

## Grades 4-8 Math Outcomes Map

Topics	4 <sup>th</sup> Grade	5 <sup>th</sup> Grade	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
<b>Numbers &amp; Numeration</b>	<ul style="list-style-type: none"> <li>○ Read and write numbers up to 1,000,000,000</li> <li>○ Read and write decimals through thousandths</li> <li>○ Translate between whole numbers and decimals in words and numerals</li> <li>○ Read, write, and model fractions</li> <li>○ Solve problems involving fractions of a collection</li> <li>○ Find Multiples of whole numbers less than 10</li> <li>○ Find whole number factors of numbers</li> <li>○ Use numerical expressions involving the four arithmetic operations and grouping symbols to give equivalent names for whole numbers.</li> <li>○ Use numerical expressions to find and represent equivalent names for fractions and decimals</li> <li>○ Use a multiplication rule to find equivalent fractions</li> <li>○ Rename fourths, fifths, tenths, and hundredths as decimals and percents</li> <li>○ Compare and order whole numbers up to 1,000,000,000 and decimals through thousandths</li> </ul>	<ul style="list-style-type: none"> <li>○ Read and write whole numbers to the 100,000,000,000 place and decimals to the thousandths place.</li> <li>○ round whole numbers and decimals</li> <li>○ use expanded notation to represent whole numbers and decimals</li> <li>○ identify prime and composite numbers</li> <li>○ factor numbers</li> <li>○ find prime factorization</li> <li>○ use numerical expressions involving one or more of the basic four arithmetic operations, grouping symbols and exponents to give equivalent names for whole numbers</li> <li>○ convert between fractions, decimals, and percentages</li> <li>○ convert fractions to simplest forms</li> <li>○ convert between mixed numbers and improper fractions</li> <li>○ compare and order fractions and mixed numbers</li> </ul>	<ul style="list-style-type: none"> <li>~Understand the representations, uses, and meanings of               <ul style="list-style-type: none"> <li>○ Positive and negative rational numbers</li> <li>○ Connect the model, number word, and number using a variety of representation, including a number line</li> <li>○ Compare and order Fractions and percentages</li> <li>○ Connect the model, number word, and number using a variety of representation</li> </ul> </li> <li>~Understand equivalent names for numbers (i.e. large and small numbers) using               <ul style="list-style-type: none"> <li>○ Exponential notation</li> <li>○ Scientific notation</li> <li>○ Standard notation</li> </ul> </li> <li>~Understand numerical relations               <ul style="list-style-type: none"> <li>○ Using factors</li> <li>○ Multiples</li> <li>○ Exponential notation</li> <li>○ Prime factorization</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>○ Understand the representations, uses, and meanings of               <ul style="list-style-type: none"> <li>• Ratios</li> <li>• Proportions</li> <li>• Percentages</li> </ul> </li> <li>○ Understand equivalent names for numbers (i.e. large and small numbers)</li> <li>○ Understand numerical relations (properties i.e. associative, commutative, identify, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>○ Understand the representations, uses, and meanings of               <ul style="list-style-type: none"> <li>• Rational numbers and Irrational numbers</li> </ul> </li> <li>○ Understand equivalent names for numbers (i.e. large and small numbers/scientific notation)</li> </ul>

	<ul style="list-style-type: none"> <li>○ Compare and order integers between -100 and 0</li> <li>○ Use area models, benchmark fractions, and numerators and denominators to compare and order fractions</li> </ul>				
