

Strands	Performance Standards	Benchmarks
M.I	Number and Operations	
		Understand numbers, ways of representing numbers, relationships among numbers, and number systems. (NCTM)
M.1.1		<p>M.1.1.M.1</p> <p>work flexibly with fractions, decimals, and percents to solve problems;</p> <ul style="list-style-type: none"> • (6) Convert between fractions and decimals. • (6) Convert between fractions or decimals to percents. • (6) Identify the fraction to the decimal equivalent (and vice versa) for halves, thirds, fourths, and fifths. • (7) Identify the fraction to the decimal conversion (and vice versa) for one-half thru tenths (excluding sevenths). • (7) Solve problems using scientific notation with positive exponents <p>• (7) Solve percent problems for real life situations (markups, discounts, commissions, sales tax...)</p> <ul style="list-style-type: none"> • (7) Calculate percent increase and percent decrease up to 100%. • (7) Convert between decimals, fractions, and percents. <p>compare and order fractions, decimals, and percents efficiently and find their approximate locations on a number line;</p> <ul style="list-style-type: none"> • (6) Write, compare, and order decimals, using place value and number lines. • (6) Compare and order fractions on a number line ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$). • (7) Compare and order both fractions and decimals. • (7) Compare and order percents, fraction, and decimals. <p>M.1.1.M.2</p> <p>understand and use ratios and proportions to represent quantitative relationships;</p> <ul style="list-style-type: none"> • (6) Write ratios. • (6) Write proportions. • (6) Identify equal ratios as proportions. • (6) Find the missing value in a proportion that contains whole numbers; understand that cross products are equal. • (7) Identify equal ratios and write them as a proportion. <p>M.1.1.M.4</p> <ul style="list-style-type: none"> • (7) Find the unknown in a proportion containing integers or decimals using cross multiplication. • (7) Calculate a unit rate for a given relationship. <p>M.1.1.M.5</p> <p>develop an understanding of large numbers and recognize and appropriately use exponential, scientific, and calculator notation;</p> <ul style="list-style-type: none"> • (6) Represent whole numbers in exponential form. • (6) Write large numbers in scientific notation. • (7) Use scientific notation and exponential notation to express large numbers. <p>• (7) Demonstrate movement of the decimal point to support understanding of the powers of 10.</p> <ul style="list-style-type: none"> • (7) Use scientific calculators to show scientific notation. • (7) Use scientific calculators to compute exponents or roots. <p>M.1.1.M.6</p> <p>use factors, multiples, prime factorization, and relatively prime numbers to solve problems;</p> <ul style="list-style-type: none"> • (6) List factors and multiples of whole numbers. • (6) Find prime factorization by making factor trees. <p>• (6) Find the greatest common factor (GCF) and least common multiple (LCM) of whole numbers.</p> <ul style="list-style-type: none"> • (6) Know and use the divisibility rules for the numbers 2, 3, 4, 5, 6, 9, 10. • (6) Know the difference between prime and composite numbers. • (6) Recognize prime numbers between 1 and 50. • (7) State if a value (between 1 and 50) is prime, composite, or neither. • (7) Write the prime factorization of a number in expanded and exponential form. • (7) Use prime factorization to find GCF and LCM. <p>M.1.1.M.7</p> <p>develop meaning for integers and represent and compare quantities with them</p> <ul style="list-style-type: none"> • (6) Understand opposites of integer values. • (6) Compare and order integers on a number line • (6) Represent everyday values (gains, losses) using integers. • (7) Represent everyday values (gains, losses...) using integers. • (7) Compare and order integers on a number line. • (7) Understand and compute absolute value of integers. • (7) Understand and find opposites of integers.
M.1.2		Understand meanings of operations and how they relate to one another. (NCTM)
		M.1.2.M.1
		understand the meaning and effects of arithmetic operations with fractions, decimals, and integers; <ul style="list-style-type: none"> • (6) Use operations with fractions, decimals and positive integers. • (6) Use order of operations to evaluate numerical expressions. • (7) Determine the correct algorithms to calculate addition, subtraction, multiplication, and division problems containing integers, fractions, and decimals. • (7) Identify and use order of operations to simplify numerical expressions containing grouping symbols and exponents.
		M.1.2.M.2
		use the associative and commutative properties of addition and multiplication and the distributive property of multiplication over addition to simplify computations with integers, fractions, and decimals; <ul style="list-style-type: none"> • (6) Apply the associative and commutative properties of addition and multiplication with whole numbers. • (7) Apply the associative and commutative properties of addition and multiplication with integers, fractions, and decimals to simplify calculations. • (7) Apply the distributive property of multiplication over addition to simplify multiplication of large values.
