CARLSTADT-EAST RUTHERFORD REGIONAL HIGH SCHOOL DISTRICT
MATHEMATICS DEPARTMENT
PRECALCULUS HONORS

Pre-calculus Honors Curriculum Guide

Pacing Guide **Pre-calculus Honors is a full year course that meets on a rotating basis for three (3) 55-minute blocks and one (1) 40-minute block for every five (5) day cycle.**	**Unit 1 (Chapter 2):** Polynomial Functions 3 weeks **Unit 2 (Chapter 4):** Functions 4 weeks **Unit 3 (Chapter 5):** Exponents and Logarithms 3 weeks **Unit 4 (Chapter 6):** Analytic Geometry 4 weeks **Unit 5 (Chapter 7):** Trigonometric Functions 3 weeks **Unit 6 (Chapter 8):** Trigonometric Equations and Applications 5 weeks **Unit 7 (Chapter 9):** Triangle Trigonometry 4 weeks **Unit 8 (Chapter 19):** Limits, Series, and Iterated Functions 4 weeks

21st Century Skills Standards: **9.1** Personal Finance Literacy **9.2** Career Awareness	 **9.1.12.D.3:** Summarize how investing builds wealth and assists in meeting long-and short-term financial goals. **9.1.12.D.5:** Justify the use of savings and investment options to meet targeted goals. **9.2.12.C.1** Review career goals and determine steps necessary for attainment. **9.2.12.C.4:** Analyze how economic conditions and social changes influence employment trends and future education.
Technology Standards	**8.1.12.A.4:** Construct a spreadsheet, enter data, and use mathematical or logical functions to manipulate data, generate charts and graphs, and interpret the results.
Interdisciplinary Connections	SCIENCE HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. ENLGISH LANUGAGE ARTS WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research.
NJSLS Mathematical Practices – These practices are demonstrated throughout the curriculum.	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
NJSLS Career Ready Practices – These practices are demonstrated throughout the curriculum	CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership and effective management. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.

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Differentiation/Accommodations/Modifications

Note: Each district should review the various strategies noted below and determine which are applicable for their population within varied grade levels and languages and make edits where needed.

Gifted and Talented	English Language Learners	Students with Disabilities	Students at Risk of School Failure
(content, process, product and learning environment) **Extension Activities:** • Conduct research and provide presentation of mathematical topics. • Design surveys to generate and analyze data to be used in discussion. • Use of higher level questioning techniques. • Provide assessments at a higher level of thinking.	**Modifications for Classroom:** **Modifications for Homework/Assignments** • Modified assignments. • Extended time for assignment completion as needed. • Use graphing calculator. • Highlight formulas.	*(appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team)* **Modifications for Classroom:** • Ask students to restate information, directions, and assignments. • Repetition and practice. • Model skills / techniques to be mastered. • Extended time to complete class work. • Provide copy of classnotes. • Preferential seating to be mutually determined by the student and teacher. • Students may request books online, on tape/CD, as available and appropriate. • Assign peer helper in the class setting. • Provide regular parent / school communication • Provide oral reminders and check	**Modifications for Classroom:** • Ask students to restate information, directions, and assignments. • Repetition and practice. • Model skills / techniques to be mastered. • Extended time to complete class work. • Provide copy of classnotes. • Preferential seating to be mutually determined by the student and teacher. • Students may request books online, on tape/CD, as available and appropriate. • Assign peer helper in the class setting. • Provide oral reminders and check student work during independent work time. • Assist student with long and short term planning of assignments • Provide regular parent / school communication. • Assign peer helper in the class

		student work during independent work time. • Assist student with long and short term planning of assignments **Modifications for Homework** • Extended time to complete assignments. • Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases. • Provide the student with clearly stated (written) expectations and grading criteria for assignments. **Modification for Assessments** • Extended time on classroom tests and quizzes. • Student may take / complete tests in an alternate setting as needed. • Restate, reread, and clarify directions/questions. • Distribute study guide for classroom tests. • Establish procedures for accommodations / modifications for assessments.	setting. • Provide oral reminders and check student work during independent work time. • Assist student with long and short term planning of assignments **Modifications for Homework** • Extended time to complete assignments. • Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases. • Provide the student with clearly stated (written) expectations and grading criteria for assignments. **Modification for Assessments** • Extended time on classroom tests and quizzes. • Student may take / complete tests in an alternate setting as needed. • Restate, reread, and clarify directions/questions. • Distribute study guide for classroom tests. • Establish procedures for accommodations / modifications for assessments.

