

Montana Instructional Alignment

HPS Critical Competencies

Mathematics

Math IV

Content Standards

Content Standard 1 - Number Sense and Operations

A student, applying reasoning and problem solving, will use number sense and operations to represent numbers in multiple ways, understand relationships among numbers and number systems, make reasonable estimates and compute fluently within a variety of relevant cultural contexts.

Content Standard 2 - Data Analysis

A student, applying reasoning and problem solving, will use data representation and analysis, probability, statistics and statistical methods to evaluate information and make informed decisions within a variety of relevant cultural contexts.

Content Standard 3 - Geometric Reasoning

A student, applying reasoning and problem solving, will understand geometric properties and spatial relationships, transformation of shapes, representational systems, spatial reasoning and geometric models to analyze mathematical situations within a variety of relevant cultural contexts.

Content Standard 4 - Algebraic Reasoning

A student, applying reasoning and problem solving, will use algebraic and functional concepts and procedures to understand patterns, quantitative and functional relationships, algebraic representations, models and change within a variety of relevant cultural contexts.

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Content Standard 1 -		Number Sense and Operations		
A student, applying reasoning and problem solving, will use number sense and operations to represent numbers in multiple ways, understand relationships among numbers and number systems, make reasonable estimates and compute fluently within a variety of relevant cultural contexts.				
State Established Benchmark At the end of Grade 12, a proficient Student will:	Essential Learning Expectation (ELE) / HPS Critical (Competencies)	NCTM Standard	Assessment Statements (Specific Examples)	Vocabulary (for instructional purposes)
1.1 (Magnitude): Represent very large and very small numbers using multiple notations and interpret their effects in problem situations. 1.2 Estimation: Identify situations where estimation is appropriate and determine the needed degree of precision and accuracy. 1.3 Equivalence: Given a representation of a number or expression, find equivalent representations using multiple notations (e.g., exponents and roots). 1.4 Properties: Analyze and apply the properties of numbers and number systems. 1.5 Modeling: Identify givens and unknowns in an unfamiliar situation and describe relationships between variables (e.g., the effect of changing an interest rate on monthly payments).	<i>Implicit in all the standards below is the process standard specifying that all topics are taught with multiple representations through problem solving with appropriate technology</i> Algebra Topics 1.4 1.5 Logarithms and Exponents 1.3 1.4 1.5	<ul style="list-style-type: none"> Geometry Algebra Number and Operations <ul style="list-style-type: none"> Algebra Number and Operations 	<ul style="list-style-type: none"> Polar Coordinates-graph, convert between polar/rectangular coordinates, polar form of complex number, polar form of a linear equation <ul style="list-style-type: none"> Logarithmic and Exponential Functions-graph, solve equations, applications such as time value of money, dB, and earthquakes 	

****Math IV does not cover all 4 standards, therefore only Standards 1, 3, and 4 are reflected in this document.**

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Content Standard 3 -		Geometric Reasoning		
A student, applying reasoning and problem solving, will understand geometric properties and spatial relationships, transformation of shapes, representational systems, spatial reasoning and geometric models to analyze mathematical situations within a variety of relevant cultural contexts.				
State Established Benchmark At the end of Grade 12, a proficient Student will:	Essential Learning Expectation (ELE) / HPS Critical (Competencies)	NCTM Standard	Assessment Statements (Specific Examples)	Vocabulary (for instructional purposes)
3.1 Reasoning: Use inductive and deductive reasoning to verify conjectures about relationships (e.g., congruence) between two- and three-dimensional objects. 3.2 Transformations: Apply transformations on figures (e.g. dilations, rotations, translations, reflections) to solve problems, and interpret the results of composite transformations. 3.3 Triangle Relationships: Solve problems using triangles, including special triangles (e.g., 30-6-0-90) and properties of triangles (e.g. sine, cosine, tangent). 3.4 Methods of Proof: Make, test, and validate conjectures using a variety of techniques (e.g., counterexample, indirect proof). 3.5 Applications: Use spatial reasoning and geometric models to solve real world problems involving regular and irregular shapes.	<i>Implicit in all the standards below is the process standard specifying that all topics are taught with multiple representations through problem solving with appropriate technology</i> Trigonometry 3.3 3.4 3.5	<ul style="list-style-type: none"> Geometry 	<ul style="list-style-type: none"> Unit Circle and special angle trigonometric values (0, 30, 45, 60 & 90 degrees) Law of Cosines and Sines (including ambiguous case) with applications Graphing trig. Functions (sine or cosine) Modeling harmonic functions Verifying and using trig. Identities Solve trig. Equations Polar Coordinates-graph, convert between polar/rectangular coordinates, polar form of complex number Vectors-resultant (geometric and algebraic), polar/rectangular form, applications 	

