Pascack Valley Regional High School District

Pascack Hills High School, Montvale, New Jersey 07645 Pascack Valley High School, Hillsdale, New Jersey 07642

Course Name: Advanced Placement Calculus AB

Born On: July, 2011

Previous Revision: August, 2020 Current Revision: August, 2023

Board Approval: 8/28/23

Course: AP Calculus AB PVRHSD CURRICULUM MAP Grade Level: 11 – 12

COURSE DESCRIPTION

Advanced Placement Calculus AB is a full year, five credit course in calculus and related topics comparable to courses taught in colleges and universities. A prerequisite is the successful completion of Honors Precalculus or Precalculus with teacher recommendation. The primary objective of this course is to prepare the student for the Calculus AB advanced placement examination. Successful completion of this examination will afford the student (depending upon the policy of the college or university) a full or half year's credit of advanced placement and credit in college level mathematics.

Each student who has mastered the concepts and skills in Advanced Placement Calculus will exhibit competency with:

- 1. Polynomial, trigonometric, exponential and logarithmic functions and function theory
- 2. The derivative of a function and applications
- 3. The antiderivatives of a functions and applications
- 4. Techniques of integration
- 5. The definite integral and applications

All mathematics courses in the Pascack Valley Regional High School District are designed to address multiple learning styles and needs, and accommodations and modifications are made for students with disabilities, multilingual students, students at risk of failure, gifted and talented students, and students with 504 plans. *AP Calculus AB* builds on concepts learned and skills developed in *Precalculus* and *Honors Precalculus*, while also spiraling in those concepts and skills to reinforce and strengthen students' algebraic foundation. Additionally, *AP Calculus AB* anticipates higher-level mathematics that will be learned in college-level math and applied math courses, and enrichment opportunities are provided to challenge students and engage them in rich, interesting mathematics. Students are encouraged to analyze data using tools and models to make valid and reliable claims (9.4.12.IML.3), and various technologies are integrated throughout the curriculum, including scientific calculators, graphing calculators, specialized software, and various Internet programs and subscriptions. These tools enrich the curriculum by giving students' access to additional mathematical representations, and they also help to differentiate by providing students with additional options to engage with mathematical tasks.

The Pascack Valley Regional High School Mathematics Department integrates 21st century life and career skills across its courses, with the dual goal of informing students about careers and fields of study that use mathematics (9.3.ST.5, 9.3.ST-ET.5 and 9.3.ST-SM.2), and helping students improve the quantitative, mathematical, and statistical reasoning skills they will need to be effective producers and consumers of quantitative information in their everyday lives (9.2.12.CAP.2). Mathematics courses address the *New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills*, with a particular emphasis on demonstrating the ability to reflect, analyze and use creative skills and ideas (9.4.12.CI.1),

investigating new challenges and opportunities for personal growth, advancement and transition (9.4.12.CI.3), identifying problem-solving strategies used in the development of an innovative product or practice (9.4.12.CT.1), and explaining the potential benefits of collaborating to enhance critical thinking and problem solving (9.4.12.CT.2). Mathematics courses also address the *New Jersey Student Learning Standards for English Language Arts Companion Standards*, with a particular focus on following complex multistep procedures (RST.9-10.3/RST.11-12.3), determining the meaning of symbols, key terms, and other domain-specific words and phrases (RST.9-10.4/RST.11-12.3), and translating quantitative or technical information expressed in words into visual forms and translating information expressed visually or mathematically into words (RST.9-10.7). Similarly, the mathematics department seeks to support students by providing them with opportunities to use quantitative, statistical, and mathematical reasoning in interdisciplinary contexts, in contexts that are meaningful to students, and in contexts that attend to the contributions and perspectives of historically marginalized groups. Specifically, mathematics courses will look to incorporate, when appropriate, contributions and experiences of people from the LGBTQ+ community and individuals with disabilities, and references to issues of social and cultural relevance, including climate change.

