HSCE Code	Expectation	District Curriculum	Instructional Materials	Additional Activities/Resources
L1	**Reasoning About Numbers, Systems, and Quantitative Literacy**			
L1.2	**Representations and Relationships**			
L1.2.1	Use mathematical symbols (e.g., interval notation, set notation, summation notation) to represent quantitative relationships and situations.			
L1.3	**Counting and Probabilistic Reasoning**			
L1.3.1	Describe, explain, and apply various counting techniques (e.g., finding the number of different 4-letter passwords; permutations; and combinations); relate combinations to Pascal's triangle; know when to use each technique.			
L1.3.2	Define and interpret commonly used expressions of probability (e.g., chances of an event, likelihood, odds).			
L1.3.3	Recognize and explain common probability misconceptions such as "hot streaks" and "being due."			
L2	**Calculation, Algorithms, And Estimation**			
L2.1	**Calculation Using Real and Complex Numbers**			
L2.1.6	Recognize when exact answers aren't always possible or practical; use appropriate algorithms to approximate solutions to equations (e.g., to approximate square roots).			
L2.2	**Sequences and Iteration**			
L2.2.1	Find the *n*th term in arithmetic, geometric, or other simple sequences.			
L2.2.2	Compute sums of finite arithmetic and geometric sequences.			
L2.2.3	Use iterative processes in such examples as computing compound interest or applying approximation procedures.			
L3	**Measurement and Precision**			
L3.2	**Understanding Error**			
L3.2.1	Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations.			
L3.2.2	Describe and explain round-off error, rounding, and truncating.			
L3.2.3	Know the meaning of and interpret statistical significance, margin of error, and confidence level.			
*L1.2.5**	*Read and interpret representations from various technological sources, such as contour or isobar diagrams. (Recommended)*			

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*L2.1.7**	*Understand the mathematical bases for the differences among voting procedures. (Recommended)*			
*L2.2.4**	*Compute sums of infinite geometric sequences. (Recommended)*			
A1	**Expressions, Equations, And Inequalities**			
A1.1	**Construction, Interpretation, and Manipulation of Expressions (linear, quadratic, polynomial, rational, power, exponential, logarithmic, and trigonometric)**			
A1.1.4	Add, subtract, multiply, and simplify polynomials and rational expressions (e.g., multiply $(x-1)(1-x^2+3)$; simplify $\frac{9x-x^3}{x+3}$.			
A1.1.5	Divide a polynomial by a monomial.			
A1.2	**Solutions of Equations and Inequalities (linear, exponential, logarithmic, quadratic, power, polynomial, rational, and trigonometric)**			
A1.2.5	Solve polynomial equations and equations involving rational expressions (e.g., solve $-2x(x^2+4x+3)=0$; solve $x-\frac{1}{x+6}=3$, and justify steps in the solution.			
A1.2.7	Solve exponential and logarithmic equations (e.g., $3(2^x)=24$), $2\ln(x+1)=4$), and justify steps in the solution.			
A1.2.9	Know common formulas (e.g., slope, distance between two points, quadratic formula, compound interest, distance = rate · time), and apply appropriately in contextual situations.			
A1.2.10	Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals (e.g., $2\sin x-1=0$ for $0 \le x \le 2\pi$).			
A2	**Functions**			
A2.3	**Families of Functions (linear, quadratic, polynomial, rational, power, exponential, logarithmic, and trigonometric)**			
A2.3.3	Write the general symbolic forms that characterize each family of functions (e.g., $f(x)=A_0a^x$; $f(x)=A\sin Bx$).			

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A2.5	**Exponential and Logarithmic Functions**			
A2.5.2	Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions (e.g., $f(x) = 10^x$, $f(x) = \log x$, $f(x) = e^x$, $f(x) = ln\ x$).			
A2.5.3	Apply properties of exponential and logarithmic functions (e.g., $a^{x+y} = a^x a^y$; $\log(ab) = \log a + \log b$).			
A2.9	**Rational Functions**			
A2.9.1	Write the symbolic form and sketch the graph of simple rational functions.			
A2.9.2	Analyze graphs of simple rational functions (e.g., $f(x) = \frac{2x+1}{x-1}$; $g(x) = \frac{x}{x^2-4}$) and understand the relationship between the zeros of the numerator and denominator and the function's intercepts, asymptotes, and domain.			
A2.10	**Trigonometric Functions**			
A2.10.1	Use the unit circle to define sine and cosine; approximate values of sine and cosine (e.g., sin 3, or cos 0.5); use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic.			
A2.10.2	Use the relationship between degree and radian measures to solve problems.			
A2.10.3	Use the unit circle to determine the exact values of sine and cosine, for integer multiples of $\pi/6$ and $\pi/4$.			
A2.10.4	Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, location of maxima and minima, and asymptotes.			
A2.10.5	Graph transformations of basic trigonometric functions (involving changes in period, amplitude, phase, and midline) and understand the relationship between constants in the formula and the transformed graph.			
A3	**Mathematical Modeling**			
A3.1	**Models of Real-world Situations Using Families of Functions** *Example: An initial population of 300 people grows at 2% per year. What will the population be in 10 years?*			
A3.1.1	Identify the family of functions best suited for modeling a given real-world situation (e.g., quadratic functions for motion of an object under the force of gravity; exponential functions for compound interest; trigonometric functions for periodic phenomena. *In the example above, recognize that the appropriate general function is exponential* ($P = P_0 a^t$).			