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<table>
<tr><td colspan="4">NTENT: Chapter 2</td></tr>
<tr><td colspan="4">Theme: Polynomial Functions</td></tr>
<tr><td colspan="4">Essential Questions:
What are linear and quadratic functions, and their graphical representations?
How do we solve polynomials?</td></tr>
<tr>
<td>Content (As a result of this learning segment, students will know…)

• 2.1 Polynomials
• 2.2 Synthetic Division
• 2.3 Graphing Polynomial Functions
• 2.4 Finding Max and Mins of Polynominals
• 2.6 Solving Polynomials Equations by Factoring
• 2.7 General Results for Polynomial Equations</td>
<td>Skills (As a result of this learning segment, students will be able to…)

• Students will be able to graph and perform operations with real numbers
• Apply rules and properties of algebra
• Graph and perform operations
• Differentiate between the degree of a function and its graphical representation.</td>
<td>Assessments (The above Essential Questions will be assessed with the following formative and summative measures:)

• Homework
• Warm up exercises
• Exit Tickets
• Group activities
• Section quizzes
• Chapter tests
• Cumulative tests
• Projects / Presentations
• Midterm exam
• Final Exam</td>
<td>Standards:
TECH 8.1.12.A.4
PFL 9.2.12.C.1

NJSLS MA 9-12
A-APR.A, APR.A.1, APR.B.3

Time Frame:
3 weeks

Materials:
Textbook: 1997 Advanced Mathematics Richard Brown ISBN: 0-395-771145

Graphing calculators: Ti-83/84 plus.

Smart board, internet research and activities, graph papers, color pencils, white boards.</td>
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<table>
<tr><td colspan="4">CONTENT: Chapter 4</td></tr>
<tr><td colspan="4">Theme: Functions - Honors</td></tr>
<tr><td colspan="4">Essential Questions:
What is a function and how do we find the domain, range, zeroes, and graphs?
How do we reflect these graphs and use symmetry to sketch them?
What is the inverse of a function and how do we find it?</td></tr>
<tr><td>Content (As a result of this learning segment, students will know…)

• 4.1 Functions
• 4.2 Operations on Functions
• 4.3 Reflecting Graphs; Symmetry
• 4.4 Periodic Functions; Stretching and Translating Graphs
• 4.5 Inverse Functions
• 4.6 Functions of Two Variables</td><td>Skills (As a result of this learning segment, students will be able to…)

• Students will be able to plot coordinates and equations of lines
• Use distance and midpoint formula in both graphs and word problems
• Find equations of circles and graph the equation
• Understand what a function is and how to test for a function
• Determine if a function has an inverse</td><td>Assessments (The above Essential Questions will be assessed with the following formative and summative measures:)

• Homework
• Warm up exercises
• Exit Tickets
• Group activities
• Section quizzes
• Chapter tests
• Cumulative tests
• Projects / Presentations
• Midterm exam
• Final Exam</td><td>Standards:
TECH 8.1.12.A.4
PFL 9.2.12.C.1
NJSLS MA 9-12
G-GPE.B.4
G-CO.A.2

Time Frame:
4 weeks

Materials:
Textbook: 1997 Advanced Mathematics Richard Brown ISBN: 0-395-771145

Graphing calculators: Ti-83/84 plus.

Smart board, internet research and activities, graph papers, color pencils, white boards.</td></tr>
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Content: Chapter 5

Theme: Exponents and Logarithms

Essential Questions:
What's the difference between integral and rational exponents?
How do we define exponential functions?
How is a logarithmic function different from an exponential function and how do we manipulate this functions?

