Montana Instructional Alignment
HPS Implementation Guide
Mathematics
Technical Math

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.

Montana Instructional Alignment
HPS Implementation Guide
Mathematics
Technical Math

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**
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 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).	*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.* **Number Sense 1.2 1.3 1.4** **Measurement 1.1 1.2**	• **Number and Operations** • **Measurement**	• Addition, subtraction, multiplication, and division of whole numbers, fractions, decimals, and integers with and without calculators. • Tape measure accurate to 16th of an inch. • Various styles of calipers to the 100th. • Protractors to the nearest degree.	

Montana Instructional Alignment
HPS Implementation Guide
Mathematics
Technical Math

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**
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.	*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.* **Triangle Trigonometry 3.3** **Conversions and unit analysis 3.1 3.5**	• **Geometry** • **Measurement**	• **SOHCAHTOA** Inverse Trig. Functions • **English Units** Use ratios to convert (in ➔ ft). • **Metric Units** Use ratios to convert (g ➔ kg). • **Unit analysis** (m/s ➔ mi/hr). • **Various meters to an appropriate place value based on context.**	

Montana Instructional Alignment
HPS Implementation Guide
Mathematics
Technical Math

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.			
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**

4.1 **Symbols:** Choose appropriate variables to construct expressions and equations representing given problem situations (e.g., linear, quadratic, exponential).
4.2 **Solving:** Solve a variety of equations, inequalities and their systems; justify the solution process using properties of numbers; and interpret solutions in context.
4.3 **Functions:** Represent functions in a variety of ways including tabular, graphic, symbolic, and verbal, and select an appropriate form for solving a given problem.
4.4 **Transforming Functions:** Analyze the effects of transformations on families of functions, recognize their characteristics, and represent functions in equivalent forms.
4.5 **Modeling:** Given data or a problem situation, select and use an appropriate function model to analyze results or make a prediction
4.6 **Connections with Geometry:** Represent geometric problems algebraically and algebraic situation geometrically.
	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.
	
	Ratios and proportions 4.2 4.5
	
	Algebra 4.2 4.5
	
	Geometry 4.2 4.4
	
	Triangle Trigonometry 4.2 4.5
		• **Algebra**
		
		• **Algebra**
		
		• **Measurement**
		
		• **Geometry**
			• Set up and solve proportions from applicable ratios and word problems.
			
			• Evaluate/solve trade based formulas for any variable (ex: V = IR).
			
			• Calculate area, perimeter, volume, and surface area of various 2- and 3-dimensional figures.
			  • Area/perimeter of triangle.
			  • Volume/surface area of a triangular prism.
			
			• Solve for unknown values.
			  • SOHCAHTOA.
			  • Inverse Trig. Functions
			  • Pythagorean Theorem	