

NJ-CCSS & NJCCCS AREA: MATHEMATICS

North Brunswick Township Public Schools

CP Calculus

Acknowledgements

Timothy C Huber, Teacher of Mathematics

Diane M Galella, Supervisor of Mathematics

Date: New_____

Revision May 2012

Board Adoption_____

New Jersey - Common Core State Standards for Mathematics
& New Jersey Core Content Curriculum Standards 2009

Unit 1: Limits

Grade: 12

Date: May 2012

| NJ-CCSS Domain Essential Questions | | NJ-CCSS Cluster.Standard Standards for Mathematical Practice | | |
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| <ul style="list-style-type: none"> • Limits • What output is a function approaching as the input values get closer to a finite or infinite number? | | <p>4.3.12.A.1 Patterns Use models and algebraic formulas to represent and analyze sequences and series, explicit formulas for nth terms, sums of finite arithmetic series.</p> <p>4.2.12.D.2 Units of Measurement Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.</p> <p>SMP.2 Reason abstractly and quantitatively. SMP.4 Model with mathematics.</p> | | |
| Skills/Objectives SWBAT... | Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity | Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction | Assessments Formative Summative Benchmarks | Pacing |
| <p>Obj. 1.5 Determine whether or not a function has a limit</p> <p>Obj. 2.2 Define the limit using graphical and algebraic approach</p> <p>Obj. 2.3 Discover and apply the limits theorems</p> <p>Obj. 2.4 Define continuity and know the terms related to continuity</p> | <ul style="list-style-type: none"> • Teacher Explanation using rational functions which can be reduced • Use Limits with delta epsilon sketchpad activity • Use graphs from p10 Instructors resource book to explain δ and ϵ graphically • Use table on p86 Instructor's guide to discover theorems • Limit applets from visual calculus website • Use Computer Lab A Quiz on using the definition of continuity from Visual Calculus website • Exploration 2.4 Graphing calculator | <ul style="list-style-type: none"> • Extended time • Assignment modification • Alternative assessments • Group investigations • Note taking guides • Previewing materials • Graphic organizers • Cue cards • Manipulatives • Music or movement • Simulations • Games and puzzles • Small group instruction • Pair-share | <p>Formative:</p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments | 20 days |

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| <p>Obj. 2.5 Find the limit of a function as x approaches infinity</p> <p>Obj. 2.6 Learn and apply the Intermediate Value Theorem</p> | <ul style="list-style-type: none"> • Limits Involving Infinity-worksheet • Use The Summary for Rational Functions <ul style="list-style-type: none"> • Students self-teach this topic from the textbook with the follow-up discussion in class. • Review of Limits-puzzle <p><u>Materials/Technology/Resources:</u> Foerster, Paul A. Calculus: Concepts and Applications. Emeryville, CA: Key Curriculum Press. 1998 Graphing Calculator, Visual Calculus Website, Instructor Resource Guide, Geometer's Sketchpad, Study Island Website</p> <p><u>Interdisciplinary Connections:</u> Geography: p75 #T9, Physics: p76 #T10</p> | | <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz 1.5, 2.2-2.4 • Test on 1.5, and Chapter 2 <p><u>Performance Assessment</u> -</p> <ul style="list-style-type: none"> • Online Quiz (computer lab) | |
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Unit 2: Derivatives

