

Learning Upgrade Math correlated to CASAS Math Standards

Standard	Math Standard Description	Learning Upgrade Math: Grade K	Learning Upgrade Math: Grade 1	Learning Upgrade Math: Grade 2	Learning Upgrade Math: Grade 3	Learning Upgrade Math: Grade 4
M1 NUMBER SENSE						
M1.1.1	Associate numbers with quantities	Lessons 1, 2, 3, 4		Lesson 7		
M1.1.2	Count with whole numbers	Lessons 8, 11, 23, 28, 30	Lessons 11, 12, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24	Lesson 7		
M1.1.3	Count by 2s, 5s, and 10s up to 100	Lessons 35, 40, 41, 42				
M1.1.4	Recognize odd and even numbers					
M1.1.5	Understand the decimal place value system: read, write, order and compare whole and decimal numbers (e.g., $0.13 > 0.013$ because $13/100 > 13/1000$)		Lessons 6, 26, 35, 36	Lessons 10, 12		Lessons 1, 3, 14, 38, 39
M1.1.6	Round off numbers to the nearest 10, 100, 1000 and/or to the nearest whole number, tenth, hundredth or thousandth according to the demands of the context				Lesson 8	Lesson 2
M1.1.7	Using place value, compose and decompose numbers with up to 5 digits and/or with three decimal places (e.g., $54.8 = 5 \times 10 + 4 \times 1 + 8 \times 0.1$)			Lessons 8, 11		
M1.1.8	Interpret and use a fraction in context (e.g., as a portion of a whole area or set)			Lesson 58	Lessons 38, 39, 40, 54	
M1.1.9	Find equivalent fractions and simplify fractions to lowest terms				Lessons 40, 42	Lessons 27, 35
M1.1.10	Use common fractions to estimate the relationship between two quantities (e.g., $31/179$ is close to $1/6$)				Lessons 40, 42	
M1.1.11	Convert between mixed numbers and improper fractions					Lesson 32
M1.1.12	Use common fractions and their decimal equivalents interchangeably					
M1.1.13	Read, write, order and compare positive and negative real numbers (integers, decimals, and fractions)			Lessons 8, 11	Lessons 40, 42	
M1.1.14	Interpret and use scientific notation					
M1.2.1	Mentally add and subtract positive whole numbers less than 20					

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M1.2.2	Add and subtract positive multi-digit numbers, including decimal numbers		Lessons 30, 37, 38, 39, 40, 41, 42, 44, 46, 47, 48, 49, 50	Lessons 9, 27, 28, 29, 30, 33, 34, 38, 41	Lessons 17, 22	Lessons 5, 6, 8
M1.2.3	Recognize when a problem situation requires addition or subtraction with multi-digit positive integers and decimal numbers, carry out the computation, and interpret the answer in context			Lessons 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 31, 37, 40	Lesson 36	
M1.2.4	Use the inverse relationship between addition and subtraction to write problem statements and to check computation (e.g., add back to check subtraction)		Lessons 8, 9, 10	Lessons 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 31, 37, 40		
M1.2.5	Use the commutative property of addition to restate problems (e.g., $34.2 + 6 = 6 + 34.2$) and recognize the proper order to write subtraction problems and enter them into a calculator		Lesson 45			
M1.2.6	Add and subtract fractions and mixed numbers, including those with unlike denominators					Lesson 25
M1.2.7	Recognize when a problem situation requires adding and/or subtracting with fractions and mixed numbers, carry out the computation, and interpret the answer in context					Lessons 25, 33, 36
M1.2.8	Use estimation strategies to determine reasonable answers to addition and subtraction problems involving integers, decimal numbers and fractions					
M1.2.9	Express the result of adding and subtracting to the level of precision indicated by the problem (e.g., as in measurements)					
M1.3.1	Mentally double all integers to 20 and halve even integers to 20				Lessons 27, 28, 30, 31	
M1.3.2	Know multiplication facts for integers through 12 and recognize their perfect squares				Lessons 27, 28, 30, 31	
M1.3.3	Mentally multiply and divide numbers by 10, 100, 1000				Lesson 29	
M1.3.4	Identify integers that are multiples of 2, 3, 4, 5, or 10					Lessons 29, 30
M1.3.5	Find factors of whole numbers to 100 (e.g., 36 is divisible by 1, 2, 3, 4, 6, 9, 12 and 18; 37 is prime)					Lessons 29, 30
M1.3.6	Recognize when a problem situation requires multiplying and/or dividing with multi-digit positive integers and decimal numbers, carry out the computation, and interpret the answer in context				Lessons 34, 35, 36	Lessons 11, 15, 16, 21, 22

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M1.3.7	Use the inverse relationship of multiplication and division to write problem statements and to check a calculation (e.g., multiply back to check division)				Lesson 33	
M1.3.8	Express the result of multiplying and dividing to the level of precision indicated by the problem					
M1.3.9	Use the context to determine whether the answer to a division problem should be rounded off or if the remainder should be expressed as a fraction (e.g., currency contexts usually do not use fractions)					
M1.3.10	Use fractional notation to indicate division (e.g., $6 \div 11 = 6/11$; $12 \div 4 = 12 \times 1/4$)					
M1.3.11	Find fractional parts of whole numbers and/or decimal numbers (e.g., $1/4$ of the \$8.3 million budget)					Lesson 32
M1.3.12	Recognize when a problem situation requires multiplying and/or dividing with fractions and mixed numbers, carry out the computation, and interpret the answer in context					
M1.3.13	Use estimation strategies to determine reasonable answers to multiplication and division problems involving integers, decimal numbers and fractions (e.g., rounding to nearest multiple, benchmark fractions)					
M1.3.14	Use the commutative property of multiplication to restate problems (e.g., $20 \times 0.25 = 1/4 \times 20$) and recognize the proper order to write a division problem and to enter it into a calculator				Lesson 37	
M1.3.15	Use the distributive property of multiplication over addition (e.g., $4(136) = 4(100 + 30 + 6)$)				Lesson 37	
M1.3.16	Use exponential notation to indicate repeated multiplication, as in squaring and cubing					
M1.3.17	Read, write and interpret the radical sign ($\sqrt{\quad}$) for square roots and ($\sqrt[3]{\quad}$) for cube roots					
M1.4.1	Recognize comparisons between quantities in situations that can be expressed as a ratio (e.g., he makes 3 out of 5 free throws) and those that can't (e.g., their final score of 11 was 4 more than the opponent's score)					
M1.4.2	Write and solve proportions for situations where two ratios are equal (e.g., currency conversion)					
M1.4.3	Find the percent equivalents to fractions and decimals					