		M.1.2.M.3
		understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems. <ul style="list-style-type: none"> • (6) Simplify addition and multiplication calculations for whole numbers. • (6) Use inverse operations to solve one step equations for addition and multiplication, and subtraction and division. • (6) Identify perfect squares and their square roots. • (7) Use inverse operations to solve word problems in multi-step equations. • (7) Use the inverse operation to show that the square root will undo squaring of a number (and vice versa) • (7) Use square roots to solve problems using the Pythagorean Theorem.

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	M.1.3	<p>Compute fluently and make reasonable estimates. (NCTM)</p> <p>select appropriate methods and tools for computing with fractions and decimals from among mental computations, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods;</p> <p>• (6) Choose an appropriate method of computation and justify their choice. • (6) Determine whether an estimate or an exact answer is needed. • (7) Determine whether an estimate or an exact answer is needed when problem solving. • (7) Select and use appropriate estimation algorithms to find reasonable estimates when computing with fractions and decimals. • (7) Use estimation to check reasonability of an answer.</p> <p>develop and analyze algorithms for computing with fractions, decimals, and integers and develop fluency in their use.</p> <p>• (6) Identify and apply the rules for adding, subtracting, multiplying and dividing with fractions and decimals. • (7) Identify and apply the rules for adding integers. • (7) Identify and apply the rules for subtracting integers. • (7) Identify and demonstrate the use of rules for multiplying and dividing integers.</p> <p>• (7) Use proper fraction and decimal algorithms to compute using positive and negative values. • (7) Apply integer, fraction, and decimal algorithms to one-step equation solving.</p> <p>develop and use strategies to estimate the results of rational-number computations and judge the reasonableness of the results;</p> <p>• (6) Know and use estimation strategies when computing with whole numbers, fractions, decimals. • (6) Check reasonableness of an answer using estimation. • (7) Select and use appropriate estimation strategies when computing with rational numbers. • (7) Check reasonability of an answer using estimation.</p> <p>develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding equivalent ratios.</p> <p>• (6) Use cross products to find the missing value in a proportion. • (6) Use proportions to determine if figures are similar and to find the missing side lengths of similar figures. • (6) Use scale drawings and proportions to determine actual measurements. • (7) Use scale drawings and proportions to determine actual measurements. • (7) Identify equal ratios as proportions. • (7) Use cross products to solve proportions. • (7) Use proportions to determine if figures are similar. • (7) Find missing side lengths of similar figures using proportions. • (7) Use dimensional analysis to make unit conversions. • (7) Use proportions to solve percent problems.</p>
M.2	Algebra	
	M.2.1	<p>Understand patterns, relations, and functions. (NCTM)</p> <p>represent, analyze, and generalize a variety of patterns with tables, graphs, words, and when possible, symbolic rules;</p> <p>• (6) Given a multi-step expression in a problem, find the missing values in a function table. • (6) Find the expression from a given function table. • (7) Find the expression from a given function table.</p> <p>identify functions as linear or nonlinear and contrast their properties from tables, graphs, or equations.</p>
	M.2.2	<p>Represent and analyze mathematical situations and structures using algebraic symbols. (NCTM)</p> <p>develop an initial conceptual understanding of different uses of variables;</p> <p>• (6) Write algebraic expressions from words to symbols and symbols to words. • (6) Write expressions from word problems. • (7) Write algebraic expressions from words to symbols and symbols to words. • (7) Write algebraic expressions from word problems. • (7) Describe what each variable represents in a given formula or problem.</p> <p>explore relationships between symbolic expressions and graphs of lines, paying particular attention to the meaning of intercept and slope;</p> <p>use symbolic algebra to represent situations and to solve problems, especially those that involve linear relationships;</p> <p>• (6) Write one operation equations to solve word problems. • (7) Write simple multi-step equations to solve word problems.</p> <p>recognize and generate equivalent forms for simple algebraic expressions and solve linear equations.</p> <p>• (6) Solve one step equations using inverse operations. • (7) Combine like-terms to simplify basic algebraic expressions. • (7) Evaluate numerical expressions and simplify algebraic expressions by applying the correct order of operations and the use of properties. • (7) State if a given value is a solution for the equation. • (7) Solve one step equations using inverse operations. • (7) Solve multistep equations using inverse operations.</p>
M.3	Geometry	
	M.3.1	<p>Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships. (NCTM)</p> <p>precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties;</p> <p>• (6) Classify and describe two dimensional shapes by angle measures and/or side lengths. • (6) Classify and describe three dimensional shapes as prisms, pyramids, cylinders, cones, and spheres. • (6) Determine the difference between regular and irregular polygons. • (7) Classify and describe two dimensional shapes by angle measures and/or side lengths. • (7) Classify and describe three dimensional shapes as prisms, pyramids, cylinders, cones, and spheres. • (7) Determine the difference between regular and irregular polygons.</p>

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		M.3.1.M.2	understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects; <ul style="list-style-type: none"> • (6) Compare similar objects to determine how the attributes are affected by changes in the dimensions of figures. • (7) Compare similar objects to determine how the attributes are affected by changes in the dimensions of figures.