Grade: 12

Date: May 2012

| NJ-CCSS Domain Essential Questions | | NJ-CCSS Cluster.Standard Standards for Mathematical Practice | | |
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| <p>Derivatives</p> <ul style="list-style-type: none"> • What is the slope of a tangent line of a curve? • What is the instantaneous rate of change at a given time? • How fast is an object moving after “t” seconds? • What is the definition of a derivative? | | <p>4.1.12.B.4 Numerical Operations Understand and apply the laws of exponents to simplify expressions involving numbers raised to powers</p> <p>4.2.12 C.2 Coordinate Geometry Show position and represent motion in the coordinate plane using vectors</p> <p>4.3.12.B.1 Functions and Relationships Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.</p> <p>4.3.12.B.2 Functions and Relationships Analyze and explain the general properties and behavior of functions [of one variable] or relations, using [appropriate] algebraic and graphing [technologies] techniques</p> <p>4.3.12.B.3 Functions and Relationships Understand and perform transformations on commonly-used functions</p> <p>4.3.12.B.4 Functions and Relationships Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions.</p> <p>4.3.12.C.1 Modeling Functions and Relationships Use functions to model real-world phenomena and solve problems that involve varying quantities.</p> <p>4.3.12 C.2 Modeling Analyze and describe how a change in an independent variable leads to change in a dependent one.</p> <p>4.3.12.D.3 Procedures Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology..</p> <p>SMP.5 Use appropriate tools strategically.</p> <p>SMP.4 Model with mathematics.</p> | | |
| Skills/Objectives SWBAT... | Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity | Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction | Assessments Formative Summative Benchmarks | Pacing |
| <p>1.1 Find the instantaneous rate of change using tables</p> <p>1.2 Find the instantaneous rate of change using equations, graphs, and tables</p> | <ul style="list-style-type: none"> • Exploration 1.1 • Use Instantaneous Rate Sketchpad activity | <ul style="list-style-type: none"> • Extended time • Assignment modification • Alternative assessments • Group investigations • Note taking guides • Previewing materials • Graphic organizers | <p>Formative:</p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework | 25 days |

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| <p>3.2 Find the derivative using the difference quotient</p> <p>3.3 Graph a function and its derivative using the graphing calculator or by hand.</p> <p>3.4 Find the derivative as a limit (the h form). Use the power rule. Apply the properties of differentiation.</p> <p>3.5 Find the velocity and acceleration equations given the displacement equation using the derivative</p> <p>3.6 Find the derivative of the sine and cosine functions.</p> <p>3.7 Use the chain rule to find the derivative of a composite function.</p> | <ul style="list-style-type: none"> • Secant-Tangent-GSP demonstration • Exploration 3.3, as teacher guided activity to show steps to find derivative on graphing calculator • Matching f and f' -puzzle • Why Do Derivatives Never Grow Old? –puzzle • Use Exploration 3.9 as teacher guided activity for the introduction • Use Exploration 3.6 as teacher guided activity to discover the formulas • The Chain Rule-worksheets • The Chain Rule-puzzle • Use Tutorials for the Calculus Phobe website for demonstration • Calculus in Motion Software-The Chain Rule <p><u>Materials/Technology/Resources:</u> Foerster, Paul A. Calculus: Concepts and Applications. Emeryville, CA: Key Curriculum Press. 1998 Graphing Calculator, Visual Calculus Website, Instructor Resource Guide, Geometer's Sketchpad, Study Island Website</p> <p><u>Interdisciplinary Connections:</u> Section 3-5: Physics</p> | <ul style="list-style-type: none"> • Cue cards • Manipulative • Music or movement • Simulations • Games and puzzles • Small group instruction • Pair-share | <ul style="list-style-type: none"> • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz on 1.2, 3.2-3.4 • Test on 1.2, 3.2-3.7 <p><u>Performance Assessment</u> -</p> <ul style="list-style-type: none"> • Study Island Assignment | |
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Unit 3: Derivatives (cont): Product and Quotient Rules

Grade: 12

Date: 2012

| NJ-CCSS Domain Essential Questions | | NJ-CCSS Cluster.Standard Standards for Mathematical Practice | | |
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| Derivatives <ul style="list-style-type: none"> • What is the slope of a tangent line of a curve? • What is the instantaneous rate of change at a given time? • How fast is an object moving after t seconds? • What is the definition of derivatives? | | <p>4.3.12.B.1 Functions and Relationships Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.</p> <p>4.3.12.B.2 Functions and Relationships Analyze and explain the general properties and behavior of functions [of one variable] or relations, using [appropriate] algebraic and graphing [technologies] techniques</p> <p>4.3.12.B.3 Functions and Relationships Understand and perform transformations on commonly-used functions</p> <p>4.3.12.B.4 Functions and Relationships Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions.</p> <p>4.3.12.D.3 Procedures Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology..</p> <p>4.2.12.D.2 Units of Measurement Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.</p> <p>4.4.12.A.1 Data Analysis Use surveys and sampling techniques to generate data and draw conclusions about large groups</p> <p>SMP.6 Attend to precision.</p> <p>SMP.8 Look for and express regularity in repeated reasoning.</p> | | |
| Skills/Objectives SWBAT... | Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity | Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction | Assessments Formative Summative Benchmarks | Pacing |
| <p>4.2 Find the derivative of the product of two functions</p> <p>4.3 Use the quotient rule</p> <p>4.4 Find the derivative of tangent, cotangent, secant, and cosecant functions</p> | <ul style="list-style-type: none"> • Visual calculus website-Drill-Product Rule • Show the misconception of The Product Rule on a simple example with numerical indexes • Rules for Differentiation Puzzle • Show the misconception of The Quotient Rule on a simple example with numerical indexes • Base the introduction on the previous homework #23, 24 p139 | <ul style="list-style-type: none"> • Extended time • Assignment modification • Alternative assessments • Group investigations • Note taking guides • Previewing materials • Graphic organizers • Cue cards • Manipulative • Music or movement • Simulations | <p>Formative:</p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended | 20 days |