Course: AP Calculus AB PVRHSD CURRICULUM MAP Grade Level: 11 – 12

Content/Topic:	Key Learning Items/Concepts and Pacing Guide	Observable Proficiencies and Skills:	NJSLS	Formative, Summative, Benchmark, and Alternative Assessments	Core Instructional and Supplemental Materials/ Modifications and Accommodations
Unit 1 –	Key learning	A. Define: polynomial	NJSLS Content	Students will be	Selection of primary sources
Functions	items/concepts:	function.	Standards	assessed	Suggestion(s):
		B. Determine the	AP Calculus AB builds on	regularly	Texts: Larson, Hostetler, Edward, Heath
Time: 3 weeks	- Polynomial/	existence, number, and	many of the concepts and	throughout this	Calculus, 7th edition, 2002 (on grade level);
(see column 2 for	Rational/Algebraic (1	location of zeros of a	skills learned in the New	course, with a	Finney, Ross Calculus Graphical, Numerical,
a more detailed	day)	polynomial function.	Jersey Student Learning	focus on both	Algebraic, California: Scott Foresman
breakdown)	- Trigonometric (1 day)	C. Define the sine and	Standards	conceptual	Addison-Wesley Publishing Company, 1999.
	- Exponential/	cosine functions.		understanding	(advanced); Deltamath (remediation, on grade
	Logarithmic (1 day)	D. Utilize proficiently	NJSLS SMP	and procedural	level, and advanced)
	- General function	the fundamental and	MP1. Make sense of	fluency.	4.11%
	properties (1 day)	higher level	problems and persevere in	Assessment	Additional Resources:
	- Limits (including	trigonometric	solving them	tools may	Cade, Caldwell, Lucia Preparing for the AP
	one-sided limits) (1 week)	identities.	MP2. Construct viable	include the	Calculus AB and Calculus BC Examinations,
	- Continuity (1/2 week)	E. Graph sine and	arguments and critique	following:	McDougal Littell, 2006.
	- Asymptotes (odd/even);	cosine functions,	the reasoning of others	- quizzes (F)	Hughes-Hallett, Gleason, et al. Calculus Single
	zeros (odd/even); slant	including variations of	MP3. Reason abstractly	- tests (S)	Variable,2nd Edition. New York: Wiley
	asymptotes (1/2 week)	$f(x) = A \sin(Bx + C)$	and quantitatively	- performance	Publishing Company, Inc., 1998. Hockett, Bock,
		and f(x) = A cos (Bx)	MP4. Model with	tasks (F/S)	How to Prepare for the AP Calculus AP
	Content-specific	+ <i>C</i>).	mathematics	- projects (S)	Examination 7th ed., Barron's, 2002.
	modifications and	F. Formulate and	MP5. Attend to precision	- homework (F)	Larson, Roland. Calculus with Analytic
	accommodations	interpret examples of	MP6. Use appropriate	- discussions	Geometry, Third Edition. Massachusetts: D. C.
	- this unit will spiral in	exponential and	tools strategically	(F)	Heath and Company.
	concepts and skills that	logarithmic functions.	MP7. Look for and make	- journals (F)	Lederman, David, Multiple-Choice &
	students learned in	G. Graph exponential	use of structure	- Form A, B, or	Free-Response Questions in Preparation for the AP Calculus AB Examination 6th and 7th ed.
	previous courses	and logarithmic	MP8. Look for and	C benchmark	
	- differentiated problem	functions.	express regularity in	(B)	D&S Marketing, 1998.
	sets can be used to	H. Explain and utilize	repeated reasoning	- alternative	