<b>Operations &amp; Computation</b>	<ul style="list-style-type: none"> <li>○ Demonstrate automaticity with basic addition and subtraction facts</li> <li>○ Use manipulatives, mental arithmetic, and algorithms to solve problems involving the addition and subtraction of whole numbers and decimals</li> <li>○ Demonstrate automaticity with multiplication facts through <math>10 \times 10</math> and proficiency with related division facts</li> <li>○ Use basic facts to compute extensions such as <math>30 \times 60</math></li> <li>○ Use mental arithmetic, paper and pencil algorithms to solve problems involving the multiplication of multi digit whole numbers by 3-digit whole numbers and divide multi digit whole numbers by 1-digit whole numbers</li> <li>○ Use manipulatives and mental arithmetic to solve problems involving the addition and subtraction of fractions with like and unlike denominators</li> <li>○ Make reasonable estimates for whole number and decimal addition and subtraction problems, and whole number multiplication and division problems</li> </ul>	<ul style="list-style-type: none"> <li>○ solve problems involving addition and subtraction of whole numbers and decimals round whole numbers and decimals</li> <li>○ demonstrate automaticity with multiplication facts and proficiency with division facts</li> <li>○ solve problems involving the multiplication of whole numbers and decimals</li> <li>○ solve problems involving division of multi digit whole numbers and decimals by whole numbers</li> <li>○ solve division with remainders in solution</li> <li>○ solve division with decimals in solution</li> <li>○ solve problems involving addition and subtraction of fractions and mixed numbers</li> <li>○ find common denominators</li> <li>○ multiply fractions</li> </ul>	<p>~Compute accurately with non-negative rational numbers</p> <ul style="list-style-type: none"> <li>○ Addition</li> <li>○ Subtraction</li> <li>○ Multiplication</li> <li>○ Division</li> </ul> <p>~Make reasonable estimates</p> <ul style="list-style-type: none"> <li>○ When computing non-negative and negative rational numbers</li> <li>○ When computing fractions and percentages</li> <li>○ When estimating the results of computations</li> </ul> <p>~Understand meanings of operations by being able to:</p> <ul style="list-style-type: none"> <li>○ Judge the reasonableness of a solution in computations</li> <li>○ Describe the effect and operations on size</li> </ul>	<ul style="list-style-type: none"> <li>○ Compute accurately with all rational numbers <ul style="list-style-type: none"> <li>● Addition</li> <li>● Subtraction</li> <li>● Multiplication</li> <li>● Division</li> </ul> </li> <li>○ Make reasonable estimates in computations of rational numbers <ul style="list-style-type: none"> <li>● Analyzing the reasonableness of a solution</li> <li>● Analyzing computational strategies</li> </ul> </li> <li>○ Understand meanings of operations by being able to <ul style="list-style-type: none"> <li>● Describe the effect of an operation on an outcome</li> <li>● Develop flexibility in solving problems by selecting strategies and using mental computation and estimation</li> <li>● PEMDAS- understand and be able to apply correct order of operations</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>○ Compute accurately with all rational and irrational numbers <ul style="list-style-type: none"> <li>● Addition</li> <li>● Subtraction</li> <li>● Multiplication</li> <li>● Division</li> </ul> </li> <li>○ Make reasonable estimates in irrational numbers in appropriate situations</li> <li>○ Students will understand meanings of operations <ul style="list-style-type: none"> <li>● PEMDAS- understand and be able to apply correct order of operations</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Use repeated addition, skip counting, arrays, area, and scaling to model multiplication and division</li> </ul>				
<b>Data &amp; Chance</b>	<ul style="list-style-type: none"> <li>○ Collect and organize data or use given data to create charts, tables, bar graphs, line plots, and line graphs</li> <li>○ Use the maximum, minimum, range, median, mode, and graphs to ask and answer questions, draw conclusions, and make predictions</li> <li>○ Describe events using certain, very likely, likely, unlikely, impossible, and other basic probability terms</li> <li>○ Use more likely, equally likely, same chance, 50-50, less likely, and other basic probability terms to compare events</li> <li>○ Predict the outcomes of experiments and test the predictions using manipulative</li> <li>○ Summarize the results and use them to predict future events</li> <li>○ Express the probability of an event as a fraction</li> </ul>	<ul style="list-style-type: none"> <li>○ collect and organize data to create bar, line, and circle graphs</li> <li>○ find maximum, minimum, range, median, mode, and mean in a data set</li> <li>○ describe events as certain, very likely, likely, unlikely, very unlikely, impossible, and other basic probability terms</li> <li>○ express probability in percentages, fractions, or decimals</li> </ul>	<p>~Select and create appropriate graphical representations of collected or given data</p> <ul style="list-style-type: none"> <li>○ Tree diagrams</li> <li>○ Pie graphs</li> <li>○ Stem-leaf graph</li> <li>○ Bar graphs</li> <li>○ Line graphs</li> </ul> <p>~Analyze and interpret data</p> <ul style="list-style-type: none"> <li>○ Tree diagrams</li> <li>○ Pie graphs</li> <li>○ Stem-leaf graph</li> <li>○ Bar / Line graphs</li> </ul> <p>~Understand and apply basic concepts of probability by</p> <ul style="list-style-type: none"> <li>○ Using a sample space to identify probability</li> <li>○ Conduct experiments involving simple and compound events, then determine and compare the experimental and theoretical probabilities</li> <li>○ Conduct experiments involving independent and dependent events, then determine and compare the experimental and theoretical probabilities</li> </ul>	<ul style="list-style-type: none"> <li>○ Select and create appropriate graphical representations of collected or given data to <ul style="list-style-type: none"> <li>● Analyze data in histograms to solve problems</li> <li>● Analyze data in box plots to solve problems</li> </ul> </li> <li>○ Analyze, interpret, calculate, describe and identify data <ul style="list-style-type: none"> <li>● Including the mean, median, mode, and range</li> <li>● Including outliers and the effect the outlier has on the data (mean, median, mode, range)</li> <li>● Solving problems involving two or more sets of data using appropriate statistical measures</li> </ul> </li> <li>○ Understand and apply basic concepts of probability</li> </ul>	<ul style="list-style-type: none"> <li>○ Select and create appropriate graphical representations of collected or given data to <ul style="list-style-type: none"> <li>● Scatter plots</li> <li>● Matrices</li> </ul> </li> <li>○ Analyze, interpret, calculate, describe and identify data <ul style="list-style-type: none"> <li>● Finding the best fit line for a given scatter plot</li> <li>● Explaining the meaning of the line as it relates to the problem</li> <li>● In matrices</li> </ul> </li> <li>○ Understand basic concepts of probability <ul style="list-style-type: none"> <li>● Make predictions based on the best fit line</li> <li>● Identify misuses of statistical and numerical data</li> </ul> </li> </ul>
<b>Measurement &amp; Reference Frames</b>	<ul style="list-style-type: none"> <li>○ Estimate length with and without tools</li> <li>○ Measure length to the nearest <math>\frac{1}{4}</math> inch and <math>\frac{1}{2}</math> centimeter</li> <li>○ Estimate the size of angles without tools</li> <li>○ Describe and use</li> </ul>	<ul style="list-style-type: none"> <li>○ estimate length in US customary and metric units</li> <li>○ measure length to the nearest <math>\frac{1}{8}</math> inch and millimeter</li> <li>○ estimate angles</li> <li>○ measure angles</li> </ul>	<p>~Understand the systems and processes of measurement; use appropriate techniques, tools, units, and formulas in making measurements of</p> <ul style="list-style-type: none"> <li>● Length</li> <li>● Perimeter</li> <li>● Area</li> <li>● Angles</li> <li>● Weight</li> <li>● Mass</li> </ul>	<ul style="list-style-type: none"> <li>○ Understand the systems and processes of measurement; use appropriate techniques, tools, units, and formulas by <ul style="list-style-type: none"> <li>● Drawing objects to scale</li> <li>● Using scale drawings to solve problems</li> </ul> </li> <li>○ Use both the Metric system and English system</li> </ul>	<ul style="list-style-type: none"> <li>○ Understand the systems and processes of measurement; use appropriate techniques, tools, units, and formulas</li> <li>○ Determine the effect on perimeter, area and volume when one or more dimensions of <ul style="list-style-type: none"> <li>● A two-dimensional figures are changed</li> <li>● A three-dimensional figures are changed</li> </ul> </li> </ul>