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| <p>4.6 Compare differentiability and continuity</p> <p>4.8 Use implicit differentiation to find the slope of the tangent line and find the equation of the tangent at a particular point on the curve.</p> | <ul style="list-style-type: none"> Review Converse and Contrapositive statements before the lecture Use Exploration 4.8 as an introduction Use Winplot graphs for demonstration Implicit Differentiation worksheet <p><u>Materials/Technology/Resources:</u></p> <p>Foerster, Paul A. Calculus: Concepts and Applications. Emeryville, CA: Key Curriculum Press. 1998 Graphing Calculator, Visual Calculus Website, Instructor Resource Guide, Geometer's Sketchpad, Study Island Website</p> <p><u>Interdisciplinary Connections:</u> Physics: p145 #42, p152 #25 &26, p175 #R7b</p> | <ul style="list-style-type: none"> Games and puzzles Small group instruction Pair-share | <p>questions</p> <ul style="list-style-type: none"> Exit prompts Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> Quiz 4.2-4.4 Chapter 4 Test (4.2-4.4, 4.6, 4.8) <p><u>Performance Assessment</u> -</p> <ul style="list-style-type: none"> Study Island Assignment | |
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| NJ-CCSS Domain Essential Questions | NJ-CCSS Cluster.Standard Standards for Mathematical Practice |
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| <p>Integrals</p> <ul style="list-style-type: none"> • How do you find the area under any curve? | <p>4.2.12.E.2 Measuring Geometric Objects Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <ul style="list-style-type: none"> • Approximation of area using grids of different sizes • Finding which shape has minimal (or maximal) area, perimeter, volume, or surface area under given conditions using graphing calculators, dynamic geometric software, and/or spreadsheets • Estimation of area, perimeter, volume, and surface area <p>4.3.12.B.1 Functions and Relationships Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.</p> <p>4.3.12.B.2 Functions and Relationships Analyze and explain the general properties and behavior of functions [of one variable] or relations, using [appropriate] algebraic and graphing [technologies] techniques</p> <p>4.3.12.B.3 Functions and Relationships Understand and perform transformations on commonly-used functions</p> <p>4.3.12.B.4 Functions and Relationships Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions.</p> <p>4.3.12.D.3 Procedures Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology..</p> <p>4.2.12.D.2 Units of Measurement Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.</p> <p>4.4.12.A.1 Data Analysis Use surveys and sampling techniques to generate data and draw conclusions about large groups</p> <p>SMP.5 Use appropriate tools strategically.</p> <p>SMP.4 Model with mathematics.</p> |

