

# **11<sup>th</sup> Grade– Math**

## **CONTENT: Number, Number Sense and Operations Standard**

| <b>Skills Based on Academic Content Standards</b>  |
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| Determine what properties hold for matrix addition and matrix multiplication; e.g., use examples to show addition is commutative and when multiplication is not commutative. |
| Determine what properties hold for vector addition and multiplication, and for scalar multiplication.  |
| Represent complex numbers on the complex plane.  |
| Use matrices to represent given information in a problem situation.  |
| Model, using the coordinate plane, vector addition and scalar multiplication.  |
| Compute sums, differences and products of matrices using paper and pencil calculations for simple cases, and technology for more complicated cases.                          |
| Compute sums, differences, products and quotients of complex numbers.  |
| Use fractional and negative exponents as optional ways of representing and finding solutions for problem situations; e.g., $27^{2/3} = (27^{1/3})^2 = 9$ .                   |
| Use vector addition and scalar multiplication to solve problems.   |

## **CONTENT: Measurement Standard**

| <b>Skills Based on Academic Content Standards</b>   |
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| Determine the number of significant digits in a measurement.  |
| Use radian and degree angle measures to solve problems and perform conversions as needed.   |
| Derive a formula for the surface area of a cone as a function of its slant height and the circumference of its base.                      |
| Calculate distances, areas, surface areas and volumes of composite three-dimensional objects to a specified number of significant digits. |
| Solve real-world problems involving area, surface area, volume and density to a specified degree of precision.                            |

## CONTENT: Geometry and Spatial Sense Standard

| Skills Based on Academic Content Standards   |
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| Use polar coordinates to specify locations on a plane.   |
| Represent translations using vectors.  |
| Describe multiplication of a vector and a scalar graphically and algebraically, and apply to problem situations. |
| Use trigonometric relationships to determine lengths and angle measures; i.e., Law of Sines and Law of Cosines.  |
| Identify, sketch and classify the cross sections of three-dimensional objects.                                   |

## CONTENT: Patterns, Functions and Algebra Standard

| Skills Based on Academic Content Standards  |
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| Identify and describe problem situations involving an iterative process that can be represented as a recursive function; e.g., compound interest.   |
| Translate a recursive function into a closed form expression or formula for the $n$ th term to solve a problem situation involving an iterative process; e.g., find the value of an annuity after 7 years.  |
| Describe and compare the characteristics of the following families of functions: quadratics with complex roots, polynomials of any degree, logarithms, and rational functions; e.g., general shape, number of roots, domain and range, asymptotic behavior. |
| Identify the maximum and minimum points of polynomial, rational and trigonometric functions graphically and with technology.  |
| Identify families of functions with graphs that have rotation symmetry or reflection symmetry about the $y$ -axis, $x$ -axis or $y = x$ .   |
| Represent the inverse of a function symbolically and graphically as a reflection about $y = x$ .  |
| Model and solve problems with matrices and vectors.   |
| Solve equations involving radical expressions and complex roots.  |
| Describe the characteristics of the graphs of conic sections.   |
| Describe how a change in the value of a constant in an exponential, logarithmic or radical equation affects the graph of the equation.  |
| Solve 3 by 3 systems of linear equations by elimination and using technology, and interpret graphically what  |

the solution means (a point, line, plane, or no solution).

## **CONTENT: Data Analysis and Probability Standard**

### **Skills Based on Academic Content Standards**

Design a statistical experiment, survey or study for a problem; collect data for the problem; and interpret the data with appropriate graphical displays, descriptive statistics, concepts of variability, causation, correlation and standard deviation.

Describe the role of randomization in a well-designed study, especially as compared to a convenience sample, and the generalization of results from each.

Describe how a linear transformation of univariate data affects range, mean, mode and median.

Create a scatterplot of bivariate data, identify trends, and find a function to model the data.

Use technology to find the Least Squares Regression Line, the regression coefficient, and the correlation coefficient for bivariate data with a linear trend, and interpret each of these statistics in the context of the problem situation.

Use technology to compute the standard deviation for a set of data, and interpret standard deviation in relation to the context or problem situation.

Describe the standard normal curve and its general properties, and answer questions dealing with data assumed to be normal.

Analyze and interpret univariate and bivariate data to identify patterns, note trends, draw conclusions, and make predictions.

Evaluate validity of results of a study based on characteristics of the study design, including sampling method, summary statistics and data analysis techniques.

Understand and use the concept of random variable, and compute and interpret the expected value for a random variable in simple cases.

Examine statements and decisions involving risk; e.g., insurance rates and medical decisions.