Content *(As a result of this learning segment, students will know…)*	**Skills** *(As a result of this learning segment, students will be able to…)*	**Assessments** (The above Essential Questions will be assessed with the following formative and summative measures:)	**Standards:** TECH 8.1.12.A.4 PFL 9.2.12.C.1 NJSLS MA 9-12 F-LE.A.1a, 1c F-BF.B.5 **Time Frame:** 3 weeks **Materials**: Textbook: 1997 Advanced Mathematics Richard Brown ISBN: 0-395-771145 Graphing calculators: Ti-83/84 plus. Smart board, internet research and activities, graph papers, color pencils, white boards.
• 5.1 Growth and Decay • 5.2 Growth and Decay: Rational Exponents • 5.3 Exponential Functions • 5.4 The Number "e" • 5.5 Logarithmic Functions • 5.6 Laws of Logarithms • 5.7 Exponential Equations, Change Bases	• Be able to change from radical to exponential form. • Be able to solve n^{th} root problems. • Be able to expand students' knowledge of exponents from integral exponents to rational exponents. • Apply logarithmic and exponential rules . • Be able to identify an exponential growth/decay graph • Be able to solve a growth/decay problems • Model exponential growth/decay in real-life by calculating compound interest.	• Homework • Warm up exercises • Exit Tickets • Group activities • Section quizzes • Chapter tests • Cumulative tests • Projects / Presentations • Midterm exam • Final Exam	

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<table>
<tr><td colspan="4">CONTENT: Chapter 6</td></tr>
<tr><td colspan="4">Theme: Analytic Geometry</td></tr>
<tr><td colspan="4">Essential Questions:
How use the coordinate plane to prove Geometry?
What are circles, ellipses, hyperbolas, and parabolas?</td></tr>
<tr>
<td>Content (As a result of this learning segment, students will know…)

• 6.1 Coordinate Proofs
• 6.2 Equations of Circles
• 6.3 Ellipses
• 6.4 Hyperbolas
• 6.5 Parabolas</td>
<td>Skills (As a result of this learning segment, students will be able to…)

• Identify a conic section
• Derive the equations of various conic sections.
• Find the equation of a circle, ellipse, and hyperbola.
• Graph the equation of a circle, ellipse, and hyperbola
• Understand where conic sections come from</td>
<td>Assessments (The above Essential Questions will be assessed with the following formative and summative measures:)

• Homework
• Warm up exercises
• Exit Tickets
• Group activities
• Section quizzes
• Chapter tests
• Cumulative tests
• Projects / Presentations
• Midterm exam
• Final Exam</td>
<td>Standards:
TECH 8.1.12.A.4
PFL 9.2.12.C.1
NJSLS MA 9-12
G-GPE.A.2, B.4

Time Frame:
4 weeks

Materials:
Textbook: 1997 Advanced Mathematics Richard Brown ISBN: 0-395-771145

Graphing calculators: Ti-83/84 plus.

Smart board, internet research and activities, graph papers, color pencils, white boards.</td>
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</table>

<table>
<tr><td colspan="4">CONTENT: Chapter 7</td></tr>
<tr><td colspan="4">Theme: Trigonometric Functions</td></tr>
<tr><td colspan="4">Essential Questions:
Finding the measure of an angle in either degrees or radians?
How do find the arc length and area of a sector of a circle?
What are the sine, cosine, and tangents function and how do we with these functions?</td></tr>
<tr><td>Content (As a result of this learning segment, students will know…)

• 7.1 Measurement of Angles
• 7.2 Sectors of Circles
• 7.3 The Sine and Cosine Functions
• 7.4 Evaluating the Graphing Sine and Cosine
• 7.5 Other Trigonometric Functions
• 7.6 The Inverse Trigonometric</td><td>Skills (As a result of this learning segment, students will be able to…)

• Understand right triangle trigonometry
• Graph the various trigonometric functions
• Understand the relationships and connections between the trigonometric ratios
• Apply the inverse to the Trigonometric functions.
• Become familiar with the various formulas that are covered in the chapter.</td><td>Assessments (The above Essential Questions will be assessed with the following formative and summative measures:)

• Homework
• Warm up exercises
• Exit Tickets
• Group activities
• Section quizzes
• Chapter tests
• Cumulative tests
• Projects / Presentations
• Midterm exam
• Final Exam</td><td>Standards:
TECH 8.1.12.A.4
PFL 9.2.12.C.1
NJSLS MA 9-12
G-SRT.C6, C7, C8
G-MG.A

Time Frame:
4 weeks

Materials:
Textbook: 1997 Advanced Mathematics Richard Brown ISBN: 0-395-771145

Graphing calculators: Ti-83/84 plus.

Smart board, internet research and activities, graph papers, color pencils, white boards.</td></tr>
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CONTENT: Chapter 8

Theme: Trigonometric Equations and Applications

Essential Questions:
What are the keys to solving simple trigonometric equations?
How to apply sine and cosine curves to solve equations?
How to understand trigonometric identities and applications of them?