| Skills/Objectives SWBAT... | Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity | Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction | Assessments Formative Summative Benchmarks | Pacing |
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| <p>1.3 Estimate the definite integral by counting squares</p> <p>1.4 Estimate the value of a definite integral by dividing the region under the graph into trapezoids.</p> <p>3.9 Find the antiderivative and indefinite integral</p> <p>5.2 Use the symbol of an indefinite integral and find the antiderivatives</p> <p>5.4 Use the formal definition of indefinite integral. Apply properties of indefinite integral. Use u-substitution</p> <p>5.5 Use Riemann Sums to find definite integral</p> <p>5.6 Use The Mean Value Theorem and Rolle's Theorem</p> | <ul style="list-style-type: none"> • Use One Type of Integral Sketchpad activity • Exploration 1.3 • Use Trapezoidal Accumulation Sketchpad activity • TRAPRULE program • Exploration 1.4 • Game-match the graph of f with the graph of its derivative • Use table on p 112 Instructor's Guide for students brainstorming • Students self-review this topic from the textbook with a follow-up discussion in class • Show the geometric meaning of differentials before introducing u-substitution • Have students calculate Riemann Sums for $n = 3, 6$ without using technology; then use Riemann Sums applets for $n = 10, 100$; discuss the limits and definition of the definite integral • Use Exploration 5.6 and Concepts 5.6 worksheets to illustrate the geometric interpretation of the Theorem | <ul style="list-style-type: none"> • Extended time • Assignment modification • Alternative assessments • Group investigations • Note taking guides • Previewing materials • Graphic organizers • Cue cards • Manipulative • Music or movement • Simulations • Games and puzzles • Small group instruction • Pair-share | <p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz 1.3, 1.4, 3.9 • Quiz 5.4 • Quiz 5.5-5.6 • Unit Test 5.2-5.6, 5.8-5.10 <p><u>Performance Assessment</u> -</p> <ul style="list-style-type: none"> • Study Island Assignment | 25 days |

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| <p>5.8 Use The Fundamental Theorem of Calculus to find the definite integral</p> <p>5.9 Use the properties of the definite integral</p> <p>5.10 Solve problems from physics using the definite integral</p> | <ul style="list-style-type: none"> • Calculus in Motion Software-Theorems • Exploration 5.6 • Visual calculus website- Mean Value Theorem - problems and solutions <ul style="list-style-type: none"> • Exploration 5.8 as self –discovery activity • Definite Integral worksheet <ul style="list-style-type: none"> • Review the definition of even and odd functions before Exploration 5.9 • Group Work 2 (5. 2 Stewart book) <p><u>Materials/Technology/Resources:</u></p> <p>Foerster, Paul A. Calculus: Concepts and Applications. Emeryville, CA: Key Curriculum Press. 1998 Graphing Calculator, Visual Calculus Website, Instructor Resource Guide, Geometer’s Sketchpad, Study Island Website</p> <p><u>Interdisciplinary Connections:</u> Physics: Section 5-10</p> | | | |
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| NJ-CCSS Domain Essential Questions | NJ-CCSS Cluster.Standard Standards for Mathematical Practice |
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| <p>Derivative and Integral of Exponential and Logarithmic Function</p> <ul style="list-style-type: none"> • What is the slope of the tangent line at a given input value for an exponential or logarithmic function? • How do you find the area under an exponential function or a logarithmic function curve? | <p>4.1.12.C.1 Estimation Recognize the limitations of estimation, assess the amount of error resulting from estimation, and determine whether the error is within acceptable tolerance limits.</p> <p>4.2.12.D.2 Units of Measurement Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.</p> <p>4.2.12.E.2 Measuring Geometric Objects Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <ul style="list-style-type: none"> • Approximation of area using grids of different sizes • Finding which shape has minimal (or maximal) area, perimeter, volume, or surface area under given conditions using graphing calculators, dynamic geometric software, and/or spreadsheets • Estimation of area, perimeter, volume, and surface area <p>4.3.12.B.1 Functions and Relationships Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.</p> <p>4.3.12.B.2 Functions and Relationships Analyze and explain the general properties and behavior of functions [of one variable] or relations, using [appropriate] algebraic and graphing [technologies] techniques</p> <p>4.3.12.B.3 Functions and Relationships Understand and perform transformations on commonly-used functions</p> <p>4.3.12.B.4 Functions and Relationships Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions.</p> <p>4.3.12.D.3 Procedures Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology..</p> <p>4.3.12.C.1 Modeling Use functions to model real-world phenomena and solve problems that involve varying quantities.</p> <p>4.3.12.C.2 Modeling Analyze and describe how a change in an independent variable leads to change in a dependent one.</p> <p>SMP.5 Use appropriate tools strategically.</p> <p>SMP.4 Model with mathematics</p> |