		M.3.1.M.3	create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationships. <ul style="list-style-type: none"> • (6) Identify congruent figures and angles. • (6) Identify complementary and supplementary angles. • (6) Find the missing complementary or supplementary angle measurement. • (6) Identify vertical and adjacent angles • (6) Identify and compare similar figures. • (6) Find the length of a side in a right triangle using the Pythagorean Theorem. • (7) Identify congruent figures and angles. • (7) Identify complementary and supplementary angles. • (7) Find the missing complementary or supplementary angle measurement. • (7) Identify vertical and adjacent angles. • (7) Identify and compare similar figures. • (7) Find the length of a side in a right triangle using the Pythagorean Theorem. • (7) Use angle relationships (supplementary/complementary angles, vertical/adjacent angles) to find missing angles when parallel lines are cut by a transversal.
	M.3.2	Specify locations and describe spatial relationships using coordinate geometry and other representational systems. (NCTM) M.3.2.M.1	use coordinate geometry to represent and examine the properties of geometric shapes; <ul style="list-style-type: none"> • (6) Locate and graph points on a coordinate plane. • (7) Locate and graph points on a coordinate plane and state the axis or quadrant on which they lie.
	M.3.3	Apply transformations and use symmetry to analyze mathematical situations. (NCTM) M.3.3.M.1	describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and scaling; <ul style="list-style-type: none"> • (6) Recognize transformations as translations, reflections, and rotations. • (6) Use translations, reflections, and rotations to transform geometric shapes. • (6) Use scale to determine actual measurements. • (6) Use actual measurements to construct a scale model. • (7) Recognize transformations as translations, reflections, and rotations. • (7) Use translations, reflections, and rotations to transform geometric shapes. • (7) Use scale to determine actual measurements. • (7) Use actual measurements to construct a scale model. • (7) Calculate the scale factor of two similar figures.
		M.3.3.M.2	examine the congruence, similarity, and line or rotational symmetry of objects using transformations <ul style="list-style-type: none"> • (6) Identify line symmetry and rotational symmetry in a variety of figures. • (6) Identify tessellations and shapes that can tessellate. • (7) Identify line symmetry and rotational symmetry in a variety of figures. • (7) Identify tessellations and shapes that can tessellate.
	M.3.4	Use visualization, spatial reasoning, and geometric modeling to solve problems. (NCTM) M.3.4.M.1	draw geometric objects with specified properties, such as side lengths or angle measures; <ul style="list-style-type: none"> • (6) Draw polygons using given specified properties.
		M.3.4.M.3	use visual tools such as networks to represent and solve problems; <ul style="list-style-type: none"> • (6) Use nets to compose and decompose three dimensional shapes. • (7) Use nets to compose and decompose three dimensional shapes.
		M.3.4.M.4	use geometric models to represent and explain numerical and algebraic relationships; <ul style="list-style-type: none"> • (6) Use given formulas to find perimeter, circumference, and area. • (6) Break a polygon into simpler shapes to find its area. • (7) Use given formulas to find perimeter, circumference, and area. • (7) Break a polygon into simpler shapes to find its area.
		M.3.4.M.5	recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such as art, science, and everyday life. <ul style="list-style-type: none"> • (6) Use indirect measurement to solve problems. • (7) Use indirect measurement to solve problems
M.4	Measurement	Understand measurable attributes of objects and the units, systems, and processes of measurement. (NCTM) M.4.1	
		M.4.1.M.1	understand both metric and customary systems of measurement; <ul style="list-style-type: none"> • (6) Understand the metric system and its units. • (6) Understand the customary system. • (7) Understand the metric system and its units. • (7) Understand the customary system.
