Maine Mathematics Standards/Sections/Performance Indicators & Descriptors Grade 9-Diploma	Common Core Mathematics Domains/Clusters/Standards High School	National Essential Skills Study (NESS) Rankings Rank		NESS	MHSA	Priority
Real Number:						
1 Students know how to represent and use real numbers. a. Use the concept of n^{th} root. b. Estimate the value(s) of roots and use technology to approximate them. c. Compute using laws of exponents. d. Multiply and divide numbers expressed in scientific notation. e. Understand that some quadratic equations do not have real solutions and that there exist other number systems to allow for solutions to these equations. **M(N&O)—HS—2**	**<u>Number & Quantity: The Real Number System</u>** **Extend the properties of exponents to rational exponents.** 1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* 2. Rewrite expressions involving radicals and rational exponents using the properties of exponents. **Use properties of rational and irrational numbers.** 3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. **<u>Number & Quantity: The Complex Number System</u>** **Perform arithmetic operations with complex numbers.** 1. Know there is a complex number *i* such that $i^2 = –1$, and every complex number has the form $a + bi$ with *a* and *b* real. **Use complex numbers in polynomial identities and equations.** 7. Solve quadratic equations with real coefficients that have complex solutions.	M20	Understand and apply the basic properties and laws of exponents and scientific notation to solve problems, including those with fractional, negative, and zero exponents.	M	M	M
		M39	Apply techniques to obtain a rational approximation or estimate of a quantity or number (including irrational numbers such as radicals).			
		M47	Solve quadratic equations by applying various tools or techniques.			

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B. <u>DATA:</u> Students make measurements and collect, display, evaluate, analyze, and compute with data to describe or model phenomena and to make decisions based on data. Students compute statistics to summarize data sets and use concepts of probability to make predictions and describe the uncertainty inherent in data collection and measurement. It is expected that when working with measurements students: • **understand that most measurements are approximations and that taking repeated measurements reveals this variability;** • **understand that a number without a unit is not a measurement, and that an appropriate unit must always be attached to a number to provide a measurement;** • **understand that the precision and accuracy of a measurement depends on selecting the appropriate tools and units; and** • **use estimation comparing measures to benchmarks appropriate to the type of measure and units.**						

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Measurement and Approximation						
1 Students understand the relationship between precision and accuracy. a. Express answers to a reasonable degree of precision in the context of a given problem. b. Represent an approximate measurement using appropriate numbers of significant figures. c. Know that most measurements are approximations and explain why it is useful to take the mean of repeated measurements. **M(G&M)—HS—7**	**<u>Number & Quantity: Quantities</u>** **Reason quantitatively and use units to solve problems.** 1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. 3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	M10	Understand and apply a systematic methodology or procedure (e.g., direct or indirect measurement, direct or indirect proof, inductive or deductive reasoning) to model and solve problems.	H	H	H
		M12	Understand accuracy and precision of measurement, round off numbers according to the correct number of significant figures, and determine percent error.			
		M20	Understand and apply the basic properties and laws of exponents and scientific notation to solve problems, including those with fractional, negative, and zero exponents.			
Data Analysis						
2 Students understand correlation and cause and effect. a. Recognize when correlation has been confused with cause and effect. b. Create and interpret scatter plots and estimate correlation and lines of best fit. c. Recognize positive and negative correlations based on data from a table or scatter plot. d. Estimate the strength of correlation based upon a scatter plot. **M(DSP)—HS—1**	**<u>Statistics & Probability: Interpreting Categorical & Quantitative Data</u>** **Summarize, represent and interpret data on two categorical and quantitative variables.** 6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.* b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.	M21	Evaluate and employ accurate and appropriate procedures for statistical data collection, organization, analysis, and display including making estimates and predictions, critiquing data, and drawing inferences (e.g., using the normal curve and z-scores, line of best fit).	M	H	H
		M22	Interpret data to determine correlation and distinguish between correlation and cause and effect.			