| Skills/Objectives SWBAT... | Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity | Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction | Assessments Formative Summative Benchmarks | Pacing |
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| <p>6.3 Find the antiderivative of a reciprocal function Learn and apply The Second Fundamental Theorem of Calculus</p> <p>6.5 Find the derivative of exponential functions using logarithmic differentiation</p> <p>6.6 Find the derivative of logarithmic functions</p> <p>6.7 Find the derivative and integral for equations involving a variable power of e</p> <p>6.8 Find limits using L'Hopital's Rule</p> <p>6.9 Differentiate and integrate algebraic functions involving logs and exponents Integrate functions involving tangent, cotangent, secant, and cosecant</p> | <ul style="list-style-type: none"> • Packet-Special Focus: The Fundamental Theorem of Calculus • Review properties of exponents and logarithms • Puzzle: Lumberjack Visual calculus website- Logarithmic Differentiation • Teacher made worksheet • Puzzle • Teacher made worksheet • Puzzle • Visual calculus website – Drill - L'Hopital's Rule • Use problem # 63 page 284 as discovery activity • Teacher made worksheet • Puzzle <p><u>Materials/Technology/Resources:</u> Foerster, Paul A. Calculus: Concepts and Applications. Emeryville, CA: Key Curriculum Press. 1998 Graphing Calculator, Visual Calculus Website, Instructor Resource Guide, Geometer's Sketchpad, Study Island Website</p> <p><u>Interdisciplinary Connections:</u> Radio: p261 #59, Physics p261 #58 Money p271 #37</p> | <ul style="list-style-type: none"> • Extended time • Assignment modification • Alternative assessments • Group investigations • Note taking guides • Previewing materials • Graphic organizers • Cue cards • Manipulative • Music or movement • Simulations • Games and puzzles • Small group instruction • Pair-share | <p><u>Formative:</u></p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and Discuss • Open-ended questions • Exit prompts • Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz 6.3 • Chapter 6 Test (6.3, 6.5-6.9) <p><u>Performance Assessment</u> -</p> <ul style="list-style-type: none"> • Study Island Assignment | 25 days |

Unit 6: Application of Differentiation

Grade: 12

Date: May 2012

| NJ-CCSS Domain Essential Questions | | NJ-CCSS Cluster.Standard Standards for Mathematical Practice | | |
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| <p>Applications Of Derivative</p> <ul style="list-style-type: none"> • How do you find the maximum and minimum value of a function? • How can you identify the intervals where the graph of a function is increasing and decreasing? • How do you determine how fast a particle is moving? • How can you find the area between two curves? • How do you find the volume of a solid? | | <p>4.3.12.B.1 Functions and Relationships Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.</p> <p>4.3.12.B.2 Functions and Relationships Analyze and explain the general properties and behavior of functions [of one variable] or relations, using [appropriate] algebraic and graphing [technologies] techniques</p> <p>4.3.12.B.3 Functions and Relationships Understand and perform transformations on commonly-used functions</p> <p>4.3.12.B.4 Functions and Relationships Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions.</p> <p>4.2.12.D.2 Units of Measurement Choose appropriate tools and techniques to achieve the specified degree of precision and error needed in a situation.</p> <p>4.2.12.E.2 Measuring Geometric Objects Use a variety of strategies to determine perimeter and area of plane figures and surface area and volume of 3D figures.</p> <ul style="list-style-type: none"> • Approximation of area using grids of different sizes • Finding which shape has minimal (or maximal) area, perimeter, volume, or surface area under given conditions using graphing calculators, dynamic geometric software, and/or spreadsheets • Estimation of area, perimeter, volume, and surface area <p>SMP.5 Use appropriate tools strategically.</p> <p>SMP.4 Model with mathematics</p> | | |
| Skills/Objectives SWBAT... | Instructional Strategies Activities/ Materials /Technology Interdisciplinary Connections Cultural Diversity | Modifications ESL / Special Education Academic Support/G&T Differentiated Instruction | Assessments Formative Summative Benchmarks | Pacing |
| <p>8.2 Graph using derivatives Use the first derivative to find max and min, intervals of increase and decrease Use the second derivative to find points of inflection and concavity of a graph.</p> | <ul style="list-style-type: none"> • Teacher made worksheet • Puzzle | <ul style="list-style-type: none"> • Extended time • Assignment modification • Alternative assessments • Group investigations • Note taking guides • Previewing materials • Graphic organizers • Cue cards • Manipulative | <p>Formative:</p> <ul style="list-style-type: none"> • In class practice problems • Board work • Do Now prompts • Class work • Homework • Problem solving activities • Think and | 42 days |