support and challenge	the inverse		assessments	McMullin, Lin Teaching AP Calculus, D&S
students	relationship between	NJSLS for ELA	(A)	Marketing Systems, 2003.
	an exponential and a	Companion Standards	- Take home	Stewart, James Calculus, 2nd Edition. New
Interdisciplinary/additio	logarithmic function.	RST.9-10.3	exams and	York: GWO Publishing Company, 2001. 1997,
nal connections	I. Utilize e as a base,	RST.9-10.4	investigations	1998, 2003 AP Calculus AB and BC Released
- various graphs may be	where:	RST.9-10.7	(F)	exams, The College Board.
explored, including those	$-e = limit (1 + 1/x) ^x$	RST.11-12.3	- On-line work	Exploring Calculus with The Geometer's
with contexts that draw on	- $limit (e^x - 1)/x = 1$	RST.11-12.4	including AP	Sketchpad® Key Curriculum Press, 2002.
the experiences of diverse	$x \rightarrow 0$		exam open	Software:
people and contexts that	J. Utilize these general	NJSLS-CLKS	ended questions	Calculus in Motion
relate to climate change	function properties:	- 21st Century Life and	(F)	Geometric Sketchpad® v. 4.02, Key Curriculu
- problems may include	- Odd and even	Careers	-	Press, 2001.
applications in science or	- Sum, difference,	9.4.12.CI.1	Administration	Calculators:
engineering	product, and quotient	9.4.12.CI.3	of previous AP	The TI-83, TI-83+, TI-84, TI-89 or TI-92
	- Composite functions	9.4.12.CT.1	exam sections	graphing calculators (Texas Instruments).
	- Inverses	9.4.12.CT.2	and questions	
	K. Find the limit of a		based on	Modifications and Accommodations:
	function.	- Technology	relevant topics	Students with special needs: Teachers and
	L. Determine whether	9.4.12.IML.3	(F)	support staff will attend to all modifications as
	and where a function			accommodations listed in students' IEPs and
	is continuous.	- Career Education		504s. Teachers will incorporate manipulatives
	M. Asymptotes	9.2.12.CAP.2		extra time, alternative assessments, scaffoldin
	(vertical, horizontal-	9.3.ST.5		spiraling, technology, and flexible grouping to
	including multiple,	9.3.ST-ET.5		support student learning.
	and slant)	9.3.ST-SM.2		Multilingual students: Teachers and support
				staff will work to support multilingual student
		NJSLS – CSDT		in their first language and in English, providing
		8.1.12.DA.1		materials and/or resources to support students
		8.1.12.DA.5		understanding. Students will be given addition
		8.1.12.DA.6		time, as appropriate, and translation tools will
		8.1.12.AP.1		utilized as needed.
		8.2.12.ETW.2		Students at risk of school failure:
				Formative and summative data will be used to
				monitor student success, and students at risk o

Each student who has mastered th logarithmic functions and function	AP Calculus AB: Advanced Placement Calculus AB is a full year, five credit course in calculus and related topics comparable to courses taught in colleges and universities. Each student who has mastered the concepts and skills in Advanced Placement Calculus will exhibit competency with polynomial, trigonometric, exponential and logarithmic functions and function theory, the derivative of a function and applications, the antiderivatives of a functions and applications, techniques of integration, and the definite integral and applications.				
		failure will receive additional supports and services, which may include parent consultation, extra help, and differentiation strategies, including small group instruction, group work, scaffolding, and spiraling. Gifted and Talented Students: Students who excel in their mastery of course standards will be further challenged with more complex tasks, extensions of concepts and skills, and extended problem solving and critical thinking opportunities.			

