

Grades 6-7-8 Mathematics Scope and Sequence

Wallingford Public Schools

The district's Scope and Sequence was revised to align with the Connecticut State Department of Education's Math Curriculum Frameworks, released in September, 2005. Every effort was made to write the objectives in a clear fashion and be true to the intent of the Frameworks.

The Scope and Sequence is organized around the four domains (Numerical and Proportional Reasoning, Algebraic Reasoning, Geometry and Measurement, Working with Data) in the CSDE Frameworks, but each domain has been divided into subsections. The first strand, Problem Solving, is a "process strand" and is meant to be integrated throughout all of the other content strands in every grade level. Each strand includes Enduring Understandings that span the three grade levels. Each grade level will write their own essential Questions to address these "big ideas" through the specific objectives at that grade.

1. Problem Solving

Numerical and Proportional Reasoning:

2. Order & Magnitude
3. Equivalent Forms
4. Place Value Patterns
5. Ratios, Proportions & Percents
6. Operations

Algebraic Reasoning:

7. Patterns & Functions
8. Expressions, Equations, and Solution Methods

Geometry and Measurement:

9. Spatial Relationships
10. Similarity, Congruence, & Transformations
11. Measurement

Working with Data:

12. Graphs & Statistics
13. Probability

Each strand begins with several Enduring Understandings to guide instruction towards the "big ideas". These Enduring Understandings take time to develop and span the three grades. The primary and major instructional objectives for each grade are listed first. Below these are the 4th Generation Connecticut Mastery Test Objectives that align with the particular strand. These CMT objectives, having been introduced and developed at least one year earlier, should be formatively assessed and reinforced. As such, they are meant to be integrated within lessons throughout the year and are tested for "mastery" in March of each grade.

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1. PROBLEM SOLVING

This learning strand is a process strand rather than a content strand and is taught through the integration of the other learning strands. This learning strand is not meant to be taught in isolation as a separate unit and should be taught within every content strand.

<u>ENDURING UNDERSTANDINGS</u>	<u>ESSENTIAL QUESTIONS</u>
<ul style="list-style-type: none">• A problem solver understands what has been done, knows why the process was appropriate, and can support it with reasons and evidence.• There can be different strategies to solve a problem, but some are more effective and efficient than others are.• The context of a problem determines the reasonableness of a solution.• There may be more than one solution to a problem.	<ul style="list-style-type: none">• How do I know where to begin when solving a problem?• How does explaining my process help me to understand a problem's solution better?• How do I decide what strategy will work best in a given problem situation?• What do I do when I get stuck?• How does finding the common characteristics among similar problems help me to be a more efficient problem solver?• How do I know when a result is reasonable?• What is the relationship between solving problems and computation?
<ol style="list-style-type: none">1.1 Distinguish between given information, unknown information, and assumptions that may be necessary.1.2 Identify different strategies to solve a problem (table, diagram, number pattern, etc.).1.3 Devise a plan to solve the problem.1.4 Apply an appropriate strategy(ies) to solve a problem.1.5 Use a variety of computational strategies (mental computation, paper-and-pencil, and calculator) to solve multi-step word and practical problems.1.6 Explain orally and in writing when a situation requires an exact answer or when an estimate is sufficient.1.7 Justify the strategy and solution with mathematical reasoning and evidence.1.8 Analyze strategies used to solve a problem.1.9 Judge the reasonableness of a solution for a problem using estimation and context.1.10 Communicate the solution and the strategies used to solve the problem in oral and/or written form.1.11 Pose problems from given situations	

Grade 6 CMT Objectives*	Grade 7 CMT Objectives*	Grade 8 CMT Objectives*
<p>5a. Identify the appropriate operation or number sentence to solve a story problem.</p> <p>5b. Write story problems from equations involving fractions and decimals, including money amounts, using all operations</p> <p>9a. Solve one-step story problems involving whole numbers, decimals and money amounts with or without extraneous information.</p> <p>9b. Solve two-step story problems involving whole numbers, decimals, fractions and money amounts without extraneous information.</p> <p>9c. Solve two-step problems involving whole numbers and decimals with extraneous information.</p> <p>9d. Solve two-step problems involving whole numbers, decimals, and money amounts and EXPLAIN how the answer was determined.</p> <p>25a. Solve extended numerical, statistical, and spatial problems.</p>	<p>5a. Identify the appropriate operation or number sentence to solve a story problem.</p> <p>5b. Write a story problem from an equation.</p> <p>9a. Solve one-step story problems involving whole numbers, fractions, decimals and money amounts with or without extraneous information.</p> <p>9b. Solve multi-step problems involving fractions and mixed numbers with or without extraneous information.</p> <p>9c. Solve multi-step problems involving whole numbers and decimals (including money amounts) and mixed numbers, including means.</p> <p>9d. Solve multi-step problems involving whole numbers, decimals or money amounts and EXPLAIN how the solution was determined.</p> <p>25a. Solve extended numerical, statistical, and spatial problems.</p>	<p>5a. Identify the appropriate operation or equation to solve a story problem.</p> <p>5b. Write a story problem from an equation.</p> <p>9a. Solve multi-step problems involving fractions, mixed numbers and decimals (including money amounts) with and without extraneous information.</p> <p>9b. Solve multi-step problems involving whole numbers, mixed numbers and decimals (including money amounts).</p> <p>9c. Solve multi-step problems involving whole numbers, decimals or money amounts and EXPLAIN how the solution was determined.</p> <p>25a. Solve extended numerical, statistical, and spatial problems.</p>

* The number/letter codes for the CMT objectives are the actual codes used in the CMT to designate the strand and objective.

