

Montana Instructional Alignment

HPS Critical Competencies

Mathematics

Seventh Grade

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 and Functional 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.

Essential Learning Expectations (ELE's / Critical Competencies) should be addressed in contexts that promote problem solving, reasoning, communication, making connections, and designing and analyzing representations. — Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics – NCTM – National Council for Teachers of Mathematics

State Established Benchmark At the end of 8th grade, a proficient student will:	OPI Essential Learning Expectation (ELE) (HPS Critical Competencies)	NCTM	Assessment Statements (Specific Examples)	Vocabulary (for instructional purposes)
1.1 Number Theory: Apply number theory concepts (e.g. primes, factors, and multiples) in mathematical problem situations.				
1.2 Estimation: Select and apply appropriate estimation strategies to measure, compute, and judge results in terms of reasonableness and accuracy. (E.g., estimate an irrational number using the square roots of perfect square numbers.)				
1.3 Rational Numbers: Recognize relationships among different representations of rational numbers and identify, compare and order rational numbers as well as common irrational numbers.	<ul style="list-style-type: none"> Estimation and computation of whole numbers, rational numbers, and intergers 	<ul style="list-style-type: none"> Developing an understanding of operations on all rational numbers 	<ul style="list-style-type: none"> $23 + (-2) = 21$ 	estimate, integer, whole number, least common multiple
1.4 Rational Number Operations: Compute fluently and solve multi-step problems using integers, fractions, decimals, percents, and numbers in exponential form.	<ul style="list-style-type: none"> Order of operations using rational numbers and integers 		<ul style="list-style-type: none"> $\frac{2^3 + 4(3 - 2)}{15(14 - 18)}$ 	commutative, associative, distributive, identity element
1.5 Proportional Reasoning: Understand and apply proportional relationships and solve problems involving rates, ratios, proportions, and percents.				
1.6 Measurement: Demonstrate an understanding of measurable attributes of objects, and the units, systems, and processes of measurement within relevant cultural contexts.	<ul style="list-style-type: none"> Use of appropriate work, steps, and vocabulary 			

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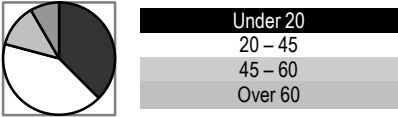
Seventh Grade

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.

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State Established Benchmark At the end of 8th grade, a proficient student will:	OPI Essential Learning Expectation (ELE) (HPS Critical Competencies)	NCTM	Assessment Statements (Specific Examples)	Vocabulary (for instructional purposes)												
2.1 Represent Data: Collect, organize and represent data (e.g. box plots, histograms, scatter plots, circle graphs) in culturally relevant contexts.	<ul style="list-style-type: none"> Collect, organize, display, and analyze data 	<ul style="list-style-type: none"> Developing an understanding of operations on all rational numbers Collect and organize data 	<ul style="list-style-type: none"> Find the mean, median, mode, and range of 26, 39, 42, 40 Make a line plot to show the time of finishers in a race <table border="1" style="margin-left: 20px;"> <tr> <td>Minutes</td> <td>30</td> <td>50</td> <td>60</td> <td>70</td> <td>80</td> </tr> <tr> <td>Finishers</td> <td>5</td> <td>4</td> <td>8</td> <td>7</td> <td>8</td> </tr> </table>	Minutes	30	50	60	70	80	Finishers	5	4	8	7	8	survey, tables, stem and leaf plots, bar graph, line graph, circle graph, mean, mode, median, range, box and whisker data
Minutes	30	50	60	70	80											
Finishers	5	4	8	7	8											
2.2 Evaluate Data: Interpret, analyze, and evaluate data to make decisions and predictions (e.g. trends in data)		<ul style="list-style-type: none"> Display and analyze data 	<ul style="list-style-type: none"> Construct a bar graph to display passengers in millions. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Airport</th> <th>Passengers (in millions)</th> </tr> </thead> <tbody> <tr> <td>Chicago</td> <td>66</td> </tr> <tr> <td>Atlanta</td> <td>54</td> </tr> <tr> <td>Dallas</td> <td>53</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Use the graph to answer the following question. Which age group forms the largest part of the population? <div style="margin-left: 20px;">  </div>	Airport	Passengers (in millions)	Chicago	66	Atlanta	54	Dallas	53					
Airport	Passengers (in millions)															
Chicago	66															
Atlanta	54															
Dallas	53															
2.3 Descriptive Statistics: Compute and apply mean, median, mode, and range to compare and describe data.		<ul style="list-style-type: none"> Collect and organize data 	<ul style="list-style-type: none"> Find the mean, median, mode, and range of a bag of Skittles candy. 	sector												
2.4 Probability: Using real-life contexts or simulation create sample spaces, determine experimental and theoretical probabilities (e.g. using tree diagrams), and make predictions																

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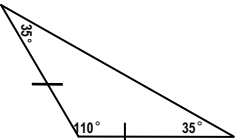
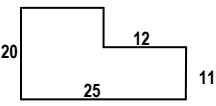
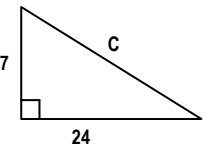
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Content Standard 3 -

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.