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Content/Topic:	Key Learning Items/Concepts and Pacing Guide	Observable Proficiencies and Skills:	NJSLS	Formative, Summative, Benchmark, and Alternative Assessments	Core Instructional and Supplemental Materials/ Modifications and Accommodations
Unit 2 –	Key learning	A. Define: derivative	NJSLS Content	Students will be	Selection of primary sources
Differential	items/concepts:	B. Relate the concept	Standards	assessed regularly	Suggestion(s):
Calculus		of derivative to:	AP Calculus AB builds on	throughout this	Texts: Larson, Hostetler, Edward, Heath
	A. The Derivative	1. Slope of a tangent	many of the concepts and	course, with a focus	Calculus, 7th edition, 2002 (on grade level);
Time: 14-16	(presented graphically,	line	skills learned in the New	on both conceptual	Finney, Ross Calculus Graphical, Numerical,
weeks (see	numerically, and	2. Instantaneous	Jersey Student Learning	understanding and	Algebraic, California: Scott Foresman
column 2 for a	analytically) (8-9 weeks)	velocity	Standards	procedural fluency.	Addison-Wesley Publishing Company, 1999.
more detailed	1. Definition (3 days)	3. Rate of change of a		Assessment tools	(advanced); Deltamath (remediation, on
breakdown)	2. Applications (3 days)	function	NJSLS SMP	may include the	grade level, and advanced)
	3. Derivative at a point (2	C. Determine the	MP1. Make sense of	following:	
	days)	derivative of these	problems and persevere in	- quizzes (F)	Additional Resources:
	4. Derivatives of functions	functions:	solving them	- tests (S)	Cade, Caldwell, Lucia Preparing for the AP
	(5-7 days)	1. Polynomial	MP2. Construct viable	- performance tasks	Calculus AB and Calculus BC
	a. Polynomial/Rational	2. Trigonometric	arguments and critique	(F/S)	Examinations, McDougal Littell, 2006.
	b. Trigonometric	3. Exponential	the reasoning of others	- projects (S)	Hughes- Hallett, Gleason, et al. Calculus
	c. Exponential	4. Logarithmic	MP3. Reason abstractly	- homework (F)	Single Variable,2nd Edition. New York:
	d. Logarithmic	D. Take derivatives of	and quantitatively	- discussions (F)	Wiley Publishing Company, Inc., 1998.
	4. Derivatives of sums,	sums, products, and	MP4. Model with	- journals (F)	Hockett, Bock, How to Prepare for the AP
	products, quotients (5 days)	quotients.	mathematics	- Form A, B, or C	Calculus AP Examination 7th ed., Barron's,
	5. Derivatives of composite	E. Use the Chain Rule	MP5. Attend to precision	benchmark (B)	2002.
	functions (3 days)	to take the derivative	MP6. Use appropriate	- alternative	Larson, Roland. Calculus with Analytic
	6. Derivatives of implicitly	of a composite	tools strategically	assessments	Geometry, Third Edition. Massachusetts: D.
	defined functions (4 days)	function.	MP7. Look for and make	(A)	C. Heath and Company.
	7. 2nd derivatives and their	F. Take the derivative	use of structure	- Take home exams	Lederman, David, Multiple-Choice &
	properties. (graphical and	of an implicitly defined	MP8. Look for and	and investigations	Free-Response Questions in Preparation for
	numerical as well as	function.	express regularity in	(F)	the AP Calculus AB Examination 6th and
	analytic) (2 days)	G. Complete related	repeated reasoning	- On-line work	7th ed.
	8. Exponential	rate problems	_	including AP exam	D&S Marketing, 1998.

