lesson	Lesson Objectives
		Differentiation Rules <ul style="list-style-type: none">Calculate instantaneous rate of change using the derivative.Calculate second derivatives and higher-order derivatives using rules of differentiation.Use the power rule to find derivatives.Use the product rule to find derivatives.Use the quotient rule to find derivatives.
		Reading Lesson 3.3
		Applications of Derivatives <ul style="list-style-type: none">Solve real-world problems involving rates of change using derivatives.Use derivatives to solve problems involving motion in a straight line.
		Reading Lesson 3.4
		Differentiating Trigonometric Functions <ul style="list-style-type: none">Determine derivatives of trigonometric functions.
		Reading Lesson 3.5
		Unit 3 Project
		Technology Corner
		AP Multiple Choice/Free Response
		Unit Test

More Derivatives**Introduction to Unit 4****Differentiating Functions Using the Chain Rule**

- Apply the chain rule to find the derivative of a composite function.
- Use the chain rule to determine the slopes of curves defined parametrically.

Reading Lesson 4.1**Differentiating Functions Using Implicit Differentiation**

- Determine derivatives using implicit differentiation.
- Use the power rule to find the derivative of a function raised to a rational power of x .

Reading Lesson 4.2**Differentiating Functions Containing Inverse Trigonometric Functions**

- Determine derivatives of inverse functions using the chain rule.
- Determine derivatives of inverse trigonometric function.

Reading Lesson 4.3

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Differentiating Exponential and Logarithmic Functions

Calculate derivatives of exponential functions with a base of e .

Calculate derivatives of exponential functions with a base other than e .

Calculate derivatives of logarithmic functions with a base other than e .

Calculate derivatives of natural logarithmic functions.

Reading Lesson 4.4**Unit 4 Project****Technology Corner****Unit 4 AP Practice Questions****Unit Test****Applications of Derivatives****Introduction to Unit 5****Relative and Absolute Extrema**

Determine critical points of a function.

Determine if the extreme value theorem applies to a function on a specific interval.

Identify the absolute minimum and maximum values of a function.

Identify the relative minimum and maximum values of a function.

Reading Lesson 5.1**The Mean Value Theorem**

Determine increasing and decreasing intervals of a function.

Use the mean value theorem to determine the value where the derivative is equal to the average rate of change.

Reading Lesson 5.2**First and Second Derivative Test**

Use the first and second derivative tests to graph $f(x)$ from $f'(x)$.

Use the first derivative test to determine relative extrema.

Use the second derivative test to determine concavity and points of inflection.

Reading Lesson 5.3**Application Problem Solving**

Solve optimization problems using derivatives.

Reading Lesson 5.4**Newton's Method, Linearization, and Differentials**

Apply Newton's method to approximate zeros of a function.

Approximate the change in f using differentials.

Use linearization to approximate tangent lines.

Reading Lesson 5.5

Unit	Lesson	Lesson Objectives
		Application of Implicit Differentiation Use implicit differentiation to solve related rate problems.
		Reading Lesson 5.6
		Unit 5 Project
		Technology Corner
		Unit 5 AP Practice Questions
		Unit Test
Definite Integrals		
		Introduction to Unit 6
		Estimating with Finite Sums Approximate a distance using area under a velocity curve. Approximate the area under a curve by using left, right, and midpoint sums. Solve accumulation problems by approximating the area under a curve.
		Reading Lesson 6.1: Estimating with Finite Sums
		Definite Integrals Evaluate a definite integral using an area formula. Evaluate definite integrals of functions with discontinuities. Use definite integrals to solve problems involving accumulation. Use integral notation to express a limit of Riemann sums.
		Reading Lesson 6.2: Definite Integrals
		Definite Integrals and Antiderivatives Apply the mean value theorem to determine a point at which a function assumes its average value over a closed interval. Calculate the area under a curve using antidifferentiation. Solve problems using the properties of definite integrals.
		Reading Lesson 6.3: Definite Integrals and Antiderivatives
		Fundamental Theorem of Calculus, Parts 1 and 2 Use the first part of the fundamental theorem of calculus to solve problems. Use the second part of the fundamental theorem of calculus to solve problems.
		Reading Lesson 6.4: Fundamental Theorem of Calculus
		Trapezoidal Rule Approximate the area under a curve using the trapezoidal rule. Compare the trapezoidal rule to other area approximations including left, right, and midpoint sums.
		Reading Lesson 6.5: Trapezoidal Rule
		Unit 6 Project
		Technology Corner
		Unit 6 AP Practice Questions
		Unit Test

