SECONDARY MATHEMATICS III—HONORS STANDARDS

Strand: NUMBER AND QUANTITY—Complex Number System (N.CN)

Perform arithmetic operations with complex numbers **(Standard N.CN.3).** Represent complex numbers and their operations on the complex plane **(Standard N.CN.4–6).** Use complex numbers in polynomial identities and equations **(Standard N.CN.10).**

- **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°.*
- **Standard N.CN.6** Calculate the distance between numbers in the complex plane as the modulus of the difference, and the midpoint of a segment as the average of the numbers at its endpoints.
- **Standard N.CN.10** Multiply complex numbers in polar form and use DeMoivre's Theorem to find roots of complex numbers.

Strand: FUNCTIONS—Interpreting Functions (F.IF)

Analyze functions using different representations **(Standard F.IF.7, d and f).**

- **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.

  f. Define a curve parametrically and draw its graph.

Strand: FUNCTIONS—Building Functions (F.BF).

Build a function that models a relationship between two quantities **(Standard F.BF.1.c).** Build new functions from existing functions **(Standards F.BF.4, b,c,d–5).**

- **Standard F.BF.1** Write a function that describes a relationship between two quantities.

  c. Compose functions. *For example, if* T(y) *is the temperature in the atmosphere as a function of height, and* h(t) *is the height of a weather balloon as a function of time, then* T(h(t)) *is the temperature at the location of the weather balloon as a function of time.*

- **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.

Strand: FUNCTIONS—Trigonometric Functions (F.TF)

Extend the domain of trigonometric functions using the unit circle **(Standard T.FT.4).** Model periodic phenomena with trigonometric functions **(Standards T.FT.6–7).** Prove and apply trigonometric identities **(Standard T.FT.9).**

- **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.

Strand: GEOMETRY—Geometric Measurement and Dimension (G.GMD)

Explain volume formulas and use them to solve problems **(Standard G.GMD.2).**

- **Standard G.GMD.2** Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.

Strand: STATISTICS AND PROBABILITY—Conditional Probability and the Rules of Probability (S.CP)

Use the rules of probability to compute probabilities of compound events in a uniform probability model **(Standard S.CP.9).**

- **Standard S.CP.9** Use permutations and combinations to compute probabilities of compound events and solve problems.