	<p>strategies to measure the perimeter and area of polygons</p> <ul style="list-style-type: none"> <li>○ Estimate the area of irregular shapes</li> <li>○ Find the volume of rectangular prisms</li> <li>○ Describe relationships among U.S. customary units of length and among metric units of length</li> <li>○ Use ordered pairs of numbers to name, locate, and plot points in the first quadrant of a coordinate grid</li> </ul>	<ul style="list-style-type: none"> <li>○ find the perimeter of polygons</li> <li>○ find the areas of rectangles, parallelograms, triangles and circles</li> <li>○ find the volume of a prism</li> <li>○ define pi as the ratio of a circle's circumference to its diameter</li> <li>○ describe relationships between US customary units of length</li> <li>○ describe relationships between metric units of length</li> <li>○ use ordered pairs to locate points on a coordinate grid</li> </ul>	<p>~Practice using both the metric system and English system</p> <p>~Convert from Metric to English and vice versa</p>		<ul style="list-style-type: none"> <li>○ Apply and use concepts of indirect measurement</li> </ul>
<p style="text-align: center;"><b>Geometry</b></p>	<ul style="list-style-type: none"> <li>○ Identify, draw, and describe points, intersecting and parallel line segments and lines, rays, and right, acute, and obtuse angles</li> <li>○ Describe, compare, and classify plane and solid figures, including polygons, circles, spheres, cylinders, rectangular prisms, cones, cubes, and pyramids</li> <li>○ Use appropriate geometric terms such as vertex, base, face, edge, and congruent</li> <li>○ Identify, describe, and sketch examples of reflections</li> <li>○ Identify and describe examples of translations and</li> </ul>	<ul style="list-style-type: none"> <li>○ identify, describe, compare, name and draw right, acute, obtuse, straight, and reflex angles</li> <li>○ describe, compare, and classify plane and solid figures by their geometric properties</li> </ul>	<p>~Investigate characteristics and properties of two-and three-dimensional geometric shapes by being able to</p> <ul style="list-style-type: none"> <li>○ Measuring and estimating the length, perimeter, area, angles, weight and mass of two-and three dimensional shapes</li> <li>○ Solve problems of involving perimeter/circumference and area of plane figures</li> <li>○ Identify and describe the intersection of figures in a plane</li> <li>○ Identify and determine the relationship between the radius, diameter, chord, center, and circumference of a circle</li> <li>○ Solve problems involving geometric figures in a coordinate plane</li> </ul> <p>~Apply transformations and symmetry in geometric situations by being able to</p>	<ul style="list-style-type: none"> <li>○ Investigate characteristics and properties of two-dimensional geometric shapes by being able to <ul style="list-style-type: none"> <li>● Identify, describe and draw from various views (top, side, front, corner)</li> <li>● Build from various views</li> <li>● Identify and describe similar and congruent polygons <ul style="list-style-type: none"> <li>○ Angle measure</li> <li>○ Length of sides</li> <li>○ Proportionality of sides</li> </ul> </li> </ul> </li> <li>○ Apply transformations and symmetry in geometric situations by being able to <ul style="list-style-type: none"> <li>● Use scaling and proportional reasoning to solve problems related to similar and congruent polygons.</li> </ul> </li> <li>○ Understand and write</li> </ul>	<ul style="list-style-type: none"> <li>○ Investigate characteristics and properties of three-dimensional geometric shapes by being able to <ul style="list-style-type: none"> <li>● Properly use the Pythagorean Theorem</li> <li>● Apply knowledge of specific shapes, i.e. squares, rectangles, triangles, and circles</li> <li>● Identify measurements of angles and side lengths</li> <li>● Apply proportions to similar shapes to identify the measurements of angles and side lengths</li> </ul> </li> <li>○ Apply dilations in geometric situations by being able to <ul style="list-style-type: none"> <li>● Identify, describe and predict dilations</li> </ul> </li> </ul>