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M1.4.4	Know the percent equivalent to common benchmark fractions (e.g., 1/2, 1/4, 3/4, 1/10, 1/5) and use them interchangeably for solving problems					
M1.4.5	Mentally find 10% and 1% of an integer or decimal number					
M1.4.6	Estimate percentages of numbers by using benchmark percents (10%, 25%, 50%) or combinations of them (e.g., 31% of 89 \approx 3(10% of 90) = 27)					
M1.4.7	Calculate a missing value from a percent relationship – the percentage, the percent, or the base – using paper and pencil or a calculator					
M1.4.8	Understand and solve problems using percents greater than 100% and less than 1%					
M1.4.9	Calculate percent of change (increase or decrease) in a variety of situations, including those involving money					
M1.5.1	Determine when and how to split up a problem into simpler parts					
M1.5.2	Apply strategies and results from simpler problems to more complex problems					
M1.5.3	Use a calculator when appropriate					
M2 ALGEBRA						
M2.1.1	Recognize the identity, commutative, associative and distributive properties for addition and multiplication as they apply in arithmetic procedures				Lesson 37	
M2.1.2	Use tables and algebraic expressions to generalize recurring numeric patterns (e.g., find the rule) and in contextual situations (e.g., seating at different-sized banquet tables)				Lesson 44	Lesson 40
M2.1.3	Find the n th term in the sequence in a functional relationship and predict how changes in one quantity will affect another					
M2.1.4	Apply the correct order of operations					
M2.2.1	Use notational conventions such as parentheses and the various ways of representing multiplication					
M2.2.2	Interpret symbols $<$, $>$, \neq and use them to express number relationships					
M2.2.3	Recognize and interpret the different meanings and uses of variables (e.g., $2x + 1 = 7$; $y = 2x + 1$; $A = l \times w$; $a + -a = 0$)					

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M2.2.4	Evaluate expressions that include unknowns by substituting specific values for variables					
M2.2.5	Use the distributive property and combine like terms to simplify an expression ($5x + 3y - 2x = 3x + 3y$) and to factor ($3x + 3y = 3(x + y)$)					
M2.2.6	Apply the commutative and associative properties of addition and multiplication to rewrite expressions				Lesson 37	
M2.2.7	Add, subtract, multiply and divide polynomial expressions					
M2.2.8	Solve simple one-step equations with unknowns (e.g., $n - 7 = 9$; $3x = 24$)				Lesson 33	
M2.2.9	Use inverse operations and properties of equality to justify steps used in simplifying and solving more complex linear equations					
M2.2.10	Solve problems involving life-skill-related and technical formulas (e.g., $\text{units} \times \text{price} = \text{cost}$; $d = r \times t$; $V = l \times R$)					
M2.2.11	Use substitution to check the solution of an equation					
M2.2.12	Solve inequalities					
M2.2.13	Solve systems of linear equations					
M2.2.14	Apply the Pythagorean theorem					
M2.2.15	Solve quadratic equations					
M2.3.1	Interpret and write expressions and equations for simple contextual math situations					
M2.3.2	Place positive and negative numbers on a number line, and relate them to direction and change					
M2.3.3	Add, subtract, multiply and divide positive and negative numbers					
M2.3.4	Use absolute value in contextual situations emphasizing a number's magnitude					
M2.3.5	Interpret and write expressions and equations representing contextual situations, including those that involve fractions, decimals, percents and negative numbers					
M2.3.6	Generate a table of values from an equation in two variables					
M2.3.7	Demonstrate understanding of the Cartesian coordinate system by locating and plotting points (x, y) and creating a coordinate plane by drawing the axes and establishing a scale					

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M2.3.8	Determine the slope of a line and relate it to the rate of change in one quantity with respect to the other					
M2.3.9	Use a graph to answer questions about functional relationships between independent and dependent variables					
M2.3.10	Write the equation of a line given two points, or a slope and a single point					
M2.3.11	Plot more than one equation on the same plane and find their intersections					
M2.3.12	Graph a linear function					
M2.3.13	Graph non-linear functions (quadratic, rational, exponential) and compare rates of change					
M2.3.14	Make graphs of direct and indirect proportions from contextual situations with attention to the domain and range of each					
M2.3.15	Interpret algebraic concepts and terminology used at the secondary level to solve computationally and conceptually challenging multi-step problems					
M3 GEOMETRY						
M3.1.1	Identify lines of symmetry in two-dimensional figures					
M3.1.2	Draw two-dimensional shapes with specific dimensions					
M3.1.3	Identify and describe specific types of triangles based on their properties (e.g., right, acute, scalene, isosceles, equilateral)			Lesson 45		
M3.1.4	Recognize and use the property that the interior angles of a triangle have a sum of 180 degrees					
M3.1.5	Identify and describe specific types of quadrilaterals based on their properties (e.g., rectangle, square, parallelogram, rhombus).	Lesson 57		Lesson 45		
M3.1.6	Recognize and use the property that the angles of a quadrilateral have a sum of 360 degrees				Lesson 54	
M3.1.7	Identify polygons of various types			Lesson 45	Lesson 54	
M3.1.8	Identify elements of a circle: center, radius, diameter, arc, chord, sector					
M3.1.9	Identify various types of common three-dimensional shapes			Lesson 45		
M3.1.10	Interpret concepts of similarity, and identify figures that are similar or congruent					