Differentiation (2 days)	H. Perform	NJSLS for ELA	open ended	McMullin, Lin Teaching AP Calculus, D&S
9. Logarithmic	logarithmic	Companion Standards	questions (F)	Marketing Systems, 2003.
differentiation (2 days)	differentiation.	RST.9-10.3	- Administration of	Stewart, James Calculus, 2nd Edition. New
10. Natural logarithmic	I. Take the derivative	RST.9-10.4	previous AP exam	York: GWO Publishing Company, 2001.
differentiation (3 days)	of the inverse of a	RST.9-10.7	sections and	1997, 1998, 2003 AP Calculus AB and BC
11. Derivatives of rational	function, including the	RST.11-12.3	questions based on	Released exams, The College Board.
powers of a function (3	inverse trigonometric	RST.11-12.4	relevant topics (F)	Exploring Calculus with The Geometer's
days)	functions.		- curve sketching	Sketchpad® Key Curriculum Press, 2002.
12. Derivative of the inverse	J. Take the derivative	NJSLS-CLKS	task (F)	Software:
of a trigonometric function	of a rational power of	- 21st Century Life and	-maximize/	Calculus in Motion
(3 days)	a function.	Careers	minimize task (F)	Geometric Sketchpad® v. 4.02, Key
13. Rolle's Theorem (1 day)	K. State and explain	9.4.12.CI.1	. ,	Curriculum Press, 2001.
14. Mean Value Theorem (1	Rolle's Theorem.	9.4.12.CI.3		Calculators:
day)	L. Explain the Mean	9.4.12.CT.1		The TI-83, TI-83+, TI-84, TI-89 or TI-92
15. Relation between	Value Theorem,	9.4.12.CT.2		graphing calculators (Texas Instruments).
differentiability and	illustrating			
continuity (2 days)	graphically and using	- Technology		Modifications and Accommodations:
16. Intermediate Value	to obtain	9.4.12.IML.3		Students with special needs: Teachers and
Theorem (2 days)	approximations.			support staff will attend to all modifications
B. Applications of the	M. Explain the	- Career Education		and accommodations listed in students'
Derivative (6-7 weeks)	relation between	9.2.12.CAP.2		IEPs and 504s. Teachers will incorporate
1. Slope of a curve (3 days)	differentiability and	9.3.ST.5		manipulatives, extra time, alternative
2. Tangent and normal lines	continuity.	9.3.ST-ET.5		assessments, scaffolding, spiraling,
(2 days)	N. Use the concept of	9.3.ST-SM.2		technology, and flexible grouping to support
3. Curve sketching (6 days)	derivative to:			student learning.
a. Increasing and decreasing	- Find the slope of a	NJSLS – CSDT		Multilingual students: Teachers and
functions	curve	8.1.12.DA.1		support staff will work to support
b. Relative and absolute	- Write equations of	8.1.12.DA.5		multilingual students in their first language
maximum and minimum	tangent lines to a	8.1.12.DA.6		and in English, providing materials and/or
points	curve	8.1.12.AP.1		resources to support students'
c. Concavity	- Concavity	8.2.12.ETW.2		understanding. Students will be given
d. Points of inflection	- Points of inflection			additional time, as appropriate, and
e. Given f'(x) and/or f''(x)	O. Sketch curves,			translation tools will be utilized as needed.
analyze $f(x)$ from a	being accurate with			Students at risk of school failure:

	graphical point of view.	respect to:		Formative and summative data will be used
	4. Extreme value problems	- Increasing and		to monitor student success, and students at
	(2 days)	decreasing functions		risk of failure will receive additional
	5. Optimization (7 days)	- Relative and absolute		supports and services, which may include
	6. Velocity and acceleration	maximum and		parent consultation, extra help, and
	of a particle moving along a	minimum points		differentiation strategies, including small
	line (5 days)	- Concavity		group instruction, group work, scaffolding,
	7. Average and	- Points of inflection		and spiraling.
	instantaneous rates of	P. Use the derivative		Gifted and Talented Students: Students
	change (2 days)	to examine extreme		who excel in their mastery of course
I	8. Related rates of change (7	values of the function.		standards will be further challenged with
	days)	Q. Optimization		more complex tasks, extensions of concepts
	9. Parametrically defined	Problems. A variety of		and skills, and extended problem solving
	curves (3 days)	problems involving		and critical thinking opportunities.
		many topics		
	Content-specific	R. Apply the derivative		
	modifications and	to motion along a line.		
	accommodations	(rectilinear motion)		
	- just in time support will be	S. Solve differential		
	incorporated to help	equations		
	students reinforce necessary	T. Analyze and sketch		
	prerequisite skills	slope fields as well as		
	- differentiated problem sets	writing general		
	can be used to support and	equation given field.		
ı	challenge students			
	Interdisciplinary/addition			
	al connections			
	- problems may include			
	applications to science or			
	engineering			
	- position, velocity, and			
	acceleration graphs will be			
	explored			