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State Established Benchmark At the end of 8th grade, a proficient student will:	OPI Essential Learning Expectation (ELE) (HPS Critical Competencies)	NCTM	Assessment Statements (Specific Examples)	Vocabulary (for instructional purposes)
3.1 Properties: Define, classify, and compare properties of solids and plane figures, including angles.	<ul style="list-style-type: none"> Identify geometry terms and explore 2- and 3-dimensional figures and use formulas 		<ul style="list-style-type: none"> Classify in as many ways as possible 	regular polygon, parallel, bisect, acute, scalene, equilateral, complementary angles, perpendicular, congruent, obtuse, right, isosceles, supplementary angles
3.2 Relationships: Determine congruence, similarity, and symmetry of objects in mathematics and in the contexts of art, science, and culture.				
3.3 Transformations: Define, identify, and apply transformations (e.g. translations, rotations, reflections, dilations) on the coordinate plane).				
3.4 Measurement: Select appropriate metric or standard units and formulas to measure and compute angles, perimeter, area, surface area, and volume.	<ul style="list-style-type: none"> Find perimeter, circumference, area of regular and irregular shapes (composed of a combination of regular shapes), volume of pyramids and prisms 	<ul style="list-style-type: none"> Developing an understanding of and applying proportionality 	<ul style="list-style-type: none"> Find the area  <ul style="list-style-type: none"> Find the perimeter and area of a rectangle 12 ft. X 9 ft. Find the surface area of a rectangular prism 2 X 4 X 1 inches 	pyramid, prism, volume, dimensions, height, base
3.5 Justification: Develop informal arguments to verify geometric relationships (e.g. Pythagorean Theorem) and solve problems.	<ul style="list-style-type: none"> Regular and irregular shapes, volume of pyramid and prisms 	<ul style="list-style-type: none"> Developing an understanding of and using formulas to determine surface areas and volumes of three-dimensional shapes 	<ul style="list-style-type: none"> Find side C 	Pythagorean theorem, square root, $\sqrt{\quad}$, powers, exponents, cube, square, hypotenuse, legs

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Content Standard 4 -

Algebraic and Functional Reasoning:

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4.1 Patterns: Create and use tables, graphs, words, and symbols/variables to represent, analyze, and generalize a variety of patterns.	<ul style="list-style-type: none"> Develop an understanding of all rational numbers 	<ul style="list-style-type: none"> Determine patterns and sequences and generate functions with tables 	<ul style="list-style-type: none"> Write the next three terms of the following sequence: 3, 10, 17..... 									
4.2 Equivalence: Recognize, simplify, and generate equivalent forms for algebraic expressions.												
4.3 Solving: Use number properties and inverse operations to solve single-variable equations and inequalities.												
4.4 Function: Identify linear and non-linear functional relationships and contrast their properties from tables, graphs, or equations.	<ul style="list-style-type: none"> Develop an understanding of all rational numbers and solving linear equations 	<ul style="list-style-type: none"> Determine patterns and sequences and generate functions with tables 	<ul style="list-style-type: none"> Make a table from the rule $y = x + 5$ Make a rule from the table: <table style="margin-left: 20px; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px 5px;">X</td> <td style="padding: 2px 5px;">3</td> <td style="border-right: 1px solid black; padding: 2px 5px;">9</td> <td style="padding: 2px 5px;">27</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px 5px;">Y</td> <td style="padding: 2px 5px;">6</td> <td style="border-right: 1px solid black; padding: 2px 5px;">18</td> <td style="padding: 2px 5px;">54</td> </tr> </table> 	X	3	9	27	Y	6	18	54	
X	3	9	27									
Y	6	18	54									
4.5 Modeling: Identify and compute rate of change/slope and intercepts from equations, graphs, and tables; model and solve contextual problems involving linear proportions.	<ul style="list-style-type: none"> Graph inequalities on a number line Solve and graph linear equations on a number line and coordinate plane 	<ul style="list-style-type: none"> Developing an understanding of operations of all rational numbers and solving linear equations. 	<ul style="list-style-type: none"> Graph $x \geq 7$ on a number line Graph the equation on a coordinate plane $y = x - 1$ 	x-axis, y-axis, quadrant, coordinate plane, ordered pair								