2. NUMERICAL AND PROPORTIONAL REASONING: Order & Magnitude

<u>ENDURING UNDERSTANDINGS</u>		
<ul style="list-style-type: none"> • Each real number can be associated with a unique point on the number line. • Whole numbers, fractions, decimals and integers can be modeled on number lines, scales, and the coordinate plane (and used to solve problems.) 		
Grade 6	Grade 7	Grade 8
<p>2.1. Use number lines, scales and the coordinate grid to locate and order whole numbers, fractions, mixed numbers, and decimals (10^{ths} to $1,000^{\text{ths}}$).</p> <p>2.2. Explore negative whole numbers in real world situations.</p> <p>2.3. Locate integers on the number lines.</p>	<p>2.1. Compare, locate, and order rational numbers and percents on number lines, scales, coordinate grids and measurement tools.</p> <p>2.2. Compare, locate and order integers on the number line.</p>	<p>2.1. Compare, locate, and order rational numbers and percents on number lines, scales, coordinate grids and measurement tools.</p> <p>2.2. Compare, locate, and order integers, powers and square roots on the number line.</p>
<p><u>CMT objectives</u></p> <p>4a. Order whole numbers up to 6 digits and decimals (tenths, hundredths).</p> <p>4b. Order fractions, decimals and mixed numbers.</p> <p>4c. Describe the magnitude of whole numbers up to 6 digits and decimals (tenths, hundredths).</p> <p>4d. Describe the magnitude of fractions and mixed numbers.</p> <p>4e. Round whole numbers up to 6 digits and decimals (tenths and hundredths) in context.</p> <p>4f. Identify points on number lines and scales, including fractions, decimals and integers.</p> <p>4g. Locate points on number lines and scales, including fractions, decimals and integers.</p>	<p><u>CMT objectives</u></p> <p>4a. Order whole numbers and decimals.</p> <p>4b. Order fractions and decimals including mixed numbers in context.</p> <p>4c. Describe the magnitude of whole numbers and decimals in and out of context.</p> <p>4d. Describe the magnitude or order of fractions or mixed numbers in context.</p> <p>4e. Round whole numbers, fractions and decimals in context.</p> <p>4f. Locate points on number lines and scales, including fractions, mixed numbers, decimals or integers.</p>	<p><u>CMT objectives</u></p> <p>4a. Order fractions and decimals including mixed numbers in context.</p> <p>4b. Describe the magnitude or order of mixed numbers, fractions and decimals in context.</p> <p>4c. Round mixed numbers, fractions and decimals in context.</p> <p>4d. Locate points on number lines and scales, including fractions, mixed numbers, decimals or integers.</p>

3. NUMERICAL AND PROPORTIONAL REASONING: Equivalent Forms

ENDURING UNDERSTANDINGS		
<ul style="list-style-type: none"> Any number or numerical expression can be represented in different ways but have the same value. Algorithms for operations with rational numbers use notions of equivalence to transform calculations into simpler ones. 		
Grade 6	Grade 7	Grade 8
<p>3.1. Use factor pairs to classify and understand the composition of a number (for example primes, composites, perfect squares).</p> <p>3.2. Use the relationships among factors, multiples, divisors, and products to work flexibly with numbers and solve problems.</p> <p>3.3. Use divisibility rules and patterns to simplify operations.</p> <p>3.4. Use the Fundamental Theorem of Arithmetic to solve problems.</p> <p>3.5. Use a variety of linear, area and ratio models to identify equivalent fractions and decimals.</p> <p>3.6. Determine the decimal equivalents of fractions.</p> <p>3.7. Recognize that multiplication by a unit fraction is equivalent to dividing by the fraction's denominator.</p> <p>3.8. Develop and use benchmarks that relate different forms of representations of rational numbers (fractions, decimals, and percents).</p>	<p>3.1. Rewrite a rational number in its equivalent fraction, decimal, ratio and percent forms with number patterns and common factors.</p> <p>3.2. Classify fractions as terminating or repeating decimals.</p> <p>3.3. Use the equivalency among fractional, decimal and percent forms to efficiently solve problems.</p>	<p>3.1. Select the appropriate equivalent notation forms of rational numbers to use in a particular situation (fraction, mixed number, improper fraction, decimal, ratio, percent, expanded form, powers of ten and scientific notation).</p> <p>3.2. Flexibly and fluently translate between a variety of equivalent forms of a number.</p>
<p>CMT Objectives</p> <p>2a. Relate fractions, mixed numbers, decimals and percents to their pictorial representations and vice versa.</p> <p>2b. Identify and shade fractional parts of regions or sets, decimals (tenths and hundredths) and mixed numbers in pictures.</p> <p>3a. Rename equivalent fractions and mixed numbers</p> <p>3b. Rename improper fractions and mixed numbers as equivalent decimals and vice versa.</p>	<p>CMT Objectives</p> <p>2a. Relate fractions, mixed numbers, decimals and percents to their pictorial representations and vice versa.</p> <p>2b. Identify and/or shade fractional parts of regions and sets, decimals and mixed numbers in pictures.</p> <p>3a. Rename fractions and mixed numbers as equivalent decimals and vice versa.</p> <p>3b. Rename fractions and decimals (up to 1.00) as equivalent percents and vice versa.</p>	<p>CMT Objectives</p> <p>3a. Rename fractions and mixed numbers as equivalent decimals and vice versa.</p> <p>3b. Rename fractions and decimals as equivalent percents and vice versa.</p> <p>3c. Identify and/or shade decimals, fractions or percents of regions or sets.</p>