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Content/Topic:	Key Learning Items/Concepts and Pacing Guide	Observable Proficiencies and Skills:	NJSLS	Formative, Summative, Benchmark, and Alternative Assessments	Core Instructional and Supplemental Materials/ Modifications and Accommodations
Unit 3 –	Key learning	A. Determine	NJSLS Content	Students will be	Selection of primary sources
Integral	items/concepts:	antiderivatives.	Standards	assessed regularly	Suggestion(s):
Calculus		B. Use antiderivatives	AP Calculus AB builds on	throughout this	Texts: Larson, Hostetler, Edward, Heath
	A. Antiderivatives (4 days)	to:	many of the concepts and	course, with a focus	Calculus, 7th edition, 2002 (on grade level);
Time: 15-16	B. Applications of	1. Find distance and	skills learned in the New	on both conceptual	Finney, Ross Calculus Graphical, Numerical,
weeks (see	antiderivatives (2 weeks)	velocity from	Jersey Student Learning	understanding and	Algebraic, California: Scott Foresman
column 2 for a	1. Distance and velocity	acceleration with	Standards	procedural fluency.	Addison-Wesley Publishing Company, 1999.
more detailed	from acceleration and initial	initial conditions.		Assessment tools	(advanced); Deltamath (remediation, on
breakdown)	conditions (3 days)	2. Find polynomial	NJSLS SMP	may include the	grade level, and advanced)
	2. Polynomial solutions of y	solutions of $y(n) = 0$	MP1. Make sense of	following:	
	(n) = 0 (3 days)	3. Solve differential	problems and persevere in	- quizzes (F)	Additional Resources:
	3. Solutions of $y' = ky$ and	equations, such as y"	solving them	- tests (S)	Cade, Caldwell, Lucia <i>Preparing for the AP</i>
	y' = c/x (applications to	$= -(k \wedge 2) y$	MP2. Construct viable	- performance tasks	Calculus AB and Calculus BC
	growth and decay) (3 days)	4. Solve equations like	arguments and critique	(F/S)	Examinations, McDougal Littell, 2006.
	C. Techniques of integration	y' = ky and y' = c/x	the reasoning of others	- projects (S)	Hughes- Hallett, Gleason, et al. Calculus
	(3 weeks)	C. Integrate by	MP3. Reason abstractly	- homework (F)	Single Variable,2nd Edition. New York:
	1. Integration by	substitution, using	and quantitatively	- discussions (F)	Wiley Publishing Company, Inc., 1998.
	substitution (5-7 days)	identities and change	MP4. Model with	- journals (F)	Hockett, Bock, How to Prepare for the AP
	2. Trigonometric integrals	of variable.	mathematics	- Form A, B, or C	Calculus AP Examination 7th ed., Barron's,
	(2 days)	D. Relate the definite	MP5. Attend to precision	benchmark (B)	2002.
	3. Trigonometric	integral to the concept	MP6. Use appropriate	- alternative	Larson, Roland. Calculus with Analytic
	substitution (3 days)	of area.	tools strategically	assessments	Geometry, Third Edition. Massachusetts: D.
	4. Partial fractions (2 days)	E. Use the definite	MP7. Look for and make	(A)	C. Heath and Company.
	D. The definite integral (3-4	integral to analyze the	use of structure	- Take home exams	Lederman, David, Multiple-Choice &
	weeks)	concept of area.	MP8. Look for and	and investigations	Free-Response Questions in Preparation for
	1. Concept of area (3 days)	F. State and explain	express regularity in	(F)	the AP Calculus AB Examination 6th and
	2. Approximation of area	definitions and	repeated reasoning	- On-line work	7th ed.
	(5-6 days)	properties related to	_	including AP exam	D&S Marketing, 1998.
	a. Riemann Summations	the definite integral.	NJSLS for ELA	open ended	