Content *(As a result of this learning segment, students will know…)*	**Skills** *(As a result of this learning segment, students will be able to…)*	**Assessments** (The above Essential Questions will be assessed with the following formative and summative measures:)	**Standards:** TECH 8.1.12.A.4 PFL 9.2.12.C.1 NJSLS MA 9-12 G-MG.A **Time Frame:** 5 weeks **Materials**: Textbook: 1997 Advanced Mathematics Richard Brown ISBN: 0-395-771145 Graphing calculators: Ti-83/84 plus. Smart board, internet research and activities, graph papers, color pencils, white boards.
• 8.1 Simple Trigonometric Equations • 8.2 Sine and Cosine Curves • 8.3 Modeling Periodic Behavior • 8.4 Relationships Among the Functions • 8.5 Solving more Difficult Trigonometric Equations	• Solve Trigonometric equation • Graph the sine and cosine curves • Model the behavior of a Trigonometric curve • Understand Trigonometric identities • Simplify trigonometric identities	• Homework • Warm up exercises • Exit Tickets • Group activities • Section quizzes • Chapter tests • Cumulative tests • Projects / Presentations • Midterm exam • Final Exam	

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<table>
<tr><td colspan="4">CONTENT: Chapter 9</td></tr>
<tr><td colspan="4">Theme: Triangle Trigonometry</td></tr>
<tr><td colspan="4">Essential Questions:
How to use the previous sections and apply all applications to equations?
When to use the law of sine/cosines to find unknown sides of triangles?
How to use trigonometry to solve navigation and surveying questions?</td></tr>
<tr><td>Content (As a result of this learning segment, students will know…)

• 9.1 Solving Right Triangles
• 9.2 The Area of a Triangle
• 9.3 Law of Sine’s
• 9.4 Law of Cosines</td><td>Skills (As a result of this learning segment, students will be able to…)

• Students will be able to apply the Law of Sine formula to solve triangles
• Apply the Law of Cosines to solve triangles
• Use Heron’s formula to solve triangles</td><td>Assessments (The above Essential Questions will be assessed with the following formative and summative measures:)

• Homework
• Warm up exercises
• Exit Tickets
• Group activities
• Section quizzes
• Chapter tests
• Cumulative tests
• Projects / Presentations
• Midterm exam
• Final Exam</td><td>Standards:
TECH 8.1.12.A.4
PFL 9.2.12.C.1
NJSLS MA 9-12
G-SRT.D.10, D.11

Time Frame:
5 weeks

Materials:
Textbook: 1997 Advanced Mathematics Richard Brown ISBN: 0-395-771145

Graphing calculators: Ti-83/84 plus.

Smart board, internet research and activities, graph papers, color pencils, white boards.</td></tr>
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CONTENT: Chapter 19

Theme: Limits, Series, and Iterated Functions

Essential Questions:
How does the student perform mathematical operations with imaginary and complex numbers?
How are real, imaginary, and complex numbers related?
What are the properties of imaginary and complex numbers?

Content *(As a result of this learning segment, students will know…)*	**Skills** *(As a result of this learning segment, students will be able to…)*	**Assessments** (The above Essential Questions will be assessed with the following formative and summative measures:)	**Standards:** TECH 8.1.12.A.4, 8.1.12.B.2, 8.1.12.F.1, 8.2.12.C.5, 8.2.12.D.2 PFL 9.1.12.D.3, 9.2.12.C.1, 9.1.12.B.2, 9.1.12.D.1 NJSLS MA 9-12 K-12.1, 12.2, 12.4 N-Q.A, Q.A.1, Q.A.2, Q.A.3 F-IF.A.2 and B
• 19.1 Limits of Functions • 19.2 Graphs of Rational Functions • 19.3 Using Technology to Approximate the Area under a Curve • 19.4 Power Series	• Find limits at a point and going to infinity • Conceptualize vertical asymptotes • Use technology to find the area under of a curve • Become familiar and attain the ability to apply series.	• Homework • Warm up exercises • Exit Tickets • Group activities • Section quizzes • Chapter tests • Cumulative tests • Projects / Presentations • Midterm exam • Final Exam	**Time Frame:** 5 weeks
			Materials: Textbook: 1997 Advanced Mathematics Richard Brown ISBN: 0-395-771145 Graphing calculators: Ti-83/84 plus. Smart board, internet research and activities, graph papers, color pencils, white boards.