4. NUMERICAL AND PROPORTIONAL REASONING: Place Value Patterns

ENDURING UNDERSTANDINGS		
<ul style="list-style-type: none"> Place value patterns with whole numbers and models may be used to extend notations with decimals, fractions and percent. Place value patterns may be expressed using exponents to write powers of ten. Very large and very small numbers may be written using scientific notation, which is based on powers of ten. 		
Grade 6	Grade 7	Grade 8
<p>4.1. Use place value patterns when multiplying and dividing decimals by 10, 100, 1000 and multiples of 10.</p> <p>4.2. Compare large numbers using standard form, expanded forms and powers of ten.</p> <p>4.3. Explore the use of exponents as a way to express a numerical value.</p> <p>4.4. Develop a variety of ways to estimate and calculate with large numbers.</p> <p>4.5. Use mental math to solve real life problems involving 100; 1,000; 10,000; 0.1 more or less than a given number.</p>	<p>4.1. Use powers of ten and positive exponents to express and compare magnitude of very large numbers and connect to scientific notation.</p> <p>4.2. Use a variety of methods to estimate and calculate with very large numbers.</p> <p>4.3. Calculate powers and square roots of numbers.</p> <p>4.4. Use mental math to solve real life problems involving 100; 1,000; 10,000; 0.1; 0.01 more or less than a given number.</p> <p>4.5. Explore alternative ways to express decimals in expanded form.</p>	<p>4.1. Use powers of ten and negative exponents to write decimals and fractions.</p> <p>4.2. Use powers of ten and positive/negative exponents to express and compare the magnitude of very large and very small numbers and connect to scientific notation.</p> <p>4.3. Find the results of multiplication and division with powers of ten using patterns in operating with exponents.</p> <p>4.4. Use exponential notation in order of operations, formulas, and applications.</p>
<p>CMT Objectives</p> <p>1a. Solve problems involving 100, 1000 or 10,000 more/less and 0.1 more/less than a given number.</p> <p>1b. Identify alternative forms of expressing whole numbers < 10,000 using expanded notation and regrouping.</p> <p>1c. Use place value concepts to identify and compare the magnitude and value of digits and numbers.</p> <p>7b. Multiply and divide whole numbers and decimals by 10, 100, and 1000.</p>	<p>CMT Objectives</p> <p>1a. Solve problems involving 0.1 more/less and 0.01 more/less than a given number.</p> <p>1b. Identify alternative forms of expressing whole numbers and decimals using expanded notation.</p> <p>1c. Identify alternative forms of expressing numbers using scientific notation.</p> <p>7c. Multiply and divide whole numbers and decimals by 10, 100, and 1000.</p>	<p>CMT Objectives</p> <p>1a. Identify alternative forms of expressing numbers using scientific notation.</p> <p>1a. Identify alternative forms of expressing numbers using scientific notation.</p> <p>7c. Multiply and divide whole numbers and decimals by 10, 100, 1000, 0.1 and 0.01 .</p>

5. NUMERICAL AND PROPORTIONAL REASONING: Ratios, Proportions & Percents

ENDURING UNDERSTANDINGS		
<ul style="list-style-type: none"> • Ratios help to make comparisons and describe quantitative relationships. • Proportional relationships express how quantities change in relationship to each other. • Percents can be used to make comparisons between groups of unequal size because each group is based on a ratio of parts per hundred. 		
Grade 6	Grade 7	Grade 8
<p>5.1. Describe the differences and similarities between fractions and ratios.</p> <p>5.2. Represent ratios in real world contexts that compare a part of a whole to the whole and parts of one set to parts of another.</p> <p>5.3. Use proportional reasoning to solve problems by building models and tables of simple equivalent ratios.</p> <p>5.4. Use ratios and proportions to calculate simple rate conversions.</p> <p>5.5. Use ratios and proportions to solve practical problems such as interpreting maps and scale drawings or identifying probability.</p> <p>5.6. Explain how a percent is a ratio based on 100.</p> <p>5.7. Estimate and find percents using benchmarks and number patterns.</p> <p>5.8. Use benchmarks such as 100%, 50%, 25%, and 10% to estimate and calculate percents.</p>	<p>5.1. Find equivalent forms of given ratios and rates to scale comparisons.</p> <p>5.2. Solve practical problems involving rates, scale factors, and mixtures with proportions.</p> <p>5.3. Find and interpret unit rates and use them to make comparisons.</p> <p>5.4. Use proportional reasoning to solve problems using tables, proportions, equations</p> <p>5.5. Use mental math strategies to solve percent problems using benchmarks for 1%, 5%, 10%, 25%, 50% and so on.</p> <p>5.6. Find percents, including percents greater than 100% and less than 1% using number patterns and the distributive property.</p> <p>5.7. Find what percent one amount is of another amount using a variety of strategies including when neither quantity is 100.</p> <p>5.8. Use proportions and percents to solve real world percent problems, including sales discount and tax problems.</p>	<p>5.1. Use mental math strategies to solve common percent problems such as 15% and 25% as well as 150% or 200% of a given number.</p> <p>5.2. Use proportions and equations to solve real world percent problems including, but not limited to, sales discount and tax problems.</p> <p>5.3. Solve percent problems involving percents that are more than 100% and less than 1%.</p> <p>5.4. Estimate and solve problems involving percent of increase and decrease in real world contexts.</p>
<p>CMT Objectives</p> <p>12a. Solve problems involving simple ratios.</p>	<p>CMT Objectives</p> <p>12a. Solve problems involving ratios.</p> <p>12b. Solve problems involving proportions in context.</p> <p>13a. Find percents of whole numbers and what percent a given number is of another number.</p> <p>13b. Solve 1-step problems involving percents in contexts.</p>	<p>CMT Objectives</p> <p>12a. Solve problems involving ratios.</p> <p>12b. Solve problems involving proportions in context.</p> <p>12c. Solve multi-step problems involving ratio or proportion and EXPLAIN how the solution was determined.</p> <p>13a. Find percents of whole numbers or the percent a given number is of another number.</p> <p>13b. Solve problems involving percents in contexts.</p>

6. NUMERICAL AND PROPORTIONAL REASONING: Operations

ENDURING UNDERSTANDINGS

- Each of the operations (addition, subtraction, multiplication, and division) has multiple concrete interpretations, and each operation is related to other operations.
- For a given set of numbers there are relationships that are always true for certain operations, and they are the rules that govern mathematical operations.
- The effects of operations with fractions and decimals are not always the same as operations with whole numbers.
- Numerical calculations can be approximated by replacing numbers with ones that are close and easy to compute with mentally.
- The numbers used to make an estimate determine whether the estimate is over or under the exact answer.