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 te integral and applications.				
 b. Inscribed and	G. State and explain	Companion Standards	questions (F)	McMullin, Lin Teaching AP Calculus, D&S
circumscribed rectangles	the First Fundamental	RST.9-10.3	- Administration of	Marketing Systems, 2003.
c. Trapezoids	Theorem of Integral	RST.9-10.4	previous AP exam	Stewart, James Calculus, 2nd Edition. New
3. Definition (2 days)	Calculus.	RST.9-10.7	sections and	York: GWO Publishing Company, 2001.
4. Properties (2 days)	H. Use the definite	RST.11-12.3	questions based on	1997, 1998, 2003 AP Calculus AB and BC
5. Fundamental Theorem of	integral to:	RST.11-12.4	relevant topics (F)	Released exams, The College Board.
Calculus (4 days)	1. Determine the		- Reimann sum task	Exploring Calculus with The Geometer's
E. Application of the	average value of a	NJSLS-CLKS	(F)	Sketchpad® Key Curriculum Press, 2002.
integral (4 weeks)	function on an interval	- 21st Century Life and		Software:
1. Comparison of total	2. Find areas between	Careers		Calculus in Motion
distance vs. displacement of	curves	9.4.12.CI.1		Geometric Sketchpad® v. 4.02, Key
velocity functions	3. Find volumes of	9.4.12.CI.3		Curriculum Press, 2001.
2. Average value of a	solids of revolution	9.4.12.CT.1		Calculators:
function on an interval (3	Interpret 1n x as the	9.4.12.CT.2		The TI-83, TI-83+, TI-84, TI-89 or TI-92
days)	area under the graph			graphing calculators (Texas Instruments).
3. Areas between curves (5	of y = 1/x	- Technology		
days) Using both dy and dx		9.4.12.IML.3		Modifications and Accommodations:
4. Volumes of solids of				Students with special needs: Teachers and
revolution (Discs and		- Career Education		support staff will attend to all modifications
Washers) (6 days)		9.2.12.CAP.2		and accommodations listed in students'
5. Volumes of solids given		9.3.ST.5		IEPs and 504s. Teachers will incorporate
known cross sections (3		9.3.ST-ET.5		manipulatives, extra time, alternative
days)		9.3.ST-SM.2		assessments, scaffolding, spiraling,
6. Interpretation of 1n x as				technology, and flexible grouping to support
area under the graph of y =		NJSLS – CSDT		student learning.
x-1 (3 days)		8.1.12.DA.1		Multilingual students: Teachers and
F. Differential Equations (2		8.1.12.DA.5		support staff will work to support
weeks)		8.1.12.DA.6		multilingual students in their first language
1. Slope Fields (1 week)		8.1.12.AP.1		and in English, providing materials and/or
2. Natural Logs (1 week)		8.2.12.ETW.2		resources to support students'
				understanding. Students will be given
Content-specific				additional time, as appropriate, and
modifications and				translation tools will be utilized as needed.
accommodations				Students at risk of school failure:
- technology will be utilized				Formative and summative data will be used
to support students'				to monitor student success, and students at
understanding of area under				risk of failure will receive additional
the curve				supports and services, which may include
- differentiated problem sets				parent consultation, extra help, and

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can be used to support and challenge students Interdisciplinary/addition al connections - problems may include applications to science or engineering - position, velocity, and acceleration graphs will be explored		differentiation strategies, including small group instruction, group work, scaffolding, and spiraling. Gifted and Talented Students: Students who excel in their mastery of course standards will be further challenged with more complex tasks, extensions of concepts and skills, and extended problem solving and critical thinking opportunities.		

