Unit 6: Applications of Integration

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

Enduring Understandings:

- Integrals can be used to solve a variety of problems related to area, velocity, acceleration, volume, and area of a solid of revolution.
- The definite integral can be used to find exact area, volume, or length by using the limit of Riemann sums.
- Which formula to use when finding volumes.
- Which variable to integrate with respect to based upon the method and whether or not the line it is being rotated around is vertical or horizontal

Essential Questions:

- How can integrals be used to find areas or volumes?
- How can you determine which method is easiest to use given a function?
- What is the practical use of finding volumes with this method?

Lesson Titles:

- Appropriate integrals are used in a variety of applications to model physical, biological, or economic situations.
- Find the accumulated change from a rate of change
- Find the average value of a function
- find the distance traveled by a particle along a line
- find the the volume of a solid with known cross sections,
- Find the volume of disks
- Find the volume of washers
- finding the area of a region
- the emphasis is on using the method of setting up an approximating Riemann sum and representing its limit as a definite integral

Career Readiness, Life Literacies & Key Skills

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.11-12.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.RST.11-12.2	Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
LA.RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
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.
LA.RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

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. area under the curve
- intro. area under two curves
- intro. differential equations
- intro. slope fields
- intro. slope fields of diff. eq. with part. sol.
- intro. slope fields of differential equations
- intro. solving diff. equations
- intro. solving differential equations with particular solutions
- intro. volume of disks
- intro. volume of shells

- intro. volume of washers
- Provide individual activity
- Provide real world examples
- Provide team work activity
- review homework
- review vocabulary that is associated with this unit

Modifications

Formative Assessment:

- Pair share
- Pair share: analyze the volume
- Partner answer/analyze questions
- Pass out of class
- pass out of class: area under the curve
- warm up: riemann sum
- warm up: trapezoidal rule

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: area under the curve
- quiz: volume of cross sections
- 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