Michigan
Curriculum Matrix for Mathematics

Michigan Mathematics Strands/High School Content Expectations	Common Core Mathematics Domains/Clusters/Standards High School	National Essential Skills Study (NESS) Rankings Rank		NESS	MME	Priority
L1.1 Number Systems and Number Sense						
L1.1.1 Know the different properties that hold in different number systems, and recognize that the applicable properties change in the transition from the positive integers, to all integers, to the rational numbers, and to the real numbers.	**Number & Quantity: The Real Number System** **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.	M2	Understand and apply basic algebraic properties (commutative and associative laws of addition and multiplication, distributive law of multiplication over addition, and identities and inverses).	H	H	H
		M35	Use the properties of real (rational and irrational) numbers and demonstrate understanding of ordering and absolute value.			
L1.1.2 Explain why the multiplicative inverse of a number has the same sign as the number, while the additive inverse of a number has the opposite sign.	*There is no Michigan Mathematics Learning Expectation-Common Core alignment.*	M35	Use the properties of real (rational and irrational) numbers and demonstrate understanding of ordering and absolute value.	M	H	H
L1.1.3 Explain how the properties of associativity, commutativity, and distributivity, as well as identity and inverse elements, are used in arithmetic and algebraic calculations.	**Algebra: Reasoning with Equations & Inequalities** **Understand solving equations as a process of reasoning and explain the reasoning.** 1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	M2	Understand and apply basic algebraic properties (commutative and associative laws of addition and multiplication, distributive law of multiplication over addition, and identities and inverses).	H	H	H
		M7	Simplify and solve algebraic equations by identifying and using the correct order of operations and techniques necessary to carry out the solution.			
		M11	Apply variables in expressions and equations to solve problems (i.e., write mathematical equations for given situation, create a mathematical model to understand the relationships between variables, or make connections between the structures of mathematically abstract concepts and the real world).			
		M35	Use the properties of real (rational and irrational) numbers and demonstrate understanding of ordering and absolute value.			

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L1.1.4 Describe the reasons for the different effects of multiplication by, or exponentiation of, a positive number by a number less than 0, a number between 0 and 1, and a number greater than 1.	*There is no Michigan Mathematics Learning Expectation-Common Core alignment.*	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	H	H
		M35	Use the properties of real (rational and irrational) numbers and demonstrate understanding of ordering and absolute value.			
L1.1.5 Justify numerical relationships (e.g., show that the sum of even integers is even; that every integer can be written as $3m+k$, where k is 0, 1, or 2, and m is an integer; or that the sum of the first n positive integers is $n(n+1)/2$).	**Functions: Building Functions** **Build a function that models a relationship between two quantities.** 2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	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
L1.1.6 Explain the importance of the irrational numbers and in basic right triangle trigonometry; the importance of π because of its role in circle relationships; and the role of e in applications such as continuously compounded interest.	**Algebra: Seeing Structure in Expressions** **Write expressions in equivalent forms to solve problems.** 4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.* **Functions: Trigonometric Functions** **Extend the domain of trigonometric functions using the unit circle.** 1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. 2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. 3. (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosine, and tangent for $\pi-x$, $\pi+x$, and $2\pi-x$ in terms of their values for x, where x is any real number.	M18	Understand the properties of circles (radius, arc, diameter, chord, secant, and tangent) and apply circle quantities (lengths of line segments, angle measure within a circle, circumference, and area) in problem-solving situations.	M	H	H
		M24	Understand the concepts of recurrence relations and apply them to solve consumer mathematics problems involving such things as percentage rates, personal loans, simple interest, compound interest, installment buying, mortgage rates, etc.			
		M28	Know and apply the six basic trigonometric functions and ratios and solve right triangles using basic trigonometric ratios (sine, cosine, tangent).			
		M48	Express, graph, and interpret exponential and logarithmic functions.			