



Manhattan Center for Science and Math High School

Mathematics Department Curriculum

Content/Discipline Calculus BC Term 2

<http://mcsportal.net>

Marking Period 1

Topic and Essential Question

Chapter 7 – (1) How is the integral used to find the area of a region under the curve? (2) How do we the volume of a solid with known cross sections, and the volumes of rotation? (2) How do we solve a free response questions involving the area between two curves and volume of a solid.

Chapter 8 – (1) How do we recognize limits that produce indeterminate forms? (2) How do we apply L'Hopital's Rule to evaluate the limit? (3) How do recognize that the given integral is improper? (4) How do we determine whether the improper integral converges or diverges? (5) How do we evaluate improper integrals that has infinite limit of integration and has an infinite discontinuity? (6) How do we use the graphing calculator to evaluate definite improper integrals?

Unit/Topics

Unit #4 – (1) Applications of Integrals (Chapter 7) and (2) L'Hopital Rule and Improper Integrals (Chapter 8)

SWBAT/Objectives

Content ("Know"):

Chapter 7 – Applications of Integrals 12 days

- (1) Area between Curves
- (2) Volume of Solids
- (3) Surface of Revolution
- (4) Volume of Cross Section

Chapter 8 - L'Hopital Rule and Improper Integrals 16 days

- (1) Apply L'Hopital's Rule to evaluate limits.
- (2) Evaluate improper integrals that has infinite limit of integration and has an infinite discontinuity.
- (3) Justify whether the given integral converges or diverges.
- (4) Apply appropriate integration techniques and L'Hopital's rule in finding or evaluating an improper integral.
- (5) Use graphing calculator to verify the limits and evaluate improper integrals.

Skills ("Do"):

Chapter 7 – Applications of Integrals 12 days

- (1) Students will be able to calculate are using the disc method and the area between curves.
- (2) Students will be able to calculate volume between the two curves with known cross sections.
- (3) Students will be able to calculate the volume of a cross section.

Chapter 8 - L'Hopital Rule and Improper Integrals 16 days

- (1) Students will be able to apply L'Hopital's Rule to evaluate limits.
- (2) Students will be able to evaluate improper integrals that has infinite limit of integration and has an infinite discontinuity.
- (3) Students will be able to justify whether the given integral converges or diverges.
- (4) Students will be able to apply appropriate integration techniques and L'Hopital's rule in finding or evaluating an improper integral.
- (5) Students will be able to use graphing calculator to verify the limits and evaluate improper integrals.

Vocabulary/Key Terms

Area under between two curves, Volume of a solid, Volumes of Rotation, Cross Sections, Integration by Parts, Trigonometric Integrals, Partial Fractions, Integration Techniques, Indeterminate Forms, L'Hopital's Rule, Improper Integrals.

Assessments:

- Classwork
- Lesson Summary
- Homework
- Warm-up (DO NOW) Quiz next day
- Tests
- Notebook Check once a week
- Portfolio Check at the end of each unit plan.

Common Core Standards:

F.IF.5 ,F.IF.6 , F.IF.7, F.IF.8 , F.IF.9

Common Core Standards for Math Practices:

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics
- MP5: Use appropriate tools strategically
- MP6- Attend to precision
- MP7: Look for and make use of structure
- MP8- Look for and express regularity in repeated reasoning

Differentiated Instruction:

- Flexible grouping
- Cooperative Learning
- Visual Learning – SMART Board, White board
- Visual and interactive questions using the Smart board
- Students have an option to view additional videos, tutorials, interactive practice problems online through the class website, www.mszhao.com

ELLs:

- Students with ELL's will watch videos (the video has English and Spanish both versions) and additional tutorials about the lesson through the class website.
- Students are allowed extra time for works and assessments.

SWDs:

- Preview the Key Terms to give students access to context.
- Assign chapter summary to give less proficient readers access to content.

High-Achievers:

- ❖ Have gifted students assist students that are not as gifted.
- ❖ Ask students to take on leadership roles when working in groups.

Resources/Books

- ✚ Graphing Calculator for individual use inside and outside of the classroom.
- ✚ Larson, Hostetler, Edwards. Calculus of a single variable. The 8th edition. Houghton Mifflin Company, 2006
- ✚ Multiple-Choice & Free-Response Questions in Preparation for the AP Calculus Examinations (AB), 8th Edition, 2003 by David Lederman.
- ✚ Fast Track to a 5: preparing for the AP calculus AB and Calculus BC Examinations, by Sharon Cade, Jeff Lucia, and Rhea Caldwell.
- ✚ AP Calculus Preparing for the Advanced Placement Examination, 2000 by James F. Bohan, AMSCO. There are 5 complete model Exams, Review exercises and chapter assessments, use of graphing calculators and complete answer key with solutions.
- ✚ AP Central web site to find past free-response exams and AP Exam information. See www.apcentral.collegeboard.com.