Content/Topic:	Key Learning Items/Concepts and Pacing Guide	Observable Proficiencies and Skills:	NJSLS	Formative, Summative, Benchmark, and Alternative Assessments	Core Instructional and Supplemental Materials/ Modifications and Accommodations
Unit 4 –	Key learning	- utilize the Shell	NJSLS Content	Students will be	Selection of primary sources
Extensions	items/concepts:	method to find volume	Standards	assessed regularly	Suggestion(s):
		- calculate arc lengths	AP Calculus AB builds	throughout this	Texts: Larson, Hostetler, Edward, Heath
Time: 4 weeks	1. Volumes of Solids using	and lateral areas	on many of the	course, with a	Calculus, 7th edition, 2002 (on grade level);
(see column 2	shell method (1 week)	- evaluate integrals	concepts and skills	focus on both	Finney, Ross Calculus Graphical, Numerical,
for a more	2. Arc Lengths (1 week)	using integration by	learned in the New	conceptual	Algebraic, California: Scott Foresman
detailed	3. Surfaces of solids formed	parts	Jersey Student Learning	understanding and	Addison-Wesley Publishing Company, 1999.
breakdown)	by revolutions (lateral areas		Standards	procedural	(advanced); Deltamath (remediation, on grade
	of solids) (1 week)			fluency.	level, and advanced)
	4. Integration by Parts (1		NJSLS SMP	Assessment tools	
	week)		MP1. Make sense of	may include the	Additional Resources:
			problems and persevere	following:	Cade, Caldwell, Lucia <i>Preparing for the AP</i>
	Content-specific		in solving them	- quizzes (F)	Calculus AB and Calculus BC Examinations,
	modifications and		MP2. Construct viable	- tests (S)	McDougal Littell, 2006.
	accommodations		arguments and critique	- performance	Hughes- Hallett, Gleason, et al. Calculus Single
	- technology will be utilized		the reasoning of others	tasks (F/S)	Variable,2nd Edition. New York: Wiley
	to support students'		MP3. Reason abstractly	- projects (S)	Publishing Company, Inc., 1998. Hockett, Bock,
	understanding of three-		and quantitatively	- homework (F)	How to Prepare for the AP Calculus AP
	dimensional concepts		MP4. Model with	- discussions (F)	Examination 7th ed., Barron's, 2002.
	- differentiated problem sets		mathematics	- journals (F)	Larson, Roland. Calculus with Analytic
	can be used to support and		MP5. Attend to	- Form A, B, or C	Geometry, Third Edition. Massachusetts: D. C.
	challenge students		precision	benchmark (B)	Heath and Company.
			MP6. Use appropriate	- alternative	Lederman, David, Multiple-Choice &
	Interdisciplinary/addition		tools strategically	assessments	Free-Response Questions in Preparation for the
	al connections		MP7. Look for and	(A)	AP Calculus AB Examination 6th and 7th ed.
	- problems may include		make use of structure	- Take home	D&S Marketing, 1998.
	applications to science or		MP8. Look for and	exams and	McMullin, Lin Teaching AP Calculus, D&S
	engineering		express regularity in	investigations (F)	Marketing Systems, 2003.
			repeated reasoning	- On-line work	Stewart, James Calculus, 2nd Edition. New

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logarithmic functions and function theory, the derivative of a function and applications, the antiderivatives of a functions and applications, techniques of integration,
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	NJSLS for ELA	including AP exam open ended	York: GWO Publishing Company, 2001. 1997, 1998, 2003 AP Calculus AB and BC Released
	Companion Standards	questions (F)	exams, The College Board.
	RST.9-10.3	- Administration	Exploring Calculus with The Geometer's
	RST.9-10.4	of previous AP	Sketchpad® Key Curriculum Press, 2002.
	RST.9-10.7	exam sections and	Software:
	RST.11-12.3	questions based	Calculus in Motion
	RST.11-12.4	on relevant topics (F)	Geometric Sketchpad® v. 4.02, Key Curriculum Press, 2001.
	NJSLS-CLKS		Calculators:
	- 21st Century Life and		The TI-83, TI-83+, TI-84, TI-89 or TI-92
	Careers		graphing calculators (Texas Instruments).
	9.4.12.CI.1		
	9.4.12.CI.3		Modifications and Accommodations:
	9.4.12.CT.1		Students with special needs: Teachers and
	9.4.12.CT.2		support staff will attend to all modifications and
			accommodations listed in students' IEPs and
	- Technology		504s. Teachers will incorporate manipulatives,
	9.4.12.IML.3		extra time, alternative assessments, scaffolding,
			spiraling, technology, and flexible grouping to
	- Career Education		support student learning.
	9.2.12.CAP.2		Multilingual students: Teachers and support
	9.3.ST.5		staff will work to support multilingual students
	9.3.ST-ET.5		in their first language and in English, providing
	9.3.ST-SM.2		materials and/or resources to support students'
			understanding. Students will be given additional
	NJSLS – CSDT		time, as appropriate, and translation tools will be
	8.1.12.DA.1		utilized as needed.
	8.1.12.DA.5		Students at risk of school failure:
	8.1.12.DA.6		Formative and summative data will be used to
	8.1.12.AP.1		monitor student success, and students at risk of
	8.2.12.ETW.2		failure will receive additional supports and
			services, which may include parent consultation,
			extra help, and differentiation strategies,
			including small group instruction, group work,
			scaffolding, and spiraling.
			Gifted and Talented Students: Students who
			excel in their mastery of course standards will be
			further challenged with more complex tasks,

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					functions and applications, techniques of integration,
					extensions of concepts and skills, and extended
					problem solving and critical thinking
					opportunities.