Grade 6	Grade 7	Grade 8
<p>6.1. Use calculators effectively to explore number relationships and to solve more complex problems.</p> <p>6.2. Use mental math strategies in estimation and computational situations.</p> <p>6.3. Investigate the need for order of operations in calculating a series of mathematical operations, including parentheses and exponents.</p> <p>6.4. Simplify expressions using order of operations and algebraic properties (associative, commutative, distributive, and identities).</p> <p>6.5. Use the factor/product relationships of composite numbers, multiples of 10, 100, and 1000 and divisibility rules to efficiently determine products and quotients.</p> <p>6.6. Add, subtract and multiply fractions and decimals using a variety of models and computational strategies.</p> <p>6.7. Determine the fractional part of a set using procedures connected to models.</p> <p>6.8. Represent division with decimals, fractions and mixed numbers as related to models and context.</p>	<p>6.1. Use calculators effectively to explore number relationships and to solve more complex problems.</p> <p>6.2. Use mental math strategies in estimation and computational situations.</p> <p>6.3. Use the order of operations and algebraic properties (associative, commutative, distributive, and identities) to compute and solve a variety of multi-step problems.</p> <p>6.4. Use the distributive property to multiply and divide mixed numbers and decimals.</p> <p>6.5. Use appropriate methods to divide by a fraction or a decimal.</p> <p>6.6. Develop the rules for operations with integers through explorations and activities with a variety of models and number lines.</p> <p>6.7. Explore the role of absolute value in operations with integers while solving problems involving distance.</p> <p>6.8. Calculate answers to multi-step problems efficiently and accurately with fractions, decimals, mixed numbers, improper fractions, ratios, proportions and percents.</p> <p>6.9. Estimate reasonable answers to computations with fractions, mixed numbers, decimals, and percents using a variety of</p>	<p>6.1. Use calculators effectively to explore number relationships and to solve more complex problems.</p> <p>6.2. Use mental math strategies in estimation and computational situations.</p> <p>6.3. Apply the order of operations, the distributive, associative, and commutative properties, identities and inverses to simplify computations with rational numbers when solving problems.</p> <p>6.4. Use the rules for exponents to multiply and divide with powers of ten, including negative exponents.</p> <p>6.5. Solve simple problems involving exponential growth through the exploration of patterns of exponential growth using tables and/or calculators.</p> <p>6.6. Solve a variety of problems involving integers, powers, roots, and scientific notation.</p> <p>6.7. Make and justify reasonable estimates to computations with fractions, mixed numbers, decimals, and percents.</p>

<p>6.9. Predict when products or quotients with fractions and decimals will yield a larger result than either factor.</p> <p>6.10. Create and solve a variety of problems involving fractions, decimals, mixed numbers, money and simple percents.</p> <p>6.11. Compare and contrast the use of a variety of estimation strategies such as flexible rounding, front-end and adjust, compatible numbers, and clustering.</p> <p>6.12. Estimate reasonable answers to computations with whole numbers, fractions, mixed number and decimals using a variety of strategies.</p> <p>6.13. Explain why an estimate will be more or less than the exact answer.</p>	<p>strategies.</p> <p>6.10. Explain why an estimate will be more or less than the exact answer.</p>	<p>6.8. Develop and use a variety of methods to estimate and calculate mentally with very large numbers and very small numbers.</p>
<p>CMT Objectives</p> <p>6a. Multiply and divide facts.</p> <p>7a. Add and subtract 2-, 3- and 4-digit whole numbers, money amounts and decimals.</p> <p>7c. Multiply and divide 2- and 3-digit whole numbers and money amounts by 1-digit numbers and 1-digit decimals (multiply only).</p> <p>7d. Identify the correct placement of the decimal point in multiplication and division of decimals by 1-digit numbers.</p> <p>8a. Add and subtract fractions and mixed numbers with reasonable and appropriate denominators.</p> <p>8b. Multiply whole numbers and fractions by fractions and mixed numbers.</p> <p>10a. Identify the best expression to find an estimate.</p> <p>10b. Identify whether and why a particular strategy will result in an overestimate or an underestimate.</p> <p>11a. Identify a reasonable estimate to a problem, including change.</p> <p>11b. Determine a reasonable estimate and describe the strategy used to arrive at the estimate.</p> <p>11c. Given an estimate, judge its reasonableness</p>	<p>CMT Objectives</p> <p>7a. Add and subtract 2-, 3- and 4-digit whole numbers, money amounts, and decimals.</p> <p>7b. Multiply and divide 2- and 3-digit whole numbers, money amounts and decimals by 1-digit numbers (multiply only).</p> <p>8a. Add and subtract fractions and mixed numbers with reasonable and appropriate denominators.</p> <p>8b. Multiply whole numbers and fractions by fractions and mixed numbers.</p> <p>8c. Add positive and negative integers (range -20 to +20).</p> <p>10a. Identify the best expression to find an estimate.</p> <p>10b. Identify whether and why a particular strategy will result in an overestimate or an underestimate.</p> <p>11a. Identify a reasonable estimate to a problem.</p> <p>11b. Determine a reasonable estimate and describe the strategy used to arrive at the estimate.</p> <p>11c. Given an estimate as a solution, judge its reasonableness and justify the decision.</p> <p>23b. Use order of operations.</p>	<p>CMT Objectives</p> <p>7a. Add and subtract 2-, 3- and 4-digit whole numbers, money amounts, and decimals.</p> <p>7b. Multiply 2- and 3-digit whole numbers, money amounts and decimals by 1- or 2-digit numbers and decimals.</p> <p>Divide 2- and 3-digit whole numbers, money amounts and decimals by 1-digit whole numbers and decimals.</p> <p>8a. Add and subtract fractions and mixed numbers with reasonable and appropriate denominators</p> <p>8b. Multiply whole numbers and fractions by fractions and mixed numbers</p> <p>8c. Add or multiply positive and negative integers.</p> <p>11a. Determine a reasonable estimate and describe the strategy used to arrive at the estimate.</p> <p>11b. Given an estimate as a solution for problems involving whole numbers, mixed numbers, decimals and percents, judge its reasonableness and then justify the</p>

