Secondary III Honors

Course Number 5251-5252

* Honors topics are highlighted

Month	Strands (include state core numbers)	Standards	Assessment
Qtr. 1			
Aug-Sep.	Strand: NUMBER AND QUANTITY—The Complex Number System (N.CN) Strand: ALGEBRA—Seeing Structures in Expressions (A.SSE) Strand: ALGEBRA—Arithmetic With Polynomials and Rational Expressions (A.APR)	Standard N.CN.8 Extend polynomial identities to the complex numbers. For example, rewrite x2 + 4 as (x + 2i)(x – 2i). Standard N.CN.9 Know the Fundamental Theorem of Algebra. Limit to polynomials with real coefficients. Standard A.SSE.1 Interpret polynomial and rational expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complex expressions by viewing one or more of their parts as a single entity. For example, examine the behavior of P(1+r/n) nt as n becomes large. Standard A.SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, see x4 – y4 as (x2) 2 – (y2) 2 , thus recognizing it as a difference of squares that can be factored as (x2 – y2)(x2 + y2). Standard A.APR.5 Know and apply the Binomial Theorem for the expansion of (x + y)n in powers of x and y for a positive integer n, where x and y are any numbers. For example, with coefficients determined by Pascal's Triangle. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	Combination of diagnostic, formative, and summative assessments

	Strand: FUNCTIONS—Interpreting Functions (F.IF)	d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. **Standard N.CN.3** Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers. **Standard N.CN.4** Represent complex numbers on the complex plane in rectangular form and polar form (including real and imaginary numbers), and explain why the rectangular form of a given complex number represents the same number. **Standard N.CN.5** Represent addition, subtraction, multiplication, and conjugation of complex numbers geometrically on the complex plane; use properties of this representation for computation. *For example, (-1 + √3 i)3 = 8 because (-1 + √3 i) has modulus 2 and argument 120°.*	
October	Strand: ALGEBRA—Arithmetic With Polynomials and Rational Expressions (A.APR)	Standard A.APR.1 Understand that all polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. Standard A.APR.2 Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x). Standard A.APR.3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. „ Standard A.APR.4 Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity (x2 + y2) 2	Combination of diagnostic, formative, and summative assessments

		= (x2 – y2) 2 + (2xy) 2 can be used to generate Pythagorean triples. Standard A.APR.6 Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division or, for the more complicated examples, a computer algebra system. Standard A.APR.7 Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. **Standard F.IF.7** Graph functions expressed symbolically, and show key features of the graph, by hand in simple cases and using technology for more complicated cases. **d.** Graph rational functions, identifying zeros, asymptotes, and point discontinuities when suitable factorizations are available, and showing end behavior.	
Qtr. 2			
November	Strand: ALGEBRA: CREATING EQUATIONS (A.CED)	Standard A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. Standard A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. Standard A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, maximizing the volume of a box for a given surface area while drawing attention to the practical domain.	Combination of diagnostic, formative, and summative assessments

	Strand: ALGEBRA: REASONING WITH EQUATIONS AND INEQUALITIES (A.REI)	Standard A.CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange the compound interest formula to solve for t: A = P(1+r/n) nt **Standard F.BF.4** Find inverse functions. **b.** Verify by composition that one function is the inverse of another. **c.** Read values of an inverse function from a graph or a table, given that the function has an inverse. **d.** Produce an invertible function from a non-invertible function by restricting the domain. **Standard F.BF.5** Understand the inverse relationship between exponents and logarithms, and use this relationship to solve problems involving logarithms and exponents. Standard A.REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. Standard A.REI.11 Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, for example, using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/ or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.↔	
	Strand: FUNCTIONS—Interpreting Functions (F.IF)	Standard F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative	

		maximums and minimums; symmetries; end behavior; and periodicity. Standard F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. Standard F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. Standard F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. Compare and contrast square root, cubed root, and step functions with all other functions. Standard F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	
December	Strand: FUNCTIONS—Interpreting Functions (F.IF) Strand: FUNCTIONS—Building Functions (F.BF)	e. Graph exponential and logarithmic functions, showing intercepts and end behavior; and trigonometric functions, showing period, midline, and amplitude. Standard F.BF.1 Write a function that describes a relationship between two quantities. b. Combine standard function types using arithmetic operations. For example, build a	Combination of diagnostic, formative, and summative assessments