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M3.1.11	Use concepts and attributes of geometric shapes to find unknown dimensions in figures and applications				Lesson 54	
M3.2.1	Identify parallel, perpendicular and intersecting lines					Lessons 54, 55
M3.2.2	Describe characteristics of angles formed by two intersecting lines, including complementary and supplementary angles					Lesson 55
M3.2.3	Describe characteristics of angles formed by a transversal intersecting parallel lines					
M3.2.4	Demonstrate understanding of the 360-degree system of measuring angles and rotation					Lesson 55
M3.2.5	Use benchmark angles of 45, 90 and 180 degrees to estimate the size of angles					Lesson 55
M3.2.6	Identify rotations of 90, 180, 270 and 360 degrees as $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, full					Lesson 55
M3.2.7	Identify angles as right, acute and obtuse					Lessons 54, 55
M3.2.8	Measure or draw an angle using a protractor					Lesson 55
M3.2.9	Use reasoning to determine the size of unknown angles in complex drawings					
M3.3.1	Use the four main (N, S, E, W) and secondary (e.g., NW) compass directions for spatial orientation					
M3.3.2	Use a map with a coordinate grid (e.g., locate C5)					
M3.3.3	Enlarge or reduce similar figures, keeping them proportional					
M3.3.4	Combine, divide, rotate, reconfigure or transform shapes to alter figures and change their position on a coordinate grid					
M3.3.5	Locate or position items in a two-dimensional coordinate system (e.g., in a diagram of a building)					
M3.3.6	Recognize or create a three-dimensional object from a two-dimensional representation (e.g., follow a pattern)					
M3.3.7	Recognize and draw two-dimensional views of three-dimensional objects from different perspectives					
M4 MEASUREMENT						
M4.1.1	Identify and use the appropriate units, instruments and techniques for measurement tasks		Lesson 55	Lesson 47		Lesson 55
M4.1.2	Read and use linear scales (e.g., a ruler, tape measure, metric rule, thermometer)					

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M4.1.3	Read the temperature from a thermometer in degrees Fahrenheit or Celsius					
M4.1.4	Read and use analog scales (e.g., on clocks, meters, gauges)				Lesson 50	
M4.1.5	Read and use digital scales (e.g., on digital clocks, odometers)				Lesson 50	
M4.1.6	Read and use various indicators of time (e.g., place dates on a time line, interpret numeric representations, compare 12 and 24-hour clocks)				Lesson 50	
M4.1.7	Use non-standard measurement methods (e.g., using an object as a measure)					
M4.1.8	Compare the measure of one object to another (e.g., this is about 3 times as long as that; about 6 of these will fit in there)			Lessons 14, 36		
M4.1.9	Use specialized measurement tools in contextual situations					
M4.1.10	Make rough-estimate approximations of measurements			Lesson 48	Lesson 47	
M4.1.11	Recognize level of accuracy required in a given measurement situation in terms of precision, rounding, etc.					
M4.2.1	Calculate with and convert between customary US units of linear measurement: inches, feet, yards, miles					Lessons 22, 36, 45, 46, 53, 56
M4.2.2	Calculate with and convert between metric units of linear measurement: meters, centimeters, millimeters, kilometers					Lessons 22, 36, 45, 46, 53, 56
M4.2.3	Estimate equivalents between customary US and metric units of linear measure					
M4.2.4	Compare linear measurements, including in decimal notation (e.g., tolerances)					
M4.2.5	Calculate with and convert between customary US units of weight: ounces, pounds, tons					Lessons 22, 36, 45, 46, 53, 56
M4.2.6	Calculate with and convert between metric units of weight: grams, kilograms, milligrams				Lesson 47	Lessons 22, 36, 45, 46, 53, 56
M4.2.7	Estimate equivalents between customary US and metric units of weight					
M4.2.8	Calculate with and convert between customary US units of capacity: fluid ounces, cups, pints, quarts, gallons				Lesson 47	Lessons 22, 36, 45, 46, 53, 56
M4.2.9	Calculate with and convert between metric units of capacity: liters, milliliters				Lesson 47	Lessons 22, 36, 45, 46, 53, 56
M4.2.10	Estimate equivalents between customary US and metric units of capacity					

