Cliffside Park Public Schools

Department:	Course Title
Mathematics	**Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson /Hostetler

Date:	**September 3-25** **Chapter1 (A)**
Essential Question(s):	• How is the domain and range of a function determined from the graph of a function? • What happens to a parent function when you transform its graph? • How do we use intercepts and symmetry as sketching aids?
Content	• Introduction to Functions • Graphs of Functions • Quadratic Functions • Graphs and Transformations • Operations on Functions
Skills:	• Determine whether a function is a relation • Find the domain of a function • Determine a graph to be a function • Identify parts if a parabola based on the equation of the function • Convert from one form of a quadratic function to another • Determine parent functions • Write sum, difference, product, and quotient of functions and find their domain • Form composite functions and find their domain • Determine whether a function is even, odd or neither • Investigate parabola activity on graphing calculator regarding parent functions and transformations
Standards/Benchmarks	**A.REI.8(+), A.REI.9(+), F.BF.4d(+), F.IF.4F, IF.5F, IF.6**

Assessments/Resources	- Warm-up activities/Homework review - Class discussions - Tests/Quizzes - Use of graphing calculators

Cliffside Park Public Schools

Department:	Course Title
Mathematics	**Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson/Hostetler

Date	September 29 -October 16 Chapter 1 (B)
Essential Question(s):	• • What is the algebraic process that is used to find the inverse of a function? • Do all functions have inverses? • What are the techniques for fitting models to data? • How do we write the mathematical models? • Can graphing calculator be of any help in finding the mathematical models? • How can combinations of functions be used to model and solve real-life problems?
Content	• Combinations of Functions • Inverse Functions • One-to-One Functions • Rates of Changes • Mathematical Modeling
Skills:	• Define inverse relations and functions • Find inverse relations from tables, graphs and equations • Determine whether an inverse relation is a function • Find the average rate of change of a function over an interval • Work with and solve various problems involving the rate of change • Apply combinations of functions to model and solve real-life problems • Use mathematical models to approximate sets of data points • Write mathematical models for direct, inverse, and joint variations

	• Use least squares regression feature of a graphing utility to find mathematical models • Explore and investigate functions and their inverses activity on graphing calculator
Standards/Benchmarks	**A.REI.2, A.REI.11, F.BF.1b, F.BF.3, F.BF.4a, F.IF.4, F.IF.5, F.IF.6, F.IF.7b, F.IF.7c, F.IF7e, F.IF.8, I.IF.9**
Assessments/Resources	• Warm-up activities/Homework review • Class discussions • Tests/Quizzes • Use of graphing calculators

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Department:	Course Title:
Mathematics	**Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson/Hostetler

	October 19 – November 13 **Chapter 2 (A)**
Essential Question(s):	• What is the procedure used to find real zeros of a polynomial function? • Why should we learn polynomial functions? • How can one use polynomial functions to model various aspects of nature?
Content	• Polynomial Functions • The Division Algorithm • Remainder and Factor Theorems • The Rational Zero Test and Finding Real Zeros • Graphs of Polynomial Functions • Rational Functions • Vertical and Horizontal Asymptotes and Holes • Graphing Rational Functions
Skills:	• Define and divide polynomials • Apply the Remainder and Factor Theorems and make connections between remainders and factors • Determine the maximum number of zeros of a polynomial function • Find all rational zeros of a polynomial function • Factor a polynomial completely • Recognize and describe the graphs of various polynomial functions • Identify the properties of general polynomial functions • Find the domain of a rational function • Find intercepts, asymptotes, and holes • Describe the end behavior of a function • Write and perform arithmetic operation on complex numbers

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	• Find the number of zeros of a polynomial • Give the complete factorization of a polynomial expressions • Graph functions expressed symbolically and show key features of the graph by hand in the simple cases and using technology for more complicated cases • Investigate and explore asymptotes on graphing calculator •
Standards/Benchmarks	**N.CN.3(+), N.CN.4(+), N.CN.5(+), N.CN.6(+)**
Assessments/Resources	• Warm-up activities/Homework review • Class discussions • Tests/Quizzes