	rotations		<ul style="list-style-type: none"> <li>○ Transform figures in a coordinate plane</li> <li>○ Describe the transformation of a figure in a coordinate plane</li> </ul>	<ul style="list-style-type: none"> <li>● If-then statements</li> <li>● Converse of if-then statements</li> </ul> <ul style="list-style-type: none"> <li>○ Identify and evaluate absolute value equations</li> </ul>	
<b>Functions, Patterns &amp; Algebra</b>	<ul style="list-style-type: none"> <li>○ Extend, describe, and create numeric patterns</li> <li>○ Describe rules for patterns and use them to solve problems</li> <li>○ Use words and symbols to describe and write rules for functions that involve the four basic arithmetic operations and use the rules to solve problems</li> <li>○ Use conventional notation to write expressions and number sentences using the four basic arithmetic operations</li> <li>○ Determine whether number sentences are true or false</li> <li>○ Solve open sentences and explain the solutions</li> <li>○ Write expressions and number sentences to model number stories</li> <li>○ Evaluate numeric expressions containing grouping symbols</li> <li>○ Insert grouping symbols to make number sentences true</li> <li>○ Apply the Distributive Property of Multiplication over Addition to the partial-products multiplication algorithm</li> </ul>		<ul style="list-style-type: none"> <li>~Patterns and functions</li> <li>○ Identity</li> <li>○ Commutative</li> <li>○ Associative</li> <li>○ Distributive</li> <li>○ Order of operations</li> <li>~Evaluating algebraic equations</li> <li>○ Solve simple (one and two step) algebraic equations</li> <li>○ Solve simple (one and two step) algebraic inequalities</li> <li>~Use algebraic notation to represent and analyze situations and structures by being able to</li> <li>○ Use graphs, tables and symbols to model and solve problems involving rates and changes and ratios</li> </ul>	<ul style="list-style-type: none"> <li>○ Understand patterns and functions</li> <li>○ In linear relations and sequences</li> <li>○ In functions using graphs, tables, diagrams, and written descriptions</li> <li>○ Use and evaluate algebraic equations</li> <li>○ Using linear equalities and inequalities to solve problems</li> <li>○ Solve algebraic two-step equations</li> <li>○ Use algebraic notation to represent and analyze situations and structures by being able to</li> <li>○ Model fluency in the use of formulas to solve problems</li> <li>○ Understand and be able to graph</li> <li>○ Points in a coordinate plane</li> <li>○ Basic linear equations in a coordinate plane</li> <li>○ Inequalities on a number line</li> </ul>	<ul style="list-style-type: none"> <li>○ Understand patterns and functions <ul style="list-style-type: none"> <li>● Translate tabular, verbal, graphic and algebraic representations of functions</li> <li>● Identify functions as linear or non-linear</li> <li>● Identify slope of linear functions</li> <li>● Identify intercepts of a linear function</li> <li>● Interpret and compare properties of a linear function</li> </ul> </li> <li>○ Solve algebraic equations using inverse operations of <ul style="list-style-type: none"> <li>● Addition and subtraction</li> <li>● Multiplication and division</li> <li>● Squares and square roots</li> <li>● Cubes and cube roots</li> </ul> </li> <li>○ Write algebraic equations <ul style="list-style-type: none"> <li>● Given two points</li> <li>● Given the slope and one point of a line</li> <li>● Given the slope and y-intercept of a line</li> </ul> </li> <li>○ Use algebraic notation to represent and analyze situations and structures by being able to solve algebraic problems and justify answers both graphically and symbolically <ul style="list-style-type: none"> <li>● Using linear equations</li> <li>● Using Linear inequalities</li> </ul> </li> </ul>