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M4.2.11	Calculate with and compare temperatures, including those below zero					
M4.2.12	Estimate equivalents between Fahrenheit and Celsius temperatures					
M4.2.13	Calculate with and convert between units of time: seconds, minutes, hours, days, months, years					Lessons 22, 36, 45, 46, 53, 56
M4.2.14	Use decimal placement and metric prefixes to convert like units (e.g., mm, cm, m; mg, g, kg)					Lessons 22, 36, 45, 46, 53, 56
M4.3.1	Demonstrate understanding of the concept of two and three-dimensional measurements, and square and cubic units					
M4.3.2	Calculate perimeter of rectangles and other common figures				Lesson 55	
M4.3.3	Calculate circumference of a circle, using a given formula					
M4.3.4	Calculate area of rectangles and other common figures, using a given formula				Lesson 55	
M4.3.5	Estimate area of curved shapes					
M4.3.6	Calculate volume and surface area of rectangular and other common shapes, using a given formula					
M4.3.7	Calculate area or volume of irregular or composite shapes by dividing the figure into parts					
M4.3.8	Interpret the exponential relationship of linear measure, area and volume (e.g., ft., sq. ft., cu. ft.)					
M4.3.9	Apply measurement in three-dimensional scale modeling					
M4.4.1	Interpret scale drawings (e.g., blueprints, maps)					
M4.4.2	Interpret and use proportions in solving problems involving dimensions or scale					
M4.4.3	Plan linear spacing in a design (e.g., the arrangement of shelves to fit in a cabinet)					
M4.4.4	Plan a layout (e.g., how many pieces of a specific shape can fit in a space)					
M4.5.1	Interpret, calculate and apply rates involving time, such as velocity (e.g., mi/hr, ft/sec, m/sec), frequency (e.g., calls/hr), consumption (e.g., cal/day, kW/hr), flow (e.g., gal/min), change (e.g., degrees/min, inches/year)					

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M4.5.2	Interpret, calculate and apply rates (e.g., cents/min, \$/sq. ft., mi/gal)					
M4.5.3	Use averaging in calculating rates (e.g., average speed)					
M4.5.4	Demonstrate understanding and solve problems involving the interrelation of distance, time and speed					
M4.5.5	Estimate time, distance and speed in travel situations					
M4.5.6	Estimate equivalents between mph and km/h					
M5 STATISTICS, DATA ANALYSIS AND PROBABILITY						
M5.1.1	Identify, count and extract relevant data in lists, tables and charts		Lesson 57		Lessons 52, 53	
M5.1.2	Collect, label, sort and order numerical information for a particular purpose (e.g., to count and list stock, keep a log, construct a schedule)		Lesson 51			
M5.1.3	Use a tally to record numerical information					
M5.1.4	Use or construct a table to record and present numerical information					
M5.1.5	Use or construct a table that provides for calculation of data (e.g., units × price; totals, subtotals)					
M5.1.6	Construct a graph or other visual representation of data			Lessons 54, 57	Lessons 52, 53	
M5.1.7	Present data in different interpretations (e.g., as percentages, difference, change)					
M5.1.8	Demonstrate how selection and presentation of data can be oriented for audience and purpose and can influence perceptions and conclusions (e.g., changing the scale on the graph can change the perceived message)					
M5.2.1	Extract and compare information from scatterplots and pictographs, as well as bar, circle and line graphs			Lessons 54, 57	Lessons 52, 53	
M5.2.2	Compare information from multiple plottings on the same graph			Lessons 54, 57		
M5.2.3	Find summary statistics of a data set, including the mean, median, mode and range, and determine how changes in the extreme values affect each of them					
M5.2.4	Demonstrate how the spread of data is a factor in determining whether mean or median should be used as a measure of central tendency					

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M5.2.5	Interpret the language of distribution in statistics (e.g., percentiles, quartiles, standard deviation) and use it to describe and communicate data					
M5.2.6	Make simple generalizations about a data set, including recognizing clusters and more/less contrasts and identifying trends					
M5.2.7	Compare different samples or groupings (e.g., age, gender) in a data set, or compare individual pieces of data to an overall set or average					
M5.2.8	Express data relationships in terms of ratios, fractions or percent (e.g., 3 to 1 ratio; 3 out of 4; 75%)					
M5.2.9	Make observations, evaluate arguments, and draw conclusions based on statistical reasoning, recognizing the distinction between causation and correlation					
M5.2.10	Identify constraints on extending data to make predictions					
M5.2.11	Use computer programs to assist in compiling and analyzing data					
M5.2.12	Recognize when data sets can be viably compared and when they cannot					
M5.2.13	Interpret the concepts and implications of sampling and randomization in surveys					
M5.3.1	Find all the possible outcomes (sample space) by systematically figuring the possible combinations and/or permutations of a number of elements in practical situations					
M5.3.2	Determine the probability of certain simple events (e.g., in the results of tossing a coin or rolling a die) and express the likelihood of an occurrence as a ratio fraction or a percent					
M5.3.3	Identify possible outcomes involving compound events and determine the probability of their occurrence by considering whether the events are independent (e.g., rolling one die multiple times) or conditional (choosing 2 aces from a deck of cards)					
M5.3.4	Apply the rules of probability to real-world events (e.g., risk of injury when not wearing seat belts), recognizing the importance of assumptions of randomness and independence of attributes when reading media reports					

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M1 NUMBER SENSE						
M1.1.1	Associate numbers with quantities					
M1.1.2	Count with whole numbers					
M1.1.3	Count by 2s, 5s, and 10s up to 100					
M1.1.4	Recognize odd and even numbers					
M1.1.5	Understand the decimal place value system: read, write, order and compare whole and decimal numbers (e.g., $0.13 > 0.013$ because $13/100 > 13/1000$)	Lessons 36, 37, 38				
M1.1.6	Round off numbers to the nearest 10, 100, 1000 and/or to the nearest whole number, tenth, hundredth or thousandth according to the demands of the context	Lesson 37				
M1.1.7	Using place value, compose and decompose numbers with up to 5 digits and/or with three decimal places (e.g., $54.8 = 5 \times 10 + 4 \times 1 + 8 \times 0.1$)					
M1.1.8	Interpret and use a fraction in context (e.g., as a portion of a whole area or set)					
M1.1.9	Find equivalent fractions and simplify fractions to lowest terms	Lessons 25, 34				
M1.1.10	Use common fractions to estimate the relationship between two quantities (e.g., $31/179$ is close to $1/6$)					
M1.1.11	Convert between mixed numbers and improper fractions					
M1.1.12	Use common fractions and their decimal equivalents interchangeably					
M1.1.13	Read, write, order and compare positive and negative real numbers (integers, decimals, and fractions)					
M1.1.14	Interpret and use scientific notation				Lessons 7, 8, 9	
M1.2.1	Mentally add and subtract positive whole numbers less than 20					
M1.2.2	Add and subtract positive multi-digit numbers, including decimal numbers	Lessons 1, 39, 40	Lessons 18, 19			
M1.2.3	Recognize when a problem situation requires addition or subtraction with multi-digit positive integers and decimal numbers, carry out the computation, and interpret the answer in context	Lessons 1, 39, 40	Lessons 18, 19			
M1.2.4	Use the inverse relationship between addition and subtraction to write problem statements and to check computation (e.g., add back to check subtraction)					