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A3.1.2	Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. *In the example above, substitute the given values* $P_0 = 300$ *and* $a = 1.02$ *to obtain* $P = 300(1.02)^t$.			
A3.1.3	Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. *In the example above, the exact solution is 365.698, but for this problem an appropriate approximation is 365.*			
*A1.1.7**	*Transform trigonometric expressions into equivalent forms using basic identities such as:* $\sin^2\theta + \cos^2\theta = 1$, $\tan\theta = \frac{\sin\theta}{\cos\theta}$, *and* $\tan^2\theta + 1 = \sec^2\theta$. *(Recommended)*			
*A2.2.4**	*If a function has an inverse, find the expression(s) for the inverse. (Recommended)*			
*A2.2.5**	*Write an expression for the composition of one function with another; recognize component functions when a function is a composition of other functions. (Recommended)*			
*A2.2.6**	*Know and interpret the function notation for inverses and verify that two functions are inverses using composition. (Recommended)*			
G1	**Figures and Their Properties**			
G1.7	**Conic Sections and Their Properties**			
G1.7.1	Find an equation of a circle given its center and radius; given the equation of a circle, find its center and radius.			
G1.7.2	Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones.			
G1.7.3	Graph ellipses and hyperbolas with axes parallel to the *x*- and *y*-axes, given equations.			
*G1.7.4**	*Know and use the relationship between the vertices and foci in an ellipse, the vertices and foci in a hyperbola, and the directrix and focus in a parabola; interpret these relationships in applied contexts. (Recommended)*			
S1	**Univariate Data – Examining Distributions**			
S1.1	**Producing and Interpreting Plots**			
S1.1.1	Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics.			

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S1.1.2	Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of outliers on these measures.			
S1.2	**Measures of Center and Variation**			
S1.2.1	Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context.			
S1.2.2	Estimate the position of the mean, median, and mode in both symmetrical and skewed distributions, and from a frequency distribution or histogram.			
S1.2.3	Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, and standard deviation.			
S1.3	**The Normal Distribution**			
S1.3.1	Explain the concept of distribution and the relationship between summary statistics for a data set and parameters of a distribution.			
S1.3.2	Describe characteristics of the normal distribution, including its shape and the relationships among its mean, median, and mode.			
S1.3.3	Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution.			
S1.3.4	Calculate *z*-scores, use *z*-scores to recognize outliers, and use *z*-scores to make informed decisions.			
S3	**Samples, Surveys, and Experiments**			
S3.1	**Data Collection and Analysis**			
S3.1.1	Know the meanings of a sample from a population and a census of a population, and distinguish between sample statistics and population parameters.			
S3.1.2	Identify possible sources of bias in data collection and sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates.			
S3.1.3	Distinguish between an observational study and an experimental study, and identify, in context, the conclusions that can be drawn from each.			

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S4	**Probability Models and Probability Calculation**			
S4.1	**Probability**			
S4.1.1	Understand and construct sample spaces in simple situations (e.g., tossing two coins, rolling two number cubes and summing the results).			
S4.1.2	Define mutually exclusive events, independent events, dependent events, compound events, complementary events, and conditional probabilities; and use the definitions to compute probabilities.			
S4.2	**Application and Representation**			
S4.2.1	Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn diagrams, or other counting techniques.			
S4.2.2	Apply probability concepts to practical situations, in such settings as finance, health, ecology, or epidemiology, to make informed decisions.			
*S3.1.4**	*Design simple experiments or investigations to collect data to answer questions of interest; interpret and present results. (Recommended)*			
*S3.1.5**	*Understand methods of sampling, including random sampling, stratified sampling, and convenience samples, and be able to determine, in context, the advantages and disadvantages of each. (Recommended)*			
*S3.1.6**	*Explain the importance of randomization, double-blind protocols, replication, and the placebo effect in designing experiments and interpreting the results of studies. (Recommended)*			
*S3.2.1**	*Explain the basic ideas of statistical process control, including recording data from a process over time. (Recommended)*			
*S3.2.2**	*Read and interpret basic control charts; detect patterns and departures from patterns. (Recommended)*			
*S4.1.3**	*Design and carry out an appropriate simulation using random digits to estimate answers to questions about probability; estimate probabilities using results of a simulation; compare results of simulations to theoretical probabilities. (Recommended)*			