
*The mission of the Chardon Local Schools is high achievement
for all students where learning is our most important work.*

Course of Study – MATH

Revised November 2021

AP CALCULUS – AB





COS — MATH — Revised November 2021

AP Calculus AB

Strand: Limits and Continuity

Learning Standard:

CHA 1.1 Introducing Calculus: Can Change Occur at an Instant?

LIM 1.2 Defining Limits and Using Limit Notation

LIM 1.3 Estimating Limit Values from Graphs

LIM 1.4 Estimating Limit Values from Tables

LIM 1.5 Determining Limits Using Algebraic Properties of Limits

LIM 1.6 Determining Limits Using Algebraic Manipulation

LIM 1.7 Selecting Procedures for Determining Limits

LIM 1.8 Determining Limits Using the Squeeze Theorem

LIM 1.9 Connecting Multiple Representations of Limits

LIM 1.10 Exploring Types of Discontinuities

LIM 1.11 Defining Continuity at a Point

LIM 1.12 Confirming Continuity over an Interval

LIM 1.13 Removing Discontinuities

LIM 1.14 Connecting Infinite Limits and Vertical Asymptotes

LIM 1.15 Connecting Limits at Infinity and Horizontal Asymptotes

LIM 1.16 Working with the Intermediate Value Theorem (IVT)

How Taught?

Teaching activities may include, but are not limited to:

- Direct Instruction
- Cooperative Groups
- Stations
- Data Driven Instruction
- Scaffolding

Materials:

- Texas Instrument Graphing Calculator
- Chromebook
- AP Classroom

How Assessed?

Assessments may include, but are not limited to:

- Pre-Assessments (pre-tests, observation, anticipation guide, questioning, diagnostics)
- Formative Assessments (entry/exit slips, group work, reflections, discussions, writer's workshops,



COS — MATH — *Revised November 2021*

AP Calculus AB

	<p>homework/classwork, self and peer evaluations, observations, conferences, rubrics)</p> <ul style="list-style-type: none">● Summative Assessments (formal essays, using rubrics; tests/exams, projects, creative assignments, presentations) <p>How Re-Taught? Re-teaching activities may include, but are not limited to:</p> <ul style="list-style-type: none">● breaking down concept into smaller components● presenting the information again in a different way● Universal Design for Learning principles offering students opportunities to experience and engage material in new and different way● practice activities such as computer tutorials, games, hands-on activities● review sessions
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COS — MATH — Revised November 2021

AP Calculus AB

Strand: Differentiation: Definition and Fundamental Properties

Learning Standard:

- 2.1** Defining Average and Instantaneous Rates of Change at a Point
- 2.2** Defining the Derivative of a Function and Using Derivative Notation
- 2.3** Estimating Derivatives of a Function at a Point
- 2.4** Connecting Differentiability and Continuity: Determining When Derivatives Do and Do Not Exist
- 2.5** Applying the Power Rule
- 2.6** Derivative Rules: Constant, Sum, Difference, and Constant Multiple
- 2.7** Derivatives of $\cos x$, $\sin x$, e^x , and $\ln x$
- 2.8** The Product Rule
- 2.9** The Quotient Rule
- 2.10** Finding the Derivatives of Tangent, Cotangent, Secant, and/or Cosecant Functions

How Taught?

Teaching activities may include, but are not limited to:

- Direct Instruction
- Cooperative Groups
- Stations
- Data Driven Instruction
- Scaffolding

Materials:

- Texas Instrument Graphing Calculator
- Chromebook

How Assessed?

Assessments may include, but are not limited to:

- Pre-Assessments (pre-tests, observation, anticipation guide, questioning, diagnostics)
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- Summative Assessments (formal essays, using rubrics; tests/exams,



COS — MATH — *Revised November 2021*

AP Calculus AB

	<p>projects, creative assignments, presentations)</p>
	<p>How Re-Taught? Re-teaching activities may include, but are not limited to:</p> <ul style="list-style-type: none">● breaking down concept into smaller components● presenting the information again in a different way● Universal Design for Learning principles offering students opportunities to experience and engage material in new and different way● practice activities such as computer tutorials, games, hands-on activities● review sessions