	Strand: FUNCTIONS—Linear, Quadratic, and Exponential Models (F.LE)	function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. Standard F.BF.3 Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Note the effect of multiple transformations on a single function and the common effect of each transformation across function types. Include functions defined only by a graph. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. Standard F.BF.4 Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. Include linear, quadratic, exponential, logarithmic, rational, square root, and cube root functions. For example, f(x) = 2x3 or f(x) = (x+1)/(x-1) for $x \neq 1$ Standard F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function. Standard F.LE.4 For exponential models, express as a logarithm the solution to abct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology. Include the relationship between properties of logarithms and properties of exponents, such as the connection between the properties of exponents and the basic logarithm property that log xy = log x + log y. Standard F.LE.5 Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.	

January	Strand: ALGEBRA—Seeing Structures in Expressions (A.SSE)	Standard A.SSE.4 Understand the formula for the sum of a series and use the formula to solve problems. a. Derive the formula for the sum of an arithmetic series. b. Derive the formula for the sum of a geometric series, and use the formula to solve problems. Extend to infinite geometric series. For example, calculate mortgage payments.	Combination of diagnostic, formative, and summative assessments
Qtr. 3			
Jan-Feb.	Strand: FUNCTIONS—Trigonometric Functions (F.TF)	Standard F.TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. Standard F.TF.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. Standard F.TF.3 Use special triangles to determine geometrically the values of sine, cosine, tangent for ∏/3, ∏/4 and ∏6, and use the unit circle to express the values of sine, cosine, and tangent for ∏ – x, ∏ + x, and 2∏ – x in terms of their values for x, where x is any real number. Standard F.TF.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. Standard F.TF.7 Use inverse functions to solve trigonometric equations that arise in modeling context; evaluate the solutions using technology and interpret them in terms of context. Limit solutions to a given interval.	
March	Strand: FUNCTIONS—Interpreting Functions (F.IF) Strand: GEOMETRY—Similarity, Right Triangles, and Trigonometry (G.SRT)	e. Graph exponential and logarithmic functions, showing intercepts and end behavior; and trigonometric functions, showing period, midline, and amplitude. Standard G.SRT.9 Derive the formula A = 1/2 ab sin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.	Combination of diagnostic, formative, and summative assessments

	Strand: FUNCTIONS—Trigonometric Functions (F.TF)	Standard G.SRT.10 Prove the Laws of Sines and Cosines and use them to solve problems. Standard G.SRT.11 Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces). **Standard F.TF.4** Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. **Standard F.TF.6** Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed. **Standard F.TF.7** Use the inverse functions to solve trigonometric equations that arise in the modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context. **Standard F.TF.9** Prove the addition and subtraction formulas for sine, cosine, and tangent, and use them to solve problems.	
Qtr. 4			
April	Strand: GEOMETRY—Modeling With Geometry (G.MG)	Standard G.MG.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). Standard G.MG.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). Standard G.MG.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). **Standard N.CN.10** Multiply complex numbers in polar form and use DeMoivre's Theorem	Combination of diagnostic, formative, and summative assessments

		to find roots of complex numbers.	
May-June	Strand: STATISTICS—Interpreting Categorical and Quantitative Data (S.ID) Strand: STATISTICS—Making Inferences and Justifying Conclusions (S.IC) Strand: STATISTICS AND PROBABILITY—Conditional Probability and the Rules of Probability (**S.CP)**	Standard S.ID.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. **Standard F.IF.7** Graph functions expressed symbolically, and show key features of the graph, by hand in simple cases and using technology for more complicated cases. **f.** Define a curve parametrically and draw its graph. Standard S.IC.1 Understand that statistics allow inferences to be made about population parameters based on a random sample from that population. Standard S.IC.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. Standard S.IC.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. Standard S.IC.6 Evaluate reports based on data. **Standard S.CP.9** Use permutations and combinations to compute probabilities of compound events and solve problems.	Combination of diagnostic, formative, and summative assessments