		M.4.1.M.2	understand relationships among units and convert from one unit to another within the same system; <ul style="list-style-type: none"> • (6) Make conversions within the customary system. • (6) Make conversions within the metric system. • (7) Make conversions within the customary system • (7) Make conversions within the metric system.
		M.4.1.M.3	understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume. <ul style="list-style-type: none"> • (6) Use appropriate units to measure objects. • (6) Select correct label when measuring angles, perimeter, area, surface area, and volume.
	M.4.2	Apply appropriate techniques, tools, and formulas to determine measurements. (NCTM) M.4.2.M.1	use common benchmarks to select appropriate methods for estimating measurements; <ul style="list-style-type: none"> • (6) Use estimation to determine whether a measurement is reasonable. • (6) Use benchmark angles (45° angle, right angle, and straight angle) to estimate angle measurement. • (7) Use estimation to determine whether a measurement is reasonable.

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			<ul style="list-style-type: none"> • (7) Use benchmark angles (45° angle, right angle, and straight angle) to estimate angle measurement.
		M.4.2.M.2	<ul style="list-style-type: none"> select and apply techniques and tools to accurately find length, area, volume, and angle measurement to appropriate levels of precision; • (6) Select appropriate measurement tools based on the precision and measurement error.
		M.4.2.M.3	<ul style="list-style-type: none"> develop and use formulas to determine the circumference of circles and the area of triangles, parallelograms, trapezoids, and circles and develop strategies to find the area of more-complex shapes; • (6) State and use formulas to determine the area of circles, parallelograms and trapezoids. • (6) State and use formulas to determine the circumference of a circle. • (6) Use formulas to develop strategies to determine the area of complex shapes. • (7) Use formulas to develop strategies to determine the area of complex shapes.
		M.4.2.M.4	<ul style="list-style-type: none"> develop strategies to determine the surface area and volume of selected prisms, pyramids, and cylinders; • (6) Determine the volume of prisms, pyramids, and cylinders. • (6) Determine the surface area of prisms, pyramids, and cylinders. • (7) Determine the volume of prisms, pyramids, and cylinders. • (7) Determine the surface area of prisms, pyramids, and cylinders.
		M.4.2.M.5	<ul style="list-style-type: none"> solve problems involving scale factors, using ratio and proportion; • (6) Use ratio and proportion to solve scale problems. • (7) Use ratio and proportion to solve scale problems.
M.5	Data Analysis and Probability	Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them. (NCTM)	
	M.5.1	M.5.1.M.1	<ul style="list-style-type: none"> formulate questions, design studies, and collect data about a characteristic shared by two populations or different characteristics within one population; • (6) Formulate questions, design experiments, or survey to collect relevant data to compare characteristics. • (7) Formulate questions design experiments or surveys to collect relevant data to compare characteristics.
		M.5.1.M.2	<ul style="list-style-type: none"> select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatterplots. • (6) Given a set of data select an appropriate representation. • (7) Given a set of data select an appropriate representation
	M.5.2	Select and use appropriate statistical methods to analyze data. (NCTM) M.5.2.M.1	<ul style="list-style-type: none"> find, use, and interpret measures of center and spread, including mean and interquartile range; • (6) Find, use, and interpret measures of center and spread, including mean and interquartile range. • (6) Explain how outliers affect these central tendencies. • (7) Find, use, and interpret measures of center and spread, including mean and interquartile range. • (7) Explain how outliers affect these central tendencies.
	M.5.4	Understand and apply basic concepts of probability. (NCTM) M.5.4.M.1	<ul style="list-style-type: none"> understand and use appropriate terminology to describe complementary and mutually exclusive events; • (6) Explain and compare the difference between experimental and theoretical probability. • (6) Find the theoretical probability of an event. • (7) Explain and compare the difference between experimental and theoretical probability. • (7) Find the theoretical probability of an event.
		M.5.4.M.2	<ul style="list-style-type: none"> use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations; • (6) Find the experimental probability of an event. • (7) Find experimental probability of an event and compare it to theoretical probability.
		M.5.4.M.3	<ul style="list-style-type: none"> compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models. • (6) Use tree diagrams to determine possible outcomes.
			<ul style="list-style-type: none"> • (7) Use tree diagrams and the Fundamental Counting Principle to determine possible outcomes.