Homework: Per Teacher



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Marking Period 2

Topic and Essential Question

Chapter 9 – (1) How do we determine the convergence or divergence of a series using nth-term test, geometric series test, telescoping series test, p-series test, alternating series test, integral test, root test, ratio test, direct comparison or limit comparison test? (2) How do we create a Taylor or Maclaurin polynomial of a given function? (3) How do we differentiate and integrate a power series? (4) How do we find the radius and interval of convergence of a power series? (5) How do we calculate the Lagrange error bound for Taylor polynomial approximation?

Unit/Topics

Unit #5 – (1) Infinite Series (Chapter 9)

SWBAT/Objectives Content (“Know”):

Chapter 9 – Infinite Series 15 days

- (1) Justify whether the given series converges or diverges using nth-term test, geometric series test, telescoping series test, p-series test, alternating series test, integral test, root test, ratio test, direct comparison or limit comparison test.
- (2) Write a Taylor polynomial of degree n to approximate the given function.
- (3) Find the radius and interval of convergence of a power series.
- (4) Differentiate and integrate a power series.
- (5) Compute the Lagrange error bound for a Taylor polynomial approximation

Skills (“Do”):

Chapter 9 – Infinite Series 15 days

- (1) Students will be able to justify whether the given series converges or diverges using nth-term test, geometric series test, telescoping series test, p-series test, alternating series test, integral test, root test, ratio test, direct comparison or limit comparison test.
- (2) Students will be able to write a Taylor polynomial of degree n to approximate the given function.
- (3) Students will be able to find the radius and interval of convergence of a power series.
- (4) Students will be able to differentiate and integrate a power series.
- (5) Students will be able to compute the Lagrange error bound for a Taylor polynomial approximation

Vocabulary/Key

Series Converges, Series Diverges, nth-term Test, Geometric Series Test, Telescoping Series Test, P-Series Test, Alternating

Terms Series Test, Integral Test, Root Test, Ratio Test, Direct Comparison, Limit Comparison Test. Taylor Polynomial, Radius and Interval Convergence, Power Series, Lagrange Error Bound, Taylor Polynomial Approximation.

- Assessments:**
- Classwork
 - Lesson Summary
 - Homework
 - Warm-up (DO NOW) Quiz next day
 - Tests
 - Notebook Check once a week
 - Portfolio Check at the end of each unit plan.

Common Core Standards: F.LE.2, F.LE.3, F.IF.7, A.SSE.4, F.BF. 2

Common Core Standards for Math Practices:

- MP1: Make sense of problems and persevere in solving them.
- MP2: Reason abstractly and quantitatively.
- MP3: Construct viable arguments and critique the reasoning of others.
- MP4: Model with mathematics
- MP5: Use appropriate tools strategically
- MP6- Attend to precision
- MP7: Look for and make use of structure
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- Differentiated Instruction:**
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 - Cooperative Learning
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High-Achievers:

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Resources/Books

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Marking Period 3

Topic and Essential Question

Chapter 10 - (1) How do we find the slope of the tangent line to the curve given by the set of parametric equations? (2) How do we find derivatives of parametric form, polar form and vector form of a function? (3) How do we find the position, velocity and acceleration vectors and values of parametrically-defined motion problems? (4) How do we calculate arc length of a curve given by the set of parametric equations? (5) How do we determine the area of a region bounded by polar curves?

Unit/Topics

Unit #6 – Parametric Equations and Polar Coordinates (**Chapter 10**) and Review for the AP Calculus BC Exam on [Thursday May 5th 2016](#).

SWBAT/Objectives

Content (“Know”):

Chapter 10 – Parametric Equations and Polar Coordinates 7 days and [Review for the AP Calculus BC Exam 15 days](#)

- (1) Calculate derivatives of parametric form, polar form and vector form
- (2) Produce parametric and polar graphs with or without the use of calculator.
- (3) Analyze plane curves given a parametric form, polar form, and vector form in finding local extremes and concavity.
- (4) Determine the velocity and acceleration vectors and values of parametrically-defined motion problems.
- (5) Calculate arc length of a curve given by the set of parametric equations.
- (6) Find the area of a region bounded by polar curves.

Objectives - Skills (“Do”):

Chapter 9 – Infinite Series 7 days

- (1) Student will be able to calculate derivatives of parametric form, polar form and vector form
- (2) Student will be able produce parametric and polar graphs with or without the use of calculator.
- (3) Student will be able Analyze plane curves given a parametric form, polar form, and vector form in finding local extremes and concavity.
- (4) Student will be able Determine the velocity and acceleration vectors and values of parametrically-defined motion problems.
- (5) Student will be able Calculate arc length of a curve given by the set of parametric equations.
- (6) Student will be able Find the area of a region bounded by polar curves.

Vocabulary/Key Terms

Parametric, Polar, Vector, Velocity Vectors, Acceleration Vectors, Values of Parametrically-defined Motion, Arc Length, Parametric Equation, Area of a region of the polar curves.

Assessments:

- Classwork
- Lesson Summary
- Homework
- Warm-up (DO NOW) Quiz next day
- Tests
- Notebook Check once a week
- Portfolio Check at the end of each unit plan.

Common Core Standards:

F.LE.5, F.IF.4 , F.IF.7, F.IF.9 F.LE.5, N.VM.1, N.VM.2, N.VM.4a,b,c

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Homework: Per Teacher