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| <p>10.4 Solve related rates problems using algebraic formulas, similar triangles, and/or trigonometric functions</p> <p>8.3 Find the maximum or minimum perimeter, area or volume Solve problems involving area and volume and inscribed figures Find the shortest distance from a given point to a given curve</p> <p>8.4 Find the area between two curves or bounded by two curves and two vertical lines</p> <p>8.5 Find the volume of a figure using the slicing method Find the volume of a figure using the washer method</p> | <ul style="list-style-type: none"> • Calculus in Motion Software-Related Rates & Related Rates MORE • Teacher made worksheet • Puzzle <ul style="list-style-type: none"> • Geometer’s Sketchpad demo-Box Volume • Teacher made worksheet • Puzzle <ul style="list-style-type: none"> • Calculus in Motion Software-Area between 2 curves • Teacher made worksheet • Puzzle <ul style="list-style-type: none"> • Use geometric model (pear slicing) to illustrate concept. • Use computer animation to visualize solids of rotation • Calculus in Motion Software-Volumes by revolution • Teacher made worksheet • Puzzle <p><u>Materials/Technology/Resources:</u></p> <p>Foerster, Paul A. Calculus: Concepts and Applications. Emeryville, CA: Key Curriculum Press. 1998</p> <p>Graphing Calculator, Visual Calculus Website, Instructor Resource Guide, Geometer’s Sketchpad, Study Island Website</p> <p><u>Interdisciplinary Connections:</u></p> <p>Physics section 10-4</p> | <ul style="list-style-type: none"> • Music or movement • Simulations • Games and puzzles • Small group instruction • Pair-share | <p>Discuss</p> <ul style="list-style-type: none"> • Open-ended questions • Exit prompts • Study Island assignments <p><u>Summative:</u></p> <ul style="list-style-type: none"> • Quiz 8.2, 8.3, 10.4 • Quiz-Area • Quiz 8.4, 8.5 <p><u>Performance Assessment</u> -</p> <ul style="list-style-type: none"> • Study Island Assignment | |
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NORTH BRUNSWICK TOWNSHIP HIGH SCHOOL

(2415) CP Calculus

Grade 12

5 Credits, 1 Year

Course Description:

This introduction to the study of *Calculus* emphasizes the concepts of limits, derivatives as slopes and anti-derivatives. Students should consider electing this course if they have attained at least a “C” in Precalculus. A TI-83⁺ or better graphing calculator is necessary for success.

Proficiencies:

Upon completion of this course the student should be able to

1. Understand and apply the concepts of domain and range to polynomial and transcendental functions as well as specific (i.e., odd, even, composite, and inverse).
2. Understand and apply the concepts of limits with its algebraic operations, continuity, and applicable theorems.
3. Define the derivative by application of the limit theory and learn the rules for differentiation of specific functions (constants, powers, sums, differences, products, quotients, composites, and implicit) as it applies to polynomial and transcendental functions along with higher order derivatives.
4. Graph and illustrate the concepts of The Mean Value Theorem, Rolle’s theorem, and therefore extend their knowledge of limits by use of L’Hospital’s Rule.
5. Apply the concepts of the derivative to curve sketching to find slopes, tangents, relative and global extreme values, concavity, points of inflection.
6. Investigate physical problems in terms of related rates, velocity, acceleration, maximization, and minimization of specific quantities.
7. Define the antiderivative and limits of integration order to find the area under the curve through Reimann method, trapezoidal rule.
8. Perform the appropriate techniques of integration (such as substitution, use of identities).
9. Develop the Fundamental Theorem of Calculus through the concept of limits and the definite integral.
10. Relate mathematics to the physical science through the utilization of the integration process to various natural phenomena. (i.e., area between two curves, volumes of revolution).

Course Requirements

Students will be expected to:

1. Do homework assignments daily
2. Have a graphic utility
3. Have periodic quizzes and tests

Evaluation:

Marking period grades will be determined as follows:

90% performance assessments

10% homework