

**Hamilton City School District
Grade Twelve Mathematics Grade Level Indicators**

Number, Number Sense and Operations Standard	Measurement Standard	Geometry and Spatial Sense Standard	Patterns, Functions and Algebra Standard	Data Analysis and Probability Standard
<p>Number and Number Systems</p> <p>12.1. Determine what properties (closure, identity, inverse, commutative and associative) hold for operations with complex numbers.</p> <p>Computation and Estimation</p> <p>12.2. Apply combinations as a method to create coefficients for the Binomial Theorem, and make connections to everyday and workplace problem situations.</p>	<p>Use measurement Tools and Techniques</p> <p>12.1. Solve problems involving derived measurements; e.g., acceleration and pressure.</p> <p>12.2. Use radian measures in the solution of problems involving angular velocity and acceleration.</p> <p>12.3. 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.</p>	<p>Transformations and Symmetry</p> <p>12.1. Use matrices to represent translations, reflections, rotations, dilations and their compositions.</p> <p>12.2. Derive and apply the basic trigonometric identities; i.e., angle addition, angle subtraction and double angle.</p> <p>Visualization and Geometric Models</p> <p>12.3. Relate graphical and algebraic representations of lines, simple curves and conic sections.</p> <p>12.4. Recognize and compare specific shapes and properties in multiple geometries; e.g., plane, spherical and hyperbolic.</p>	<p>Use Patterns, Relations and Functions</p> <p>12.1. Analyze the behavior of arithmetic and geometric sequences and series as the number of terms increases.</p> <p>12.2. Translate between the numeric and symbolic form of a sequence or series.</p> <p>12.3. Describe and compare the characteristics of transcendental and periodic functions; e.g., general shape, number of roots, domain and range, asymptotic behavior, extrema, local and global behavior.</p> <p>12.4. Represent the inverse of a transcendental function symbolically.</p> <p>Use Algebraic Representations</p> <p>12.5. Set up and solve systems of equations using matrices and graphs, with and without technology.</p> <p>12.6. Make arguments about mathematical properties using mathematical induction.</p> <p>12.7. Make mathematical arguments using the concepts of limit.</p> <p>12.8. 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.</p> <p>12.9. Translate freely between polar and Cartesian coordinate systems.</p> <p>Analyze Change</p> <p>12.10. Use the concept of limit to find instantaneous rate of change for a point on a graph as the slope of a tangent at a point.</p>	<p>Data Collection</p> <p>12.1. Identify and use various sampling methods (voluntary response, convenience sample, random sample, stratified random sample, census) in a study.</p> <p>Statistical Methods</p> <p>12.2. 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.</p> <p>12.3. 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.</p> <p>12.4. Apply the concept of a random variable to generate and interpret probability distributions, including binomial, normal and uniform.</p> <p>12.5. Use sampling distributions as the basis for informal inference.</p> <p>Probability</p> <p>12.6. 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.</p>

**Hamilton City School District
Grade 12 Mathematics
Vocabulary and Concept Map**

Number, Number Sense and Operations	Measurement	Geometry and Spatial Sense	Patterns, Functions and Algebra		Data Analysis and Probability		Mathematical Processes
Associative property	Acceleration	Angle addition identity	Area under a curve	Numeric form	Sampling methods	Random sample	Apply
Binomial Theorem	Angular velocity	Angle subtraction identity	Arithmetic sequence	Periodic function	Binomial distribution	Random variable	Guess and check
Closure property	Derived measurement	Composition	Asymptote	Polar coordinate system	Bivariate data	Sampling distribution	Interpret
Combinations	Limits	Conic section	Bounded interval	Range	Census	Simulation	Justify
Commutative property	Lower bounds	Dilation	Cartesian coordinate system	Roots	Complementary events	Spread	Make an organized list
Complex numbers	Pressure	Double angle identity	Domain	Series	Conditional probability	Stratified random sample	Strategy
Identity property	Radian	Hyperbolic geometry	Extrema	Slope	Convenience sample	Summary statistics	
Inverse property	Successive approximation	Matrix/matrices	Geometric sequence	Symbolic form	Data shape	Theoretical probability	
	Upper bounds	Plane geometry	Global behavior	System of equation	Experimental probability	Uniform distribution	
		Reflection	Instantaneous rate of change	Tangent at a point	Informal inference	Univariate data	
		Rotation	Inverse of a function	Transcendental function	Linear transformation	Voluntary response	
		Spherical geometry	Limit		Measures of center		
		Translation	Local behavior		Mutually exclusive events		
		Trigonometric identities	Mathematical induction		Normal distribution		
			Matrix/matrices		Probability distribution		

Performance Verb	Level in Bloom's	Appearances in Gr. 12 Indicators	Working Definition	<p style="text-align: center;">The importance of the word <i>EXPLAIN</i></p> <p>EXPLAIN is the most frequently used verb in short answer and extended response questions</p> <p>EXPLAIN means to make clear and understandable and to give reasons for</p> <p>When asked to EXPLAIN, the response must include sufficient quality information and proof</p> <p>EXPLAIN is at the analysis level for problem solving</p> <p>In mathematics, EXPLAIN can involve numerical proof and drawings as well as verbal explanation</p>
Analyze	Level IV: Analysis	1	To break down and determine the relationship of the parts	
Apply	Level III: Application	4	To put to use for some practical purpose	
Compare	Level II: Comprehension	3	To examine the qualities of to discover similarities or differences	
Connect	Level IV: Analysis	1	To place or establish in relationship	
Derive	Level IV: Analysis	1	To formulate from other specific sources	
Describe	Level I: Knowledge	3	To represent or give an account of in words	
Determine	Level IV: Analysis	2	To find out or come to a decision by investigation, reason, calculation	
Identify	Level I: Knowledge	1	To establish the identity of	
Make arguments	Level IV: Analysis	2	To prove or try to prove using reason	
Recognize	Level I: Knowledge	1	To acknowledge or perceive something	
Relate	Level II: Comprehension	1	To show a logical connection between	
Represent	Level III: Application	2	To form an image or representation of	
Solve	Level III: Application	2	To find a solution for	
Transform	Level III: Application	1	To change in character or condition, convert	
Translate	Level IV: Analysis	2	To express in different terms or representations	
Use	Level III: Application	7	To put into action or service	