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M1.2.5	Use the commutative property of addition to restate problems (e.g., $34.2 + 6 = 6 + 34.2$) and recognize the proper order to write subtraction problems and enter them into a calculator					
M1.2.6	Add and subtract fractions and mixed numbers, including those with unlike denominators					
M1.2.7	Recognize when a problem situation requires adding and/or subtracting with fractions and mixed numbers, carry out the computation, and interpret the answer in context	Lessons 32, 33, 35	Lesson 14			
M1.2.8	Use estimation strategies to determine reasonable answers to addition and subtraction problems involving integers, decimal numbers and fractions	Lesson 37				
M1.2.9	Express the result of adding and subtracting to the level of precision indicated by the problem (e.g., as in measurements)					
M1.3.1	Mentally double all integers to 20 and halve even integers to 20					
M1.3.2	Know multiplication facts for integers through 12 and recognize their perfect squares					
M1.3.3	Mentally multiply and divide numbers by 10, 100, 1000					
M1.3.4	Identify integers that are multiples of 2, 3, 4, 5, or 10					
M1.3.5	Find factors of whole numbers to 100 (e.g., 36 is divisible by 1, 2, 3, 4, 6, 9, 12 and 18; 37 is prime)					
M1.3.6	Recognize when a problem situation requires multiplying and/or dividing with multi-digit positive integers and decimal numbers, carry out the computation, and interpret the answer in context	Lessons 1, 14, 39, 40	Lessons 11, 18, 19			
M1.3.7	Use the inverse relationship of multiplication and division to write problem statements and to check a calculation (e.g., multiply back to check division)					
M1.3.8	Express the result of multiplying and dividing to the level of precision indicated by the problem					
M1.3.9	Use the context to determine whether the answer to a division problem should be rounded off or if the remainder should be expressed as a fraction (e.g., currency contexts usually do not use fractions)					
M1.3.10	Use fractional notation to indicate division (e.g., $6 \div 11 = 6/11$; $12 \div 4 = 12 \times 1/4$)	Lesson 35				
M1.3.11	Find fractional parts of whole numbers and/or decimal numbers (e.g., $1/4$ of the \$8.3 million budget)	Lesson 31	Lesson 15			

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M1.3.12	Recognize when a problem situation requires multiplying and/or dividing with fractions and mixed numbers, carry out the computation, and interpret the answer in context	Lessons 31, 35	Lessons 13, 15, 16			
M1.3.13	Use estimation strategies to determine reasonable answers to multiplication and division problems involving integers, decimal numbers and fractions (e.g., rounding to nearest multiple, benchmark fractions)	Lesson 53	Lessons 35, 36			
M1.3.14	Use the commutative property of multiplication to restate problems (e.g., $20 \times 0.25 = \frac{1}{4} \times 20$) and recognize the proper order to write a division problem and to enter it into a calculator					
M1.3.15	Use the distributive property of multiplication over addition (e.g., $4(136) = 4(100 + 30 + 6)$)	Lesson 12	Lesson 12			
M1.3.16	Use exponential notation to indicate repeated multiplication, as in squaring and cubing				Lessons 4, 5	Lesson 54
M1.3.17	Read, write and interpret the radical sign ($\sqrt{\quad}$) for square roots and ($\sqrt[3]{\quad}$) for cube roots				Lessons 3, 6	Lesson 3
M1.4.1	Recognize comparisons between quantities in situations that can be expressed as a ratio (e.g., he makes 3 out of 5 free throws) and those that can't (e.g., their final score of 11 was 4 more than the opponent's score)		Lesson 34			
M1.4.2	Write and solve proportions for situations where two ratios are equal (e.g., currency conversion)		Lessons 35, 36, 37, 38, 39	Lessons 35, 36, 37, 38, 39		
M1.4.3	Find the percent equivalents to fractions and decimals		Lessons 35, 36	Lessons 9, 11, 12		
M1.4.4	Know the percent equivalent to common benchmark fractions (e.g., $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{10}$, $\frac{1}{5}$) and use them interchangeably for solving problems					
M1.4.5	Mentally find 10% and 1% of an integer or decimal number		Lessons 35, 36			
M1.4.6	Estimate percentages of numbers by using benchmark percents (10%, 25%, 50%) or combinations of them (e.g., $31\% \text{ of } 89 \approx 3(10\% \text{ of } 90) = 27$)		Lessons 35, 36			
M1.4.7	Calculate a missing value from a percent relationship – the percentage, the percent, or the base – using paper and pencil or a calculator		Lesson 39	Lessons 35, 36, 37		
M1.4.8	Understand and solve problems using percents greater than 100% and less than 1%		Lessons 37, 38, 39	Lessons 35, 36, 37, 38, 39		

