Twelfth Grade Correlations and Benchmarks
Mathematics

Number, Number Sense and Operations Standard

A. Demonstrate that vectors and matrices are systems having some of the same properties of the real number system.

B. Develop an understanding of properties of and representations for addition and multiplication of vectors and matrices.

C. Apply factorials and exponents, including fractional exponents, to solve practical problems.
_____ 2. Apply combinations as a method to create coefficients for the Binomial Theorem, and make connections to everyday and workplace problem situations.

D. Demonstrate fluency in operations with real numbers, vectors and matrices, using mental computation or paper and pencil calculations for simple cases, and technology for more complicated cases.

E. Represent and compute with complex numbers.
_____ 1. Determine what properties (closure, identity, inverse, commutative and associative) hold for operations with complex numbers.

Measurement Standard

A. Explain differences among accuracy, precision and error, and describe how each of those can affect solutions in measurement situations.

B. Apply various measurement scales to describe phenomena and solve problems.

C. Estimate and compute areas and volume in increasingly complex problem situations.
_____ 3. Apply informal concepts of successive approximation, upper and lower bounds, and limits in measurement situations; e.g., measurement of some quantities, such as volume of a cone, can be determined by sequences of increasingly accurate approximations.

D. Solve problem situations involving derived measurements; e.g., density, acceleration.
_____ 1. Solve problems involving derived measurements; e.g., acceleration and pressure.
_____ 2. Use radian measures in the solution of problems involving angular velocity and acceleration.

Geometry and Spatial Sense Standard

A. Use trigonometric relationships to verify and determine solutions in problem situations.
_____ 2. Derive and apply the basic trigonometric identities; i.e., angle addition, angle subtraction and double angle.
_____ 3. Relate graphical and algebraic representations of lines, simple curves and conic sections.
_____ 4. Recognize and compare specific shapes and properties in multiple geometry's; e.g., plane, spherical and hyperbolic.

B. Represent transformations within a coordinate system using vectors and matrices.
_____ 1. Use matrices to represent translations, reflections, rotations, dilations and their compositions.

Patterns, Functions and Algebra Standard

A. Analyze functions by investigating rates of change, intercepts, zero, asymptotes, and local and global behavior.
_____ 1. Analyze the behavior or arithmetic and geometric sequences and series as the number of terms increases.
_____ 2. Translate between the numeric and symbolic form of a sequence or series.
_____ 3. Describe and compare the characteristics of transcendental and periodic functions; e.g., general shape, number of roots, domain and range, asymptotic behavior, extreme, local and global behavior.
_____ 4. Represent the inverse of a transcendental function symbolically.
_____ 6. Make arguments about mathematical properties using mathematical induction.
_____ 7. Make mathematical arguments using the concepts of limit.
_____ 9. Translate freely between polar and Cartesian coordinate systems.
_____10. Use the concept of limit to find instantaneous rate of change for a point on a graph as the slope of the tangent at the point.

B. Use the quadratic formula to solve quadratic equations that have complex roots.

C. Use recursive functions to model and solve problems; e.g., home mortgages, annuities.
_____ 8. Compare estimates of the area under a curve over a bounded interval by partitioning the region with rectangles; e.g., make successive estimates using progressively smaller rectangles.

D. Apply algebraic methods to represent and generalize problem situations involving vectors and matrices.
_____ 5. Set up and solve systems of equations using matrices and graphs, with and without technology.

Data Analysis and Probability Standard

A. Create and analyze tabular and graphical displays of data using appropriate tools, including spreadsheets and graphing calculators.

B. Use descriptive statistics to analyze and summarize data, including measures of center, dispersion, correlation and variability.
_____ 1. Transform bivariate data so it can be modeled by a function; e.g., use logarithms to allow nonlinear relationship to be modeled by linear function.
_____ 3. Describe the shape and find all summary statistics for a set of univariate data, and describe how a linear transformation affects shape, center and spread.

C. Design and perform a statistical experiment, simulation or study; collect and interpret data; and use descriptive statistics to communicate and support predictions and conclusions.
_____ 4. Apply the concept of a random variable to generate and interpret probability distributions, including binomial, normal and uniform.
_____ 5. Use sampling distributions as the basis for informal inference.
_____ 6. Use theoretical or experimental probability including simulations, to determine probabilities in real-world problem situations involving uncertainty, such as mutually exclusive events, complementary events, and conditional probability.

D. Connect statistical techniques to applications in workplace and consumer situations.
_____ 1. Identify and use various sampling methods (voluntary response, convenience sample, random sample, stratified random sample, census) in a study.