Unit 5: Integration

Content Area: **Mathematics**
Course(s): **Honors Calculus**
Time Period: **March**
Length: **6 weeks**
Status: **Published**

Enduring Understandings:

- Derivatives and anti-derivatives have an inverse relationship to each other.
- Students may not understand what the integral is actually used for.
- Students may occasionally use differentiation rules when integrating.
- The anti-derivative has both theoretical and real life applications
- The area under the curve is the geometric meaning of anti-derivatives.

Essential Questions:

- How are area under the curve and the definite integral related?
- How are the properties of definite integrals related to the Riemann sum definition?
- How are the rules for differentiation used to develop the basic rules of integration?
- How can one apply numerical techniques to compute an integral without knowing the associated antiderivative?
- How can we use the measure of area under a curve to discuss net change of a function over time?
- How is the anti-derivative related to the accumulation function?

Lesson Titles:

- Basic properties of definite integrals (examples include additivity and linearity).
- Definite integral as a limit of Riemann sums.
- Definite integral of the rate of change of a quantity over an interval interpreted as the change of the quantity over the interval:
- Evaluate indefinite integrals using power rule
- Evaluate integrals using u-substitution
- Find the constant of integration given a particular solution
- Interpretations and properties of definite integrals
- Solve differential equations using integration
- Use of the Fundamental Theorem to evaluate definite integrals.
- Use of the Fundamental Theorem to represent a particular antiderivative,
- Use the Fundamental Theorem of Calculus to the analytical and graphical analysis of functions so defined.

21st Century Skills and Career Ready Practices:

WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Inter-Disciplinary Connections:

LA.RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.
LA.RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
LA.RST.11-12.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
LA.RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

- Blooms Analysis - Break down objects or ideas into simpler parts and find evidence to support generalizations
- Blooms Application - Apply Knowledge to actual situations
- Blooms Evaluation - Make and defend judgments based on internal evidence or external criteria
- Blooms Knowledge - Remember previously learned information
- Blooms Synthesis - Compile component ideas into a new whole or propose alternative solutions
- intro. definite integrals
- intro. evaluating definite integrals using FTC part I
- intro. evaluating indefinite integrals using power rule
- intro. evaluating indefinite integrals using u-substitution.
- intro. finding area under the curve using geometric approx.
- intro. indefinite integrals
- intro. integration by parts
- Intro. right, middle, and left rectangular approximation
- intro. trapezoidal approx.
- Provide individual activity
- Provide real world examples
- Provide team work activity
- review homework

- review vocabulary that is associated with this unit

Modifications

Formative Assessment:

- define the function given the graph
- Pair share
- Partner answer/analyze questions
- Pass out of class
- Pass out of class: find the mistake in the differential equation
- pass out of class: particular solutions
- warm up: matching functions to solutions

Alternate Assessment

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Benchmark Assessment

Skills-based assessment- math practice

Summative Assessment:

- Individual Assignment
- Marking Period Assessment
- performance task
- Project

- Quiz: definite integrals
- Quiz: Indefinite integrals
- Review game
- Unit test

Resources & Materials:

- Calculus: Graphical, Numerical, Algebraical, by Finney, Demana and Kennedy
- data investigations
- Establish a set of general strategies for student independence and self-evaluation
- Evoke student participation from their seats and at the board
- graphing calculator activities
- Independent/Cooperative learning explorations
- Powerpoint lessons
- Smartboard Lessons