COS — MATH — Revised November 2021

AP Calculus AB

Strand: Differentiation: Composite, Implicit, and Inverse Functions

<p>Learning Standard:</p> <p>3.1 The Chain Rule 3.2 Implicit Differentiation 3.3 Differentiating Inverse Functions 3.4 Differentiating Inverse Trigonometric Functions 3.5 Selecting Procedures for Calculating Derivatives 3.6 Calculating Higher-Order Derivatives</p>	<p>How Taught? Teaching activities may include, but are not limited to:</p> <ul style="list-style-type: none">• Direct Instruction• Cooperative Groups• Stations• Data Driven Instruction• Scaffolding
<p>Materials:</p> <ul style="list-style-type: none">• Texas Instrument Graphing Calculator• Chromebook	<p>How Assessed? Assessments may include, but are not limited to:</p> <ul style="list-style-type: none">• Pre-Assessments (pre-tests, observation, anticipation guide, questioning, diagnostics)• Formative Assessments (entry/exit slips, group work, reflections, discussions, writer's workshops, homework/classwork, self and peer evaluations, observations, conferences, rubrics)• Summative Assessments (formal essays, using rubrics; tests/exams, projects, creative assignments, presentations) <p>How Re-Taught? Re-teaching activities may include, but are not limited to:</p> <ul style="list-style-type: none">• breaking down concept into smaller components



COS — MATH — Revised November 2021

AP Calculus AB

	<ul style="list-style-type: none">• presenting the information again in a different way• Universal Design for Learning principles offering students opportunities to experience and engage material in new and different way• practice activities such as computer tutorials, games, hands-on activities• review sessions
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COS — MATH — Revised November 2021

AP Calculus AB

Strand: Contextual Applications of Differentiation

<p>Learning Standard:</p> <p>4.1 Interpreting the Meaning of the Derivative in Context</p> <p>4.2 Straight-Line Motion: Connecting Position, Velocity, and Acceleration</p> <p>4.3 Rates of Change in Applied Contexts Other Than Motion</p> <p>4.4 Introduction to Related Rates</p> <p>4.5 Solving Related Rates Problems</p> <p>4.6 Approximating Values of a Function Using Local Linearity and Linearization</p> <p>4.7 Using L'Hospital's Rule for Determining Limits of Indeterminate Forms</p>	<p>How Taught?</p> <p>Teaching activities may include, but are not limited to:</p> <ul style="list-style-type: none">• Direct Instruction• Cooperative Groups• Stations• Data Driven Instruction• Scaffolding
<p>Materials:</p> <ul style="list-style-type: none">• Texas Instrument Graphing Calculator• Chromebook	<p>How Assessed?</p> <p>Assessments may include, but are not limited to:</p> <ul style="list-style-type: none">• Pre-Assessments (pre-tests, observation, anticipation guide, questioning, diagnostics)• Formative Assessments (entry/exit slips, group work, reflections, discussions, writer's workshops, homework/classwork, self and peer evaluations, observations, conferences, rubrics)• Summative Assessments (formal essays, using rubrics; tests/exams, projects, creative assignments, presentations) <p>How Re-Taught?</p> <p>Re-teaching activities may include, but are not limited to:</p>



COS — MATH — *Revised November 2021*

AP Calculus AB

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COS — MATH — Revised November 2021

AP Calculus AB

Strand: Analytical Applications of Differentiation

Learning Standard:

- 5.1 Using the Mean Value Theorem
- 5.2 Extreme Value Theorem, Global Versus Local Extrema, and Critical Points
- 5.3 Determining Intervals on Which a Function Is Increasing or Decreasing
- 5.4 Using the First Derivative Test to Determine Relative (Local) Extrema
- 5.5 Using the Candidates Test to Determine Absolute (Global) Extrema
- 5.6 Determining Concavity of Functions over Their Domains
- 5.7 Using the Second Derivative Test to Determine Extrema
- 5.8 Sketching Graphs of Functions and Their Derivatives
- 5.9 Connecting a Function, Its First Derivative, and Its Second Derivative
- 5.10 Introduction to Optimization Problems
- 5.11 Solving Optimization Problems
- 5.12 Exploring Behaviors of Implicit Relations

How Taught?

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- Stations
- Data Driven Instruction
- Scaffolding

Materials:

- Texas Instrument Graphing Calculator
- Chromebook

How Assessed?