and justify the decision.

decision.

7. ALGEBRAIC REASONING: Patterns and Functions

ENDURING UNDERSTANDINGS

- Patterns can be used to identify relationships and make generalizations
- Mathematical relationships may be represented and analyzed with the help of tables, graphs, equations and inequalities.

Grade 6	Grade 7	Grade 8
<p>7.1. Analyze numeric and geometric patterns.</p> <p>7.2. Use patterns to identify trends and justify predictions.</p> <p>7.3. Determine the nature of changes in linear relationships using graphs, tables and equations.</p> <p>7.4. Model a problem in context with a table of values, a graph and an expression or rule.</p> <p>7.5. Plot ordered pairs on a coordinate plane.</p>	<p>7.1. Generalize mathematical situations and patterns with algebraic expressions, equations and inequalities</p> <p>7.2. Identify the independent and dependent variables in a given situation.</p> <p>7.3. Recognize and explain when a graph should be continuous or a discrete set of points.</p> <p>7.4. Use graphs, tables, equations, and verbal descriptions to represent and analyze changes in linear and nonlinear relationships.</p> <p>7.5. Recognize that a linear relationship has a constant rate of change.</p> <p>7.6. Represent the relationship between two variables with ordered pairs on a coordinate plane.</p>	<p>7.1. Represent generalized patterns using algebraic expressions and equations.</p> <p>7.2. Identify relationships that are linear and nonlinear.</p> <p>7.3. Compare and contrast the properties of linear and nonlinear equations using tables, graphs, and equations within the context of real world situations.</p> <p>7.4. Recognize and solve problems of direct variation.</p> <p>7.5. Use tables, graphs and equations to represent mathematical relationships and real-world problems.</p> <p>7.6. Determine the constant rate of change in a linear relationship and recognize this as the slope of a line.</p> <p>7.7. Compare and contrast the graphs of lines with the same slope versus those with different slopes.</p> <p>7.8. Interpret slope and y-intercepts from contextual situations, graphs, and linear equations.</p>
<p>CMT Objectives</p> <p>22a. Identify the missing terms in a pattern or identify rules for given patterns using numbers and attributes.</p> <p>22b. Extend or complete patterns and state rules for given patterns using numbers and attributes.</p>	<p>CMT Objectives</p> <p>22a. Identify the missing terms in a pattern or identify rules for a given pattern using numbers and attributes.</p> <p>22b. Extend or complete patterns and state rules for given patterns using numbers and attributes.</p> <p>23d Represent situations with algebraic expressions.</p> <p>23e. Write an expression to represent a situation.</p>	<p>CMT Objectives</p> <p>22a. Identify the missing terms in a pattern or identify rules for a given pattern using numbers and attributes.</p> <p>22b. Extend or complete patterns and state rules for given patterns using numbers and attributes.</p> <p>23d. Represent situations with algebraic expressions or equations.</p> <p>23e. Write an expression to represent a situation.</p>

8. ALGEBRAIC REASONING: Expressions, Equations, and Solution Methods

ENDURING UNDERSTANDINGS

- Any algebraic expression or equation can be represented in equivalent ways.
- Algebraic methods (tables, graphs, equations and appropriate technology) can be used to solve real-world problems.
- The equivalence of both sides of an equation is maintained if the same value is added, subtracted, multiplied or divided on each side.