Standard	Math Standard Description	Learning Upgrade Math: Grade 5	Learning Upgrade Math: Grade 6	Learning Upgrade Math: Grade 7	Learning Upgrade Math: Grade 8	Learning Upgrade Math: Algebra
M1.4.9	Calculate percent of change (increase or decrease) in a variety of situations, including those involving money		Lessons 37, 38	Lessons 38, 39		
M1.5.1	Determine when and how to split up a problem into simpler parts			Lesson 33	Lesson 28	Lesson 26
M1.5.2	Apply strategies and results from simpler problems to more complex problems			Lesson 33	Lesson 28	Lesson 26
M1.5.3	Use a calculator when appropriate					
M2 ALGEBRA						
M2.1.1	Recognize the identity, commutative, associative and distributive properties for addition and multiplication as they apply in arithmetic procedures					
M2.1.2	Use tables and algebraic expressions to generalize recurring numeric patterns (e.g., find the rule) and in contextual situations (e.g., seating at different-sized banquet tables)					
M2.1.3	Find the n th term in the sequence in a functional relationship and predict how changes in one quantity will affect another		Lesson 35		Lessons 21, 39	Lessons 13, 57
M2.1.4	Apply the correct order of operations					
M2.2.1	Use notational conventions such as parentheses and the various ways of representing multiplication	Lessons 46, 47				
M2.2.2	Interpret symbols $<$, $>$, \neq and use them to express number relationships		Lessons 27, 28, 29, 30			
M2.2.3	Recognize and interpret the different meanings and uses of variables (e.g., $2x + 1 = 7$; $y = 2x + 1$; $A = l \times w$; $a + -a = 0$)		Lessons 21, 22, 23, 30, 32, 33	Lessons 28, 29, 31		
M2.2.4	Evaluate expressions that include unknowns by substituting specific values for variables		Lessons 21, 22, 23, 32, 33			
M2.2.5	Use the distributive property and combine like terms to simplify an expression ($5x + 3y - 2x = 3x + 3y$) and to factor ($3x + 3y = 3(x + y)$)		Lessons 27, 28, 29, 30			
M2.2.6	Apply the commutative and associative properties of addition and multiplication to rewrite expressions		Lessons 27, 28, 29, 30			
M2.2.7	Add, subtract, multiply and divide polynomial expressions					Lessons 33, 35, 36, 37, 48
M2.2.8	Solve simple one-step equations with unknowns (e.g., $n - 7 = 9$; $3x = 24$)		Lessons 31, 32, 33	Lessons 23, 24, 26, 27		

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M2.2.9	Use inverse operations and properties of equality to justify steps used in simplifying and solving more complex linear equations				Lessons 3, 6	
M2.2.10	Solve problems involving life-skill-related and technical formulas (e.g., $\text{units} \times \text{price} = \text{cost}$; $d = r \times t$; $V = l \times R$)		Lesson 35	Lessons 23, 24, 26, 27	Lesson 59	Lesson 59
M2.2.11	Use substitution to check the solution of an equation		Lesson 31			
M2.2.12	Solve inequalities		Lessons 7, 31	Lessons 23, 24, 26, 27, 28, 29, 31		Lesson 12
M2.2.13	Solve systems of linear equations			Lessons 29, 31	Lessons 14, 15, 32, 33, 34	Lessons 12, 30, 31, 32
M2.2.14	Apply the Pythagorean theorem				Lessons 51, 52	
M2.2.15	Solve quadratic equations			Lesson 22		
M2.3.1	Interpret and write expressions and equations for simple contextual math situations			Lessons 14, 16, 18, 19, 20, 21, 22, 28, 29, 31	Lesson 39	Lessons 1, 4, 5, 6, 7, 11, 12, 13, 47, 54
M2.3.2	Place positive and negative numbers on a number line, and relate them to direction and change		Lessons 2, 3, 4, 5	Lessons 2, 6, 7	Lessons 2, 3	
M2.3.3	Add, subtract, multiply and divide positive and negative numbers			Lessons 2, 6, 7, 9, 11, 12		
M2.3.4	Use absolute value in contextual situations emphasizing a number's magnitude		Lesson 8			
M2.3.5	Interpret and write expressions and equations representing contextual situations, including those that involve fractions, decimals, percents and negative numbers			Lessons 21, 22, 29		Lessons 11, 12, 13
M2.3.6	Generate a table of values from an equation in two variables		Lesson 35		Lesson 58	
M2.3.7	Demonstrate understanding of the Cartesian coordinate system by locating and plotting points (x, y) and creating a coordinate plane by drawing the axes and establishing a scale	Lesson 48	Lessons 6, 8, 49	Lesson 33	Lesson 28	Lesson 26
M2.3.8	Determine the slope of a line and relate it to the rate of change in one quantity with respect to the other		Lesson 39	Lessons 35, 36, 37	Lessons 28, 29, 56, 57	
M2.3.9	Use a graph to answer questions about functional relationships between independent and dependent variables				Lessons 21, 35, 36, 38, 39	Lessons 13, 54, 57
M2.3.10	Write the equation of a line given two points, or a slope and a single point		Lesson 39	Lessons 35, 36, 37	Lessons 56, 57	
M2.3.11	Plot more than one equation on the same plane and find their intersections					