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Mathematical Modeling Using Differential Equations**Introduction to Unit 7****Slope Fields**

Use a slope field to find a graphical solution for a given differential equation.

Use initial conditions to find solutions to differential equations.

Reading Lesson 7.1: Slope Fields and Euler's Method**Antidifferentiation by Substitution**

Evaluate indefinite integrals without using substitution.

Use substitution as a method of evaluating indefinite and definite integrals.

Verify an antiderivative formula.

Reading Lesson 7.2: Antidifferentiation by Substitution**Exponential Growth and Decay**

Predict temperatures by using Newton's law of cooling.

Use exponential functions to model growth and decay.

Use separation of variables to solve initial value problems.

Reading Lesson 7.4: Exponential Growth and Decay**Unit 7 Project****Technology Corner****Unit 7 AP Practice Questions****Unit Test****Applications of Definite Integrals****Introduction to Unit 8****Integral as Net Change**

Calculate the displacement of an object from a given velocity function.

Calculate the total distance an object travels from a given velocity function.

Express the net change of a quantity as a definite integral.

Find the net change of a quantity from a rate of change that is given in graphical or tabular form.

Find the net, or accumulated, change of a quantity from a rate of change function.

Reading Lesson 8.1: Accumulation and Net Change**Areas in the Plane**

Calculate the area between two curves defined by only two functions and over a closed interval by integrating with respect to x .

Calculate the area between two curves defined by only two functions and over a closed interval by integrating with respect to y .

Use subregions to calculate the area between two curves over a closed interval.

Reading Lesson 8.2: Areas in the Plane

Unit	Lesson	Lesson Objectives
		<p>Volumes</p> <p>Find the volume of a solid generated by revolving a line or curve around a given line.</p> <p>Find the volume of a solid generated by revolving a region bounded by two or more lines or curves around a given line.</p> <p>Find the volume of a solid with known cross sections.</p> <p>Use a definite integral to express the volume of a solid.</p> <p>Reading Lesson 8.3: Volumes</p> <p>Applications from Science and Statistics</p> <p>Use the definite integral to solve problems involving fluid pressure.</p> <p>Use the definite integral to solve problems involving probabilities.</p> <p>Use the definite integral to solve problems involving work.</p> <p>Reading Lesson 8.5: Applications from Science and Statistics</p> <p>L'Hospital's Rule and Other Applications</p> <p>Apply L'Hospital's rule to evaluate the limit of an indeterminate form.</p> <p>Compare the growth rates of functions.</p> <p>Reading Lesson 9.2 and 9.3: L'Hospital's Rule and Other Applications</p> <p>Unit 8 Project</p> <p>Technology Corner</p> <p>Unit 8 AP Practice Questions</p> <p>Unit Test</p>
Review		
		<p>Preparing for the Exam</p> <p>Review: Limits and Continuity</p> <p>Review: Derivatives</p> <p>Review: Applications of Derivatives</p> <p>Review: Integrals</p> <p>Review: Applications of Integrals</p> <p>Review: Differential Equations</p> <p>Practice Exam 1 – Part A</p> <p>Practice Exam 1 – Part B</p> <p>Practice Exam 1 – Free-Response Section</p> <p>Practice Exam 2 – Part A</p> <p>Practice Exam 2 – Part B</p> <p>Practice Exam 2 – Free-Response Section</p>