Grade 6	Grade 7	Grade 8
<p>8.1. Use variables as placeholders, to denote a pattern or to write a formula.</p> <p>8.2. Represent numerical and contextual situations with algebraic expressions, equations and inequalities.</p> <p>8.3. Evaluate algebraic expressions and formulas using substitution.</p> <p>8.4. Construct and complete simple function tables from rules and write rules from function tables</p> <p>8.5. Solve simple linear equations using materials that model equivalence such as a balance or guess-and-check.</p>	<p>8.1. Use variables and appropriate operations to write expressions.</p> <p>8.2. Justify the simplification of expressions by applying the commutative, associative, identity, and distributive properties.</p> <p>8.3. Model and solve one–step and two-step linear equations using a variety of formal and informal methods.</p> <p>8.4. Write equations to solve and model a variety of multi-step word problems.</p> <p>8.5. Create appropriate contextual problems from simple equations.</p> <p>8.6. Solve problems using concrete, verbal, symbolic, graphical and tabular representations.</p>	<p>8.1. Recognize and generate equivalent forms for simple algebraic expressions and equations using the commutative, associative, identity, and distributive properties.</p> <p>8.2. Use inverse operations to solve multi-step equations using algebraic properties.</p> <p>8.3. Use tables, graphs and equations to solve real-world problems.</p> <p>8.4. Write equations to solve and model a variety of multi-step word problems.</p> <p>8.5. Create appropriate contextual problems from given equations.</p> <p>8.6. Introduce the use of a graphing calculator to represent and to describe a linear function with tables, patterns, graphs and equations.</p> <p>8.7. Informally explore the common solution to two linear equations through a table of values, graphs and equations within the context of real world situations.</p>
<p><u>CMT Objectives</u></p> <p>23a. Solve simple one-step algebraic equations.</p> <p>23b. Evaluate equations, identify fact family relationships, and use formulas provided.</p>	<p><u>CMT Objectives</u></p> <p>23e. Write an expression to represent a situation.</p> <p>23a. Solve simple 1-step or 2-step algebraic equations.</p> <p>23c. Evaluate expressions or solve equations and use formulas.</p>	<p><u>CMT Objectives</u></p> <p>23e. Write an expression to represent a situation.</p> <p>23a. Solve simple equations, including 2-step equations.</p> <p>23b. Solve multi-step problems, using algebraic concepts</p> <p>23c. Evaluate expressions or solve equations and use formulas.</p>

9. GEOMETRY AND MEASUREMENT: Spatial Relationships

ENDURING UNDERSTANDINGS

- Two- and three-dimensional objects with or without curved surfaces can be described, classified, and analyzed by their attributes.
- Polygons can be described uniquely by their sides and angles.
- Polygons can be constructed from or decomposed into other polygons.
- There are special characteristics of lines or line segments in the plane that can be named, described and analyzed.

Grade 6	Grade 7	Grade 8
<p>9.1. Make and test conjectures about the relationships between angles and side lengths of polygons.</p> <p>9.2. Find patterns that help determine angle sums of polygons.</p> <p>9.3. Draw polygons with certain properties using appropriate tools.</p> <p>9.4. Explore parallel lines and angles created by lines intersecting.</p> <p>9.5. Use standard essential geometric vocabulary.</p>	<p>9.1. Use geometric relationships (such as parallel, perpendicular, congruent, angle measures) to describe the attributes of sets of and subsets of plane figures and solids.</p> <p>9.2. Construct various angles and polygons using a compass and straightedge.</p> <p>9.3. Use the relationship between the sides and angles of polygons to solve problems</p> <p>9.4. Draw and interpret cross-sections and front, side, and top views of various solids.</p> <p>9.5. Use standard essential geometric vocabulary.</p>	<p>9.1. Use the relationship between the sides and angles of polygons to solve problems</p> <p>9.2. Explore angle relationships including alternate interior, alternate exterior, corresponding, supplementary, complementary and vertical.</p> <p>9.3. Make and test conjectures about relationships among perimeters, areas, surface areas and volumes of congruent and similar polygons and solids.</p> <p>9.4. Relate two dimensional representations to the corresponding three-dimensional object.</p> <p>9.5. Investigate the Pythagorean Theorem by exploring the relationship of the sides of triangles and the area of squares constructed off each side.</p> <p>9.6. Use standard essential geometric vocabulary.</p>
<p><u>CMT Objectives</u></p> <p>17a. Identify and classify 2- and 3-dimensional geometric shapes and figures.</p> <p>17b. Draw, describe and classify 2-dimensional geometric shapes and figures.</p>	<p><u>CMT Objectives</u></p> <p>17a. Identify, describe or classify geometric shapes and figures.</p> <p>17b. Draw, describe and classify 2-dimensional geometric shapes and figures.</p>	<p><u>CMT Objectives</u></p> <p>17a. Identify, describe and classify geometric shapes and figures.</p> <p>17b. Draw, describe and classify geometric shapes and figures.</p>

10. GEOMETRY AND MEASUREMENT: Similarity, Congruence, and Transformations

ENDURING UNDERSTANDINGS		
<ul style="list-style-type: none"> • An object’s location in space can be described and analyzed quantitatively using the Cartesian coordinate system. • The motions of two-dimensional objects in the plane can be described and analyzed. • Geometric figures can change size and/or position while maintaining proportional attributes. 		
Grade 6	Grade 7	Grade 8
<p>10.1. Distinguish between congruence and similarity.</p> <p>10.2. Investigate the rotational and reflection symmetries of a shape.</p> <p>10.3. Determine which polygons fit together to cover a flat surface and why.</p> <p>10.4. Use rectangular coordinate grids to draw polygons and determine distances.</p>	<p>10.1. Identify similar figures by comparing corresponding parts, sides, and angles.</p> <p>10.2. Use scale factors and ratios to describe relationships among the side lengths of similar figures.</p> <p>10.3. Draw shapes on coordinate grids and use coordinate rules to stretch and shrink those shapes.</p> <p>10.4. Use the properties of similar figures to solve problems about shapes and measurements, such as distances and heights that you cannot measure</p> <p>10.5. Explore the relationships among angles, sides, perimeters, and areas of congruent and similar polygons using models and diagrams on the rectangular coordinate plane.</p> <p>10.6. Describe the effect of transformations on polygons with line and/or rotational symmetry.</p>	<p>10.1. Investigate the effect of scale factors on the length, area, and volume ratios of similar polygons and solids.</p> <p>10.2. Use coordinate geometry to explore and verify geometric relationships of parallel and perpendicular lines and polygons and their transformations.</p> <p>10.3. Perform reflections, rotations, and translations of polygons.</p> <p>10.4. Predict the effects of similarity and congruence transformation on lengths, angle measures, areas, volumes, and orientation.</p> <p>10.5. Use rectangular grids to represent polygons and perform transformations (translations, rotations, reflections, and dilations) on those polygons.</p>
<p>CMT Objectives</p> <p>18a. Identify lines of symmetry.</p> <p>18b. Draw lines of symmetry.</p> <p>18c. Identify congruent and similar figures.</p> <p>18d. Identify geometric reflections, rotations, and translations.</p> <p>18e. Locate and draw points on grids.</p>	<p>CMT Objectives</p> <p>18a. Identify lines of symmetry.</p> <p>18b. Draw lines of symmetry.</p> <p>18c. Identify congruent and similar figures.</p> <p>18d. Identify geometric reflections, rotations, and translations.</p> <p>18d. Identify and EXPLAIN congruent or similar figures.</p> <p>18e. Locate and draw points on grids.</p> <p>18f. Identify geometric transformations (reflections, rotations, and translations.)</p> <p>18g. Draw geometric transformations (reflections and rotations).</p> <p>18h. Relate 2-dimensional to 3-dimensional representations and visa versa.</p>	<p>CMT Objectives</p> <p>18a. Identify congruent or similar figures.</p> <p>18b. Draw, classify or describe and/or EXPLAIN why figures are similar.</p> <p>18c. Locate and draw points on four quadrant coordinate grids.</p> <p>18d. Identify geometric transformations (reflections, rotations, and translations.)</p> <p>18e. Draw geometric transformations (reflections and rotations and translations).</p> <p>18f. Relate 2-dimensional to 3-dimensional representations and visa versa.</p>