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M2.3.12	Graph a linear function				Lessons 16, 18, 19, 38	
M2.3.13	Graph non-linear functions (quadratic, rational, exponential) and compare rates of change				Lessons 11, 16, 18, 19, 35, 36, 38	Lessons 54, 57
M2.3.14	Make graphs of direct and indirect proportions from contextual situations with attention to the domain and range of each				Lessons 11, 28, 29, 35, 36, 39	Lessons 10, 27, 28, 29
M2.3.15	Interpret algebraic concepts and terminology used at the secondary level to solve computationally and conceptually challenging multi-step problems					
M3 GEOMETRY						
M3.1.1	Identify lines of symmetry in two-dimensional figures					
M3.1.2	Draw two-dimensional shapes with specific dimensions					
M3.1.3	Identify and describe specific types of triangles based on their properties (e.g., right, acute, scalene, isosceles, equilateral)					
M3.1.4	Recognize and use the property that the interior angles of a triangle have a sum of 180 degrees					
M3.1.5	Identify and describe specific types of quadrilaterals based on their properties (e.g., rectangle, square, parallelogram, rhombus).	Lessons 57, 58				
M3.1.6	Recognize and use the property that the angles of a quadrilateral have a sum of 360 degrees	Lessons 57, 58				
M3.1.7	Identify polygons of various types	Lessons 57, 58				
M3.1.8	Identify elements of a circle: center, radius, diameter, arc, chord, sector					
M3.1.9	Identify various types of common three-dimensional shapes			Lesson 47		
M3.1.10	Interpret concepts of similarity, and identify figures that are similar or congruent				Lessons 44, 45, 46, 47, 48	
M3.1.11	Use concepts and attributes of geometric shapes to find unknown dimensions in figures and applications		Lessons 43, 49, 50	Lesson 47		
M3.2.1	Identify parallel, perpendicular and intersecting lines				Lesson 46	
M3.2.2	Describe characteristics of angles formed by two intersecting lines, including complementary and supplementary angles			Lesson 46	Lesson 46	
M3.2.3	Describe characteristics of angles formed by a transversal intersecting parallel lines			Lesson 46		

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M3.2.4	Demonstrate understanding of the 360-degree system of measuring angles and rotation					
M3.2.5	Use benchmark angles of 45, 90 and 180 degrees to estimate the size of angles					
M3.2.6	Identify rotations of 90, 180, 270 and 360 degrees as $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, full					
M3.2.7	Identify angles as right, acute and obtuse					
M3.2.8	Measure or draw an angle using a protractor					
M3.2.9	Use reasoning to determine the size of unknown angles in complex drawings			Lesson 46		
M3.3.1	Use the four main (N, S, E, W) and secondary (e.g., NW) compass directions for spatial orientation					
M3.3.2	Use a map with a coordinate grid (e.g., locate C5)	Lesson 48				
M3.3.3	Enlarge or reduce similar figures, keeping them proportional			Lesson 42		
M3.3.4	Combine, divide, rotate, reconfigure or transform shapes to alter figures and change their position on a coordinate grid					
M3.3.5	Locate or position items in a two-dimensional coordinate system (e.g., in a diagram of a building)					
M3.3.6	Recognize or create a three-dimensional object from a two-dimensional representation (e.g., follow a pattern)		Lessons 43, 49, 50			
M3.3.7	Recognize and draw two-dimensional views of three-dimensional objects from different perspectives					
M4 MEASUREMENT						
M4.1.1	Identify and use the appropriate units, instruments and techniques for measurement tasks					
M4.1.2	Read and use linear scales (e.g., a ruler, tape measure, metric rule, thermometer)					
M4.1.3	Read the temperature from a thermometer in degrees Fahrenheit or Celsius					
M4.1.4	Read and use analog scales (e.g., on clocks, meters, gauges)					
M4.1.5	Read and use digital scales (e.g., on digital clocks, odometers)					
M4.1.6	Read and use various indicators of time (e.g., place dates on a time line, interpret numeric representations, compare 12 and 24-hour clocks)					

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M4.1.7	Use non-standard measurement methods (e.g., using an object as a measure)					
M4.1.8	Compare the measure of one object to another (e.g., this is about 3 times as long as that; about 6 of these will fit in there)					
M4.1.9	Use specialized measurement tools in contextual situations					
M4.1.10	Make rough-estimate approximations of measurements					
M4.1.11	Recognize level of accuracy required in a given measurement situation in terms of precision, rounding, etc.					
M4.2.1	Calculate with and convert between customary US units of linear measurement: inches, feet, yards, miles	Lesson 50				
M4.2.2	Calculate with and convert between metric units of linear measurement: meters, centimeters, millimeters, kilometers	Lesson 50				
M4.2.3	Estimate equivalents between customary US and metric units of linear measure		Lesson 39	Lessons 35, 36, 37		
M4.2.4	Compare linear measurements, including in decimal notation (e.g., tolerances)					
M4.2.5	Calculate with and convert between customary US units of weight: ounces, pounds, tons	Lesson 50				
M4.2.6	Calculate with and convert between metric units of weight: grams, kilograms, milligrams	Lesson 50				
M4.2.7	Estimate equivalents between customary US and metric units of weight					
M4.2.8	Calculate with and convert between customary US units of capacity: fluid ounces, cups, pints, quarts, gallons	Lesson 50				
M4.2.9	Calculate with and convert between metric units of capacity: liters, milliliters	Lesson 50				
M4.2.10	Estimate equivalents between customary US and metric units of capacity					
M4.2.11	Calculate with and compare temperatures, including those below zero		Lesson 8			
M4.2.12	Estimate equivalents between Fahrenheit and Celsius temperatures		Lessons 35, 36			
M4.2.13	Calculate with and convert between units of time: seconds, minutes, hours, days, months, years	Lesson 50				