M.6	Problem Solving	Build new mathematical knowledge through problem solving. (NCTM)	
	M.6.1	M.6.1.1	Build new mathematical knowledge through problem solving. (NCTM)
	M.6.2	Solve problems that arise in mathematics and in other contexts. (NCTM) M.6.2.1	Solve problems that arise in mathematics and in other contexts. (NCTM) • (9-12) Students will solve word problems involving right triangles (Geometry)
	M.6.3	Apply and adapt a variety of appropriate strategies to solve problems. (NCTM) M.6.3.1	Apply and adapt a variety of appropriate strategies to solve problems. (NCTM) • (9-12) Students will use a variety of problem-solving strategies, such as drawing a diagram, making a chart, guess-and-check, solving a simpler problem, writing an equation and working backwards (Geometry) • (9-12) Students solve multi-step problems, including word problems, involving linear equation and linear inequalities in one variable (Algebra)
	M.6.4	Monitor and reflect the process of mathematical problem solving. (NCTM) M.6.4.1	Monitor and reflect the process of mathematical problem solving. (NCTM)
M.7	Reasoning and Proof	Recognize reasoning and proof as fundamental aspects of mathematics. (NCTM)	
	M.7.1	M.7.1.1	Recognize reasoning and proof as fundamental aspects of mathematics. (NCTM)
	M.7.2	Make and investigate mathematical conjectures. (NCTM) M.7.2.1	Make and investigate mathematical conjectures. (NCTM)
	M.7.3	Develop and evaluate mathematical arguments and proofs. (NCTM)	

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		M.7.3.1	Develop and evaluate mathematical arguments and proofs. (NCTM) <ul style="list-style-type: none"> • (9-12) Students will prove and apply theorems involving segments divided proportionally (Geometry) • (9-12) Students will prove that triangles are congruent or similar and use the concept of corresponding parts of congruent triangles (Geometry) • (9-12) Students will understand and apply the inequality theorems: triangle inequality, inequality in one triangle and the hinge theorem (Geometry) • (9-12) Students will write geometric proofs. Use and compare a variety of ways to present deductive proofs, such as flow charts, paragraphs and two-column proofs (Geometry)
	M.7.4	Select and use various types of reasoning and methods of proof. (NCTM) M.7.4.1	Select and use various types of reasoning and methods of proof. (NCTM)
M.8	Communications	Organize and consolidate their mathematical thinking through communication. (NCTM)	
	M.8.1	M.8.1.1	Organize and consolidate their mathematical thinking through communication. (NCTM) <ul style="list-style-type: none"> • (9-12) Students will complete a minimum of two (2) writing assignments per year (Algebra)
	M.8.2	Communicate their mathematical thinking coherently and clearly to peers, teachers, and others. (NCTM) M.8.2.1	Communicate their mathematical thinking coherently and clearly to peers, teachers, and others. (NCTM) <ul style="list-style-type: none"> • (9-12) Students will present problem solutions (Algebra)
	M.8.3	Analyze and evaluate the mathematical thinking and strategies of others. (NCTM) M.8.3.1	Analyze and evaluate the mathematical thinking and strategies of others. (NCTM)
	M.8.4	Use the language of mathematics to express mathematical ideas precisely. (NCTM) M.8.4.1	Use the language of mathematics to express mathematical ideas precisely. (NCTM) <ul style="list-style-type: none"> • (9-12) Students will write and interpret statements of the form
M.9	Connections	Recognize and use connections among mathematical ideas. (NCTM)	
	M.9.1	M.9.1.1	Recognize and use connections among mathematical ideas. (NCTM)
	M.9.2	Understand how mathematical ideas interconnect and build on one another to produce a coherent whole. (NCTM) M.9.2.1	Understand how mathematical ideas interconnect and build on one another to produce a coherent whole. (NCTM)
	M.9.3	Recognize and apply mathematics in contexts outside of mathematics. (NCTM) M.9.3.1	Recognize and apply mathematics in contexts outside of mathematics. (NCTM)
M.10	Representations	Create and use representations to organize, record, and communicate mathematical ideas. (NCTM)	
	M.10.1	M.10.1.1	Create and use representations to organize, record, and communicate mathematical ideas. (NCTM)
	M.10.2	Select, apply, and translate among mathematical representations to solve problems. (NCTM) M.10.2.1	Select, apply, and translate among mathematical representations to solve problems. (NCTM)
	M.10.3	Use representations to model and interpret physical, social, and mathematical phenomena. (NCTM) M.10.3.1	Use representations to model and interpret physical, social, and mathematical phenomena. (NCTM)