11. GEOMETRY AND MEASUREMENT: Measurement

ENDURING UNDERSTANDINGS

- Some attributes of objects are measurable and can be quantified using unit amounts.
- Tools, techniques and formulas exist for determining measurements.
- Standard units of measure enable people to interpret results or data.
- All measurements have some degree of uncertainty.
- Any measurement can be represented in equivalent ways.

Grade 6	Grade 7	Grade 8
<p>11.1. Use appropriate units, strategies and tools to measure length, perimeter, area, volume, capacity, weight, mass, temperature and angles.</p> <p>11.2. Examine benchmark angle measures and their relationship to a circle, e.g. 90 degrees, 180 degrees, 270 degrees).</p> <p>11.3. Use the rectangle as a basic shape to model and develop formulas for the area of triangles, parallelograms, trapezoids and circles.</p> <p>11.4. Develop formulas and procedures for finding areas and perimeters of rectangles, parallelograms, triangles and circles.</p> <p>11.5. Investigate the relationships among radius, diameter, circumference and area of circles, (including pi).</p> <p>11.6. Develop strategies to solve problems involving length, perimeter, area, volume, capacity, weight, mass, temperature and angles.</p> <p>11.7. Use benchmarks to improve the estimation of measurements with length, area, volume, mass, weight, and angles.</p> <p>11.8. Recognize relationships among units to estimate and convert units within a system (e.g., feet to yards, centimeters to meters, minutes to hours).</p> <p>11.9. Describe how powers of ten can be used</p>	<p>11.1. Solve problems using the appropriate units involving length, perimeter, area, volume, weight, mass, temperature, and angles.</p> <p>11.2. Solve problems involving the areas of regular and irregular polygons using estimation and measurement strategies.</p> <p>11.3. Develop strategies to find the volumes of regular and irregular solids using estimation and measurement strategies.</p> <p>11.4. Develop strategies to determine the surface area of three dimensional objects.</p> <p>11.5. Estimate length, area, volume, weight, mass, time, temperature, and angles by choosing appropriate units and benchmarks.</p> <p>11.6. Use ratios, tables and patterns to convert between units of length, area and volume in the customary and metric system.</p> <p>11.7. Use powers of ten as conversion ratios in the metric system.</p> <p>11.8. Solve a variety of problems in context that require the conversion on units within a measurement system, including time.</p>	<p>11.1. Describe the accuracy of estimates and measure and the precision of measurement tools.</p> <p>11.2. Investigate the relationship between the area of the base and the height to the volumes of prisms, cones and pyramids.</p> <p>11.3. Develop measurement strategies to find the surface area and volume of pyramids, cones, spheres and irregular solids.</p> <p>11.4. Develop and use formulas and strategies to find the perimeter and area of regular and irregular polygons</p> <p>11.5. Use estimation and measurement strategies to solve problems involving the volumes of solids.</p> <p>11.7. Make and test conjectures about relationships among sides, angles, perimeters, areas, surface areas and volumes of congruent and similar polygons and solids.</p> <p>11.8. Use the Pythagorean theorem to solve indirect measurement problems.</p> <p>11.9. Explore strategies to solve dimensional analysis problems.</p> <p>11.10. Use the appropriate units of measure in linear, area, and volume problems.</p> <p>11. 11. Solve and graph time-distance-rate relationships.</p> <p>11.12. Estimate and solve problems involving customary and metric measures with real</p>

<p>as conversion ratios in the metric system.</p> <p>11.10. Solve problems involving the conversion of measures within the customary and metric systems.</p> <p>11.11. Solve problems involving the conversion of measures of time and elapsed time (days, hours, minutes, and seconds).</p>		<p>world problems.</p>
<p>CMT Objectives</p> <p>15a. Estimate lengths, areas, and angle measures.</p> <p>16a. Measure and determine perimeter, area and volume (of parallelograms, rectangular prisms, and triangles.) EXPLAIN or SHOW how the solution was determined.</p> <p>16b. Identify appropriate customary or metric measures or units (length, temperature, capacity, mass) for a given situation.</p> <p>16c. Identify the correct solution to problems involving the conversions of measures of length, mass, capacity, and TIME.</p> <p>16d. Solve problems involving the conversions of measures of length, mass, capacity, and TIME.</p>	<p>CMT Objectives</p> <p>15a. Estimate lengths, areas, and angle measures.</p> <p>16a. Measure and determine perimeters, areas, and volumes. EXPLAIN or SHOW how the solution was determined.</p> <p>16b. Determine perimeters, areas and volumes.</p> <p>16c. Identify appropriate customary or metric units of measure for a given situation.</p> <p>16d. Solve problems involving the conversions of customary or metric units of measure.</p> <p>16e. Solve problems involving conversions of TIME units.</p>	<p>CMT Objectives</p> <p>15a. Estimate lengths, areas, volumes and angle measures.</p> <p>16a. Measure and determine perimeters, areas and volumes. EXPLAIN or SHOW how the solution was determined.</p> <p>16b. Determine perimeters, areas and volumes.</p> <p>16c. Solve problems involving conversions and/or operations within the customary or metric units of measure.</p>

