

**Mathematics**  
**Grade-Level Expectations: Grades 11–12**

**Number and Number Relations**

1. Read, write, and perform basic operations on complex numbers (N-1-H) (N-5-H)
2. Evaluate and perform basic operations on expressions containing rational exponents (N-2-H)
3. Describe the relationship between exponential and logarithmic equations (N-2-H)

**Algebra**

4. Translate and show the relationships among non-linear graphs, related tables of values, and algebraic symbolic representations (A-1-H)
5. Factor simple quadratic expressions including general trinomials, perfect squares, difference of two squares, and polynomials with common factors (A-2-H)
6. Analyze functions based on zeros, asymptotes, and local and global characteristics of the function (A-3-H)
7. Explain, using technology, how the graph of a function is affected by change of degree, coefficient, and constants in polynomial, rational, radical, exponential, and logarithmic functions (A-3-H)
8. Categorize non-linear graphs and their equations as quadratic, cubic, exponential, logarithmic, step function, rational, trigonometric, or absolute value (A-3-H) (P-5-H)
9. Solve quadratic equations by factoring, completing the square, using the quadratic formula, and graphing (A-4-H)
10. Model and solve problems involving quadratic, polynomial, exponential, logarithmic, step function, rational, and absolute value equations using technology (A-4-H)

**Measurement**

11. Calculate angle measures in degrees, minutes, and seconds (M-1-H)
12. Explain the unit circle basis for radian measure and show its relationship to degree measure of angles (M-1-H)
13. Identify and apply the unit circle definition to trigonometric functions and use this definition to solve real-life problems (M-4-H)
14. Use the Law of Sines and the Law of Cosines to solve problems involving triangle measurements (M-4-H)

**Geometry**

15. Identify conic sections, including the degenerate conics, and describe the relationship of the plane and double-napped cone that forms each conic (G-1-H)
16. Represent translations, reflections, rotations, and dilations of plane figures using sketches, coordinates, vectors, and matrices (G-3-H)

**Data Analysis, Probability, and Discrete Math**

17. Discuss the differences between samples and populations (D-1-H)
18. Devise and conduct well-designed experiments/surveys involving randomization and considering the effects of sample size and bias (D-1-H)
19. Correlate/match data sets or graphs and their representations and classify them as exponential, logarithmic, or polynomial functions (D-2-H)
20. Interpret and explain, with the use of technology, the regression coefficient and the correlation coefficient for a set of data (D-2-H)
21. Describe and interpret displays of normal and non-normal distributions (D-6-H)
22. Explain the limitations of predictions based on organized sample sets of data (D-7-H)
23. Represent data and solve problems involving Euler and Hamiltonian paths (D-9-H)

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**Patterns, Relations, and Functions**

24. Model a given set of real-life data with a non-linear function (P-1-H) (P-5-H)
25. Apply the concept of a function and function notation to represent and evaluate functions (P-1-H) (P-5-H)
26. Represent and solve problems involving  $n^{\text{th}}$  terms and sums for arithmetic and geometric series (P-2-H)
27. Compare and contrast the properties of families of polynomial, rational, exponential, and logarithmic functions, with and without technology (P-3-H)
28. Represent and solve problems involving the translation of functions in the coordinate plane (P-4-H)
29. Determine the family or families of functions that can be used to represent a given set of real-life data, with and without technology (P-5-H)