Assessments may include, but are not limited to:

- Pre-Assessments (pre-tests, observation, anticipation guide, questioning, diagnostics)
- Formative Assessments (entry/exit slips, group work, reflections, discussions, writer's workshops, homework/classwork, self and peer evaluations, observations, conferences, rubrics)
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COS — MATH — *Revised November 2021*

AP Calculus AB

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COS — MATH — Revised November 2021

AP Calculus AB

Strand: Integration and Accumulation of Change

Learning Standard:

- 6.1 Exploring Accumulations of Change
- 6.2 Approximating Areas with Riemann Sums
- 6.3 Riemann Sums, Summation Notation, and Definite Integral Notation
- 6.4 The Fundamental Theorem of Calculus and Accumulation Functions
- 6.5 Interpreting the Behavior of Accumulation Functions Involving Area
- 6.6 Applying Properties of Definite Integrals
- 6.7 The Fundamental Theorem of Calculus and Definite Integrals
- 6.8 Finding Antiderivatives and Indefinite Integrals: Basic Rules and Notation
- 6.9 Integrating Using Substitution
- 6.10 Integrating Functions Using Long Division and Completing the Square
- 6.14 Selecting Techniques for Antidifferentiation

How Taught?

Teaching activities may include, but are not limited to:

- Direct Instruction
- Cooperative Groups
- Stations
- Data Driven Instruction
- Scaffolding

Materials:

- Texas Instrument Graphing Calculator
- Chromebook

How Assessed?

Assessments may include, but are not limited to:

- Pre-Assessments (pre-tests, observation, anticipation guide, questioning, diagnostics)
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COS — MATH — Revised November 2021

AP Calculus AB

	<p>projects, creative assignments, presentations)</p>
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COS — MATH — Revised November 2021

AP Calculus AB

Strand: Differential Equations

<p>Learning Standard:</p> <p>7.1 Modeling Situations with Differential Equations</p> <p>7.2 Verifying Solutions for Differential Equations</p> <p>7.3 Sketching Slope Fields</p> <p>7.4 Reasoning Using Slope Fields</p> <p>7.6 Finding General Solutions Using Separation of Variables</p> <p>7.7 Finding Particular Solutions Using Initial Conditions and Separation of Variables</p> <p>7.8 Exponential Models with Differential Equations</p>	<p>How Taught?</p> <p>Teaching activities may include, but are not limited to:</p> <ul style="list-style-type: none">• Direct Instruction• Cooperative Groups• Stations• Data Driven Instruction• Scaffolding
<p>Materials:</p> <ul style="list-style-type: none">• Texas Instrument Graphing Calculator• Chromebook	<p>How Assessed?</p> <p>Assessments may include, but are not limited to:</p> <ul style="list-style-type: none">• Pre-Assessments (pre-tests, observation, anticipation guide, questioning, diagnostics)• Formative Assessments (entry/exit slips, group work, reflections, discussions, writer's workshops, homework/classwork, self and peer evaluations, observations, conferences, rubrics)• Summative Assessments (formal essays, using rubrics; tests/exams, projects, creative assignments, presentations)
	<p>How Re-Taught?</p>



COS — MATH — *Revised November 2021*

AP Calculus AB

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COS — MATH — Revised November 2021

AP Calculus AB

Strand: Applications of Integration

Learning Standard:

- 8.1** Finding the Average Value of a Function on an Interval
- 8.2** Connecting Position, Velocity, and Acceleration of Functions Using Integrals
- 8.3** Using Accumulation Functions and Definite Integrals in Applied Contexts
- 8.4** Finding the Area Between Curves Expressed as Functions of x
- 8.5** Finding the Area Between Curves Expressed as Functions of y
- 8.6** Finding the Area Between Curves That Intersect at More Than Two Points
- 8.7** Volumes with Cross Sections: Squares and Rectangles
- 8.8** Volumes with Cross Sections: Triangles and Semicircles
- 8.9** Volume with Disc Method: Revolving Around the x - or y -Axis
- 8.10** Volume with Disc Method: Revolving Around Other Axes
- 8.11** Volume with Washer Method: Revolving Around the x - or y -Axis
- 8.12** Volume with Washer Method: Revolving Around Other Axes

Materials:

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How Taught?

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- Direct Instruction
- Cooperative Groups
- Stations
- Data Driven Instruction
- Scaffolding

How Assessed?

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COS — MATH — Revised November 2021

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	<p>evaluations, observations, conferences, rubrics)</p> <ul style="list-style-type: none">• Summative Assessments (formal essays, using rubrics; tests/exams, projects, creative assignments, presentations) <p>How Re-Taught? Re-teaching activities may include, but are not limited to:</p> <ul style="list-style-type: none">• breaking down concept into smaller components• presenting the information again in a different way• Universal Design for Learning principles offering students opportunities to experience and engage material in new and different way• practice activities such as computer tutorials, games, hands-on activities• review sessions
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