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Department:	Course Title:
Mathematics	**Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson/ Hostetler

	November 16 –30 **Chapter 2 (B)**
Essential Question(s):	• What is a rational function? What does the word rational mean to you? • Can the domain of a rational function be all real numbers? • How do you find the conjugate of a complex number? • What can be said about the behavior of x=0 and y=0? • Do calculators show all zeros and all the time?
Content	• The Fundamental Theorem of Algebra • Linear Factorization Theorem • Finding Zeros of a Polynomial Functions • Complex Numbers • Real and Complex Zeros of a Polynomial Function • Finding a Polynomial Equation When Zeros are Given • Applications of Rational Functions
Skills:	• Find the conjugate of a complex number • Simplify square roots of negative numbers • Use the Fundamental Theorem of Algebra • Apply rational functions to model and solve real-life problems • Explore powers of imaginary number • Creating and classifying a scatter plot from a given data using graphing calculator • Analyze and predict the future using the identified model

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Standards/Benchmarks	**A.APR.1, A.APR.2, A.APR.3, A.APR.4, A.APR.6, A.APR.7, F.IF.7a, F.IF.7b, F.IF.7c, F.IF.7d, F.IF7e, F.IF.8a, F.IF.8b**
Assessments/Resources	• Warm-up activities/Homework review • Class discussions • Tests/Quizzes • Use of graphing calculators

Cliffside Park Public Schools

Department:	Course Title
Mathematics	**Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson/ Hostetler

	December 1- 15 **Chapter 3**
Essential Question(s):	• How are exponential and logarithmic models used along with polynomial models to solve real world situations?
Content	• Exponential Functions and Their Graphs • Logarithmic Functions and Their Graphs • Properties of Logarithms • Solving Exponential Equations • Solving Logarithmic Equations • Modeling with Exponential and Logarithmic Functions
Skills:	• Recognize and evaluate exponential functions with base a and base e • Recognize and evaluate logarithmic functions with base a • Graph exponential and logarithmic functions • Use properties of logarithms to evaluate or rewrite logarithmic expressions • Use properties of logarithms to expand or condense logarithmic expressions • Solve simple and complicated exponential equations • Solve simple and complicated logarithmic equations • Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving these concepts • Apply exponential and logarithmic equations to model and solve real-life problems exploring graphing calculator
Standards/Benchmarks	**F.LE.1, F.LE.1a, F.LE.1b, F.LE.1c, F.LE.2, F.LE.3, F.LE.4, F.LE.5**

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Assessments/Resources	- Warm-up activities/Homework review - Class discussions - Tests/Quizzes - Use of graphing calculators

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Department:	Course Title
Mathematics	**Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson/ Hostetler

	December 16- January 29 **Chapter 4**
Essential Question(s):	• How is right triangle trigonometry used to solve right triangles? • How is the unit circle used to describe trigonometric functions? • Describe how to convert radians to degrees and degrees to radians • What are the relationships between the Pythagorean Identities for Trigonometry? • How do you graph the basic trigonometric functions on the coordinate plane? • How do transformations affect the trigonometric graphs of each function? • How do you describe the transformations without looking at the graph of the function? • Which Is the larger unit of measure, one degree or one radian? • How is the length of the intercepted arc changing if the radius of a circle is increasing and the central angle is held constant? • How would you discuss the behavior of the sine and the cosine functions in the range from 0 degree to 90 degree? • How are the reference angles used to find the trigonometric functions of obtuse angles? Negative angles? • How do the graphs of sine and cosine compare when you graph them in the same viewing window? • How do we solve real-life problems involving right triangles?
Content	• Right Triangle Trigonometry, Trigonometric Ratios • Solving Right Triangles in Real World Situations • Extending Angle Measures and Co-terminal Angles • Conversion Between Radians and Degrees • Finding Arc Length • Unit Circle and Reference Angles • Finding Six Trigonometric Values Mentally • Basic Identities(Quotient, Reciprocal, Pythagorean, Co-Function, Even/Odd) • Graphs of the Sine, Cosine, Tangent, Cotangent, Cosecant, Secant