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M4.2.14	Use decimal placement and metric prefixes to convert like units (e.g., mm, cm, m; mg, g, kg)	Lesson 50				
M4.3.1	Demonstrate understanding of the concept of two and three-dimensional measurements, and square and cubic units	Lesson 54				
M4.3.2	Calculate perimeter of rectangles and other common figures					
M4.3.3	Calculate circumference of a circle, using a given formula			Lesson 45		
M4.3.4	Calculate area of rectangles and other common figures, using a given formula			Lesson 45		
M4.3.5	Estimate area of curved shapes			Lesson 42		
M4.3.6	Calculate volume and surface area of rectangular and other common shapes, using a given formula	Lesson 54		Lesson 47	Lesson 53	
M4.3.7	Calculate area or volume of irregular or composite shapes by dividing the figure into parts			Lesson 47		
M4.3.8	Interpret the exponential relationship of linear measure, area and volume (e.g., ft., sq. ft., cu. ft.)			Lesson 47		
M4.3.9	Apply measurement in three-dimensional scale modeling					
M4.4.1	Interpret scale drawings (e.g., blueprints, maps)			Lesson 42		
M4.4.2	Interpret and use proportions in solving problems involving dimensions or scale			Lesson 42		
M4.4.3	Plan linear spacing in a design (e.g., the arrangement of shelves to fit in a cabinet)			Lesson 42		
M4.4.4	Plan a layout (e.g., how many pieces of a specific shape can fit in a space)			Lessons 42, 47		
M4.5.1	Interpret, calculate and apply rates involving time, such as velocity (e.g., mi/hr, ft/sec, m/sec), frequency (e.g., calls/hr), consumption (e.g., cal/day, kW/hr), flow (e.g., gal/min), change (e.g., degrees/min, inches/year)		Lessons 34, 35, 36	Lessons 33, 34	Lessons 28, 29	
M4.5.2	Interpret, calculate and apply rates (e.g., cents/min, \$/sq. ft., mi/gal)		Lessons 34, 35, 36, 37, 38	Lessons 33, 34, 38, 39		
M4.5.3	Use averaging in calculating rates (e.g., average speed)			Lessons 33, 34		
M4.5.4	Demonstrate understanding and solve problems involving the interrelation of distance, time and speed			Lessons 33, 34	Lesson 11	Lessons 54, 57
M4.5.5	Estimate time, distance and speed in travel situations			Lesson 33	Lesson 28	Lesson 26
M4.5.6	Estimate equivalents between mph and km/h		Lessons 35, 36			

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M5 STATISTICS, DATA ANALYSIS AND PROBABILITY						
M5.1.1	Identify, count and extract relevant data in lists, tables and charts					
M5.1.2	Collect, label, sort and order numerical information for a particular purpose (e.g., to count and list stock, keep a log, construct a schedule)					
M5.1.3	Use a tally to record numerical information					
M5.1.4	Use or construct a table to record and present numerical information					
M5.1.5	Use or construct a table that provides for calculation of data (e.g., units × price; totals, subtotals)					
M5.1.6	Construct a graph or other visual representation of data	Lesson 25	Lessons 53, 55, 56		Lessons 54, 55, 58	
M5.1.7	Present data in different interpretations (e.g., as percentages, difference, change)				Lesson 58	
M5.1.8	Demonstrate how selection and presentation of data can be oriented for audience and purpose and can influence perceptions and conclusions (e.g., changing the scale on the graph can change the perceived message)			Lesson 33	Lessons 28, 56, 57	Lesson 26
M5.2.1	Extract and compare information from scatterplots and pictographs, as well as bar, circle and line graphs				Lessons 28, 29, 54, 55, 57, 58	
M5.2.2	Compare information from multiple plottings on the same graph					
M5.2.3	Find summary statistics of a data set, including the mean, median, mode and range, and determine how changes in the extreme values affect each of them		Lesson 51	Lessons 48, 49		
M5.2.4	Demonstrate how the spread of data is a factor in determining whether mean or median should be used as a measure of central tendency		Lessons 53, 54, 57	Lessons 48, 49		
M5.2.5	Interpret the language of distribution in statistics (e.g., percentiles, quartiles, standard deviation) and use it to describe and communicate data				Lesson 58	
M5.2.6	Make simple generalizations about a data set, including recognizing clusters and more/less contrasts and identifying trends				Lessons 56, 58	

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M5.2.7	Compare different samples or groupings (e.g., age, gender) in a data set, or compare individual pieces of data to an overall set or average			Lessons 50, 51, 52, 53		
M5.2.8	Express data relationships in terms of ratios, fractions or percent (e.g., 3 to 1 ratio; 3 out of 4; 75%)			Lessons 54, 55		
M5.2.9	Make observations, evaluate arguments, and draw conclusions based on statistical reasoning, recognizing the distinction between causation and correlation			Lessons 52, 53		
M5.2.10	Identify constraints on extending data to make predictions					
M5.2.11	Use computer programs to assist in compiling and analyzing data					
M5.2.12	Recognize when data sets can be viably compared and when they cannot					
M5.2.13	Interpret the concepts and implications of sampling and randomization in surveys			Lessons 50, 51		
M5.3.1	Find all the possible outcomes (sample space) by systematically figuring the possible combinations and/or permutations of a number of elements in practical situations			Lessons 58, 59		
M5.3.2	Determine the probability of certain simple events (e.g., in the results of tossing a coin or rolling a die) and express the likelihood of an occurrence as a ratio fraction or a percent			Lessons 54, 55, 56, 57		
M5.3.3	Identify possible outcomes involving compound events and determine the probability of their occurrence by considering whether the events are independent (e.g., rolling one die multiple times) or conditional (choosing 2 aces from a deck of cards)			Lessons 58, 59		
M5.3.4	Apply the rules of probability to real-world events (e.g., risk of injury when not wearing seat belts), recognizing the importance of assumptions of randomness and independence of attributes when reading media reports					