12. WORKING WITH DATA: Graphs and Statistics

ENDURING UNDERSTANDINGS

- The question to be answered determines the data that needs to be collected, how best to collect it, and how best to organize, represent and describe it.
- Selecting the appropriate visual representation of data is based on the kind of data collected and the purpose for its use. These kinds of representations visually show patterns in data.
- There are special numerical measures that describe patterns in data. Data interpretation is enhanced by numerical measures telling how data are distributed.

Grade 6	Grade 7	Grade 8
<p>12.1. Organize data using appropriate strategies such as charts, frequency tables, line plots, stem and leaf plots.</p> <p>12.2. Display sets of data graphically using histograms, double bar graphs, back-to-back stem-and leaf plots and scatter plots.</p> <p>12.3. Construct circle graphs and recognize that they represent data proportionally.</p> <p>12.4. Describe patterns and trends in data from tables and graphs in order to make and defend predictions.</p> <p>12.5. Solve problems involving the organization of data, including sorting by multiple attributes.</p> <p>12.6. Solve logic problems requiring transitive reasoning strategies and Venn diagrams.</p> <p>12.7. Use measures of spread (range and outliers) and central tendency (mode, median and mean) to describe the shape of data sets.</p> <p>12.8. Recognize that changes in a data set can affect the mode, median, mean and range.</p>	<p>12.1. Formulate questions that can be answered through the collection, organization, and display of data.</p> <p>12.2. Organize data using appropriate strategies such as line plots, frequency tables, stem and leaf plots.</p> <p>12.3. Compare sets of data using appropriate graphical representations.</p> <p>12.4. Defend the analysis of gathered data.</p> <p>5. Defend predictions based on patterns and trends.</p> <p>12.6. Use a variety of formats such as tree diagrams and Venn diagrams to organize and classify information.</p> <p>12.7. Solve logic problems requiring transitive reasoning strategies and Venn diagrams.</p> <p>12.8. Interpret measures of spread (range and outliers) and central tendency (mode, median and mean) for a given set of data.</p> <p>12.9. Predict the effect of changes in a data set on various statistical measures such as mean, mode, and median.</p> <p>12.10. Compare and contrast two sets of data based on their distributions and measures of central tendency.</p> <p>12.11. Investigate how statistics can sometimes be misleading.</p>	<p>12.1. Formulate questions that can be answered through the collection, organization, and display of data.</p> <p>12.2. Use appropriate technology to collect, organize and analyze large data sets.</p> <p>12.3. Construct a variety of data displays, including box-and-whisker plots and scatterplots.</p> <p>12.4. Identify where measures of central tendency and measures of variation are found in graphical displays.</p> <p>12.5. Use a variety of formats such as tree diagrams and Venn diagrams to organize and classify information.</p> <p>12.6. Solve logic problems requiring transitive reasoning strategies and Venn diagrams.</p> <p>12.7. Analyze and interpret data using descriptive statistics including range, mode, median, quartiles, outliers and mean.</p> <p>12.8. Formulate and evaluate hypotheses and conclusions based on experimental data.</p> <p>12.9. Describe the role of random sampling, random number generation and the effects of sample size in statistical claims.</p> <p>12.10. Determine the accuracy of statistical claims.</p> <p>12.11. Make predictions from scatter plots using or estimating a line of best fit.</p>

<p><u>CMT Objectives</u> 19a. Identify correct information from tables, line graphs, bar graphs and stem and leaf plots and charts 19b. Create bar graphs and line graphs from data in tables and charts. 20a. Draw reasonable conclusions from data in tables, pictographs, line graphs, circle graphs, stem and leaf plots and charts. 20b. Solve problems involving means, medians, and modes of sets of data. 24a. Solve logic, counting, and classification problems involving the organization of data. 24b. Sort, classify and draw logical conclusions from data, including Venn diagrams and transitive reasoning questions.</p>	<p><u>CMT Objectives</u> 20a. Draw reasonable conclusions from data in tables, graphs, and charts. 20b. State a solution or a conclusion and EXPLAIN why an answer is or is not reasonable based on the data. 20c. Solve problems involving means, medians, modes, and ranges of sets of data 24a. Solve problems involving the organization of data. 24b. Sort or classify objects and make logical conclusions from given data including Venn diagrams, combinations, permutations, and transitive reasoning.</p>	<p><u>CMT Objectives</u> 20. Draw reasonable conclusions from data in tables, graphs, and charts. 20b. State a solution or a conclusion and EXPLAIN why an answer is or is not reasonable based on the data. 20c. Solve problems involving means, medians, modes, and ranges of sets of data 24a. Solve problems involving the organization of data. 24b. Sort or classify objects and draw logical conclusions from given data including Venn diagrams, combinations, permutations, and transitive reasoning.</p>
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13. WORKING WITH DATA: Probability

ENDURING UNDERSTANDINGS		
<ul style="list