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	• Determine Amplitude, Period, Phase Shifts, • Analyze and Determine the Domain, Range, Asymptotes of the Graphs of the Functions
Skills:	• Develop the six trigonometric ratios of an acute angle in terms of a right triangle • Evaluate trigonometric ratios using triangles • Solve triangles using trigonometric ratios • Define radian measure and convert angle measures between degrees and radians • Define trigonometric functions in terms of the unit circle • Prove and work with basic trigonometric identities • Graph the basic trigonometric functions • Describe and state the characteristics of the function graphed • Graph transformations of these basic trigonometric functions • Explore and investigate trigonometric graphs and transformations on graphing calculator • Sketch the graphs of sine, cosine, tangent functions and their reciprocals
Standards/Benchmarks	**F.TF.1, F.TF.2, F.TF.3(+), F.TF.4(+), F.TF.5, F.TF.6(+), F.TF.7(+)**
Assessments/Resources	• Warm-up activities/Homework review • Class discussions • Tests/Quizzes • Use of graphing calculators

Cliffside Park Public Schools

Department:	Course Title
Mathematics	**Pre-Calculus Honors**

Textbook(s): **PRECALCULUS fifth edition** by Larson/ Hostetler	

	February 1-26 **Chapter 5 (A)**
Essential Question(s):	• How do you graphically solve a trigonometric equation? • What is the difference between sine function and the restricted sine function? • Why is it important to restrict a sine function when working with the inverse sine function? • What makes an equation an identity?
Content	• Basic Trigonometric Equations • Solving Trigonometric Equations Graphically • Inverse Trigonometric Functions • Properties of Inverse Trigonometric Functions • Algebraic Solutions of Trigonometric Equations
Skills:	• Solve trigonometric equations graphically • State the complete solution to a trigonometric equation • Use inverse trigonometric notation • Define the domain and range of inverse trigonometric functions • Evaluate the inverse trigonometric functions • Evaluate the compositions of trigonometric functions • Explore a variety of techniques to solve trigonometric equations algebraically and graphically using graphing calculator • Solve word problems involving right triangles
Standards/Benchmarks	**F.BF.4, F.BF.4a, F.BF.4b(+), F.BF.4c(+), F.TF.6(+), F.TF.7(+), F.TF.8, F.TF.9(+),**

Cliffside Park Public Schools

Assessments/Resources	• Warm-up activities/Homework review • Class discussions • Tests/Quizzes • Use of graphing calculators

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Department: **Mathematics**	Course Title **Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson/ Hostetler

	March 1-26 **Chapter 5 (B)**
Essential Question(s):	• How is proving or verifying a trigonometric identity different then solving a trigonometric equation? • What is the difference between the reciprocal and cofunctional relationships for trigonometric functions? • How can the double-angle identity for sine function be used to calculate a distance? • How does domain of a function affect its solutions? • How do we use the graphing utility to confirm the solutions found algebraically?
Content	• Basic Trigonometric Identities • Strategies for proving Trigonometric Identities • Sum and Difference Formulas • Multiple- Angle, Power-Reducing Formula, Double-Angle and Half-Angle Formulas
Skills:	• Plan and apply strategies to prove identities • Apply the sum/ difference, multiple angle, power reducing, double angle, half angle formulas to verify the trigonometric identities • Apply the appropriate identity rule to solve trigonometric equation • Explore graphing calculator to investigate and verify the solutions
Standards/Benchmarks	**F.BF.4, F.BF.4a, F.BF.4b(+), F.BF.4c(+), F.BF.4d(+), F.BF.5(+), F.BF.5(+)**

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Assessments/Resources	- Warm-up activities/Homework review - Class discussions - Tests/Quizzes - Use of graphing calculators

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Department: **Mathematics**	Course Title **Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson/ Hostetler

	April 1- 30 **Chapter 6**
Essential Question(s):	• When is it necessary to use the Law of Sines to solve a triangle? • When is it necessary to use the Law of Cosine to solve a triangle? • What is the difference between vectors and rays? • What characterizes a vector in the plane? • Can you name a role of a vector in real world? • How can the graphing calculator be used to obtain the nth roots of unity? • How is it convenient to know nth roots of a complex number? • How is a complex number converted to polar form?
Content	• The Law of Sines • The Law of Cosines • Applications Using the Law of Sines and Cosines • Area of a Triangle Using the Law of Sines • Heron's Formular • Vectors in the plane • Properties of Vectors • Applications of Vectors in the Plane • The Dot Product • Properties of the Dot Product • The Complex Plane • Polar Form for Complex Numbers • DeMoivre's Theorem • Formulas and Rules for the nth Roots of Complex numbers • Trigonometric Form of a Complex Number

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Skills:	• Solve oblique triangles using the Law of Sines and Law of Cosines • Apply the Laws to solve real world problems • Find the component and magnitude of a vector • Perform scalar multiplication of vectors, vector addition and vector subtraction • Perform operations with linear combinations of vectors • Determine the direction angle of a vector • Determine resultant forces in physical applications • Find the dot product of two vectors and the angle between two vectors • Determine projection and component vectors and use them in physical applications • Graph a complex number in the complex plane • Find the absolute value of a complex number • Express a complex number in polar form • Perform polar multiplication and division • Calculate power and roots of complex numbers • Find and graph roots of unity • Model and solve meaningful word problems utilizing graphing calculators
Standards/Benchmarks	**N.NM.1, N.VM.2, N.VM.3, N.VM.4, N.VM.5, N.VM.5a, N.VM.5b, N.VM.6, N.VM.7, N.VM.8, N.VM.9, N.VM.10, N.VM.11, N.VM.12, G.SRT.9(+), G.SRT.10(+), G.SRT.11(+)**
Assessments/Resources	• Warm-up activities/Homework review • Class discussions • Tests/Quizzes • Use of graphing calculators

Cliffside Park Public Schools

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Mathematics	**Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson/ Hostetler

	May 3-21 **Chapter 9**
Essential Question(s):	• What is a conic section (simply conic)? • How are sections of a cone related to the real world? • How does nature imitate mathematical relationships? • How does the concept of distance relate to the concept of ellipses and hyperbolas? • How do you determine the shape of a translated conic section with graphing? • How is the procedure of parameterization of conic sections used to solve real world problems?
Content	• Introduction to Conics: Circles, Parabolas, Ellipses, and Hyperbolas • Characteristics of Parabolas, Ellipses, and Hyperbolas • Standard Equations of Parabola, Ellipse, and Hyperbola • Horizontal and Vertical Shifts of Conics • The Polar Coordinate System • Coordinate Conversion Formulas • Polar Graphs • Polar Equations of Conics
Skills:	• Define and write the equation of an ellipse and hyperbola • Identify important characteristics and graph ellipse and hyperbola • Graph and write the equation of a translated conic • Determine the shape of a translated conic without graphing • Classify a conic from a general equation • Locate points in a polar coordinate system • Convert between coordinates in rectangular and polar systems • Create graphs of equations in polar coordinates

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	• Recognize the equations of a cardioids, rose, circle, lemniscates, and limacon • Define eccentricity of an ellipse, a parabola, and a hyperbola • Develop and use the general polar equation of a conic section • Model real world problems using equations and graphs of conics
Standards/Benchmarks	**G.GPE.1, G.GPE.2, G.GPE.3(+)**
Assessments/Resources	• Warm-up activities/Homework review • Class discussions • Tests/Quizzes • Use of graphing calculators

Cliffside Park Public Schools

Department:	Course Title
Mathematics	**Pre-Calculus Honors**

Textbook(s): PRECALCULUS fifth edition by Larson/ Hostetler

	May 24- June 25 **Chapter 10**
Essential Question(s):	• How are sequences and series represented by algebraic formula? • How do limits serve as a means to better understand functions and their behavior? • How do we solve simple counting problems? • How do find the probability of an event? • How can you use the Binomial Theorem to expand binomials?
Content	• Sequences and Series • Arithmetic Sequences and Partial Sums • Geometric Sequences and Series • Introduction to Limits • Counting Principles • Probability • Binomial Theorem
Skills:	• Use sequence, factorial, and summation notation to write the terms and sum of a sequence • Recognize, write, and manipulate arithmetic sequences • Recognize, write, and manipulate geometric sequence • Describe limits of sequences and apply their properties to investigate convergent and divergent series • Apply sequences and series to solve problems including sums and binomial expansion • Connect decimal notation and geometric series • Apply Binomial Theorem to expand a power of a binomials • Experiment and explore the tools and technology to maximize the benefit whenever • Solving real-life problems •

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Standards/Benchmarks	**S.CP.8(+), S.CP.9(+), S.MD.1(+), S.MD.2(+), S.MD.3(+), S.MD.4(+), S.MD.5(+), S.MD.5a(+), S.MD.5b(+), S.MD.6(+), S.MD.7(+), S.IC.2, S.IC.3, S.CP.1, S.CP.2, S.CP.6, S.CP.7, S.CP.8(+), S.CP.9(+)**
Assessments/Resources	• Warm-up activities/Homework review • Class discussions • Tests/Quizzes • Use of graphing calculators

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Differentiation/Accommodations/Modifications			
Gifted and Talented	**English Language Learners**	**Students with Disabilities**	**Students at Risk of Failure**
(content, process, product and learning environment)	**Modifications for Classroom**	*(appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team)*	**Modifications for Classroom** Pair visual prompts with verbal presentations
Extension Activities Conduct research and provide presentation of cultural topics.	Assign a peer helper in the class setting Use Smartphone as dictionary	**Modifications for Classroom** Pair visual prompts with verbal presentations	Ask students to restate information, directions, and assignments.
Design surveys to generate and analyze data to be used in discussion.	Use Dictionary Use materials in native language, if available	Ask students to restate information, directions, and assignments.	Repetition and and practice
Debate topics of interest / cultural importance.	**Modifications for Homework/Assignments**	Repetition and and practice	Model skills / techniques to be mastered.
Authentic listening and reading sources that provide data and support for speaking and writing prompts.	Modified Assignments Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)	Model skills / techniques to be mastered.	Extended time to complete class work Provide copy of classnotes
Exploration of art and/or artists to understand society and history.	Extended time for assignment completion as needed Highlight key vocabulary	Extended time to complete class work Provide copy of class notes	Preferential seating to be mutually determined by the student and teacher
Anchor Activities	Use graphic organizers		

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| Use of Higher Level Questioning Techniques

Provide assessments at a higher level of thinking | **Modifications 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

Use dictionary or approved electronic device | Preferential seating to be mutually determined by the student and teacher

Student may request to use a computer to complete assignments.

Establish expectations for correct spelling on assignments.

Extra textbooks for home.

Student may request books on tape / CD / digital media, as available and appropriate.

Assign a 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 | Student may request to use a computer to complete assignments.

Establish expectations for correct spelling on assignments.

Extra textbooks for home.

Student may request books on tape / CD / digital media, as available and appropriate.

Assign a 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

Encourage student to proofread |

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		Encourage student to proofread assignments and tests	assignments and tests
		Provide regular parent/ school communication	Provide regular parent/ school communication
		Teachers will check/sign student agenda daily	Teachers will check/sign student agenda daily
		Student requires use of other assistive technology device	Student requires use of other assistive technology device
		Modifications for Homework and Assignments 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	**Modifications for Homework and Assignments** 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.

		grading criteria for assignments.	
			Provide the student with clearly stated (written) expectations and grading criteria for assignments.
			Implement RAFT activities as they pertain to the types / modes of communication (role, audience, format, and topic).
		Modifications for Assessments	**Modifications for Assessments** Extended time on classroom tests and quizzes.
		Extended time on classroom tests and quizzes.	
		Student may take/complete tests in an alternate setting as needed.	Student may take/complete tests in an alternate setting as needed.
		Restate, reread, and clarify directions/questions	Restate, reread, and clarify directions/questions
		Distribute study guide for classroom tests.	Distribute study guide for classroom tests.
		Establish procedures for accommodations / modifications for assessments	Establish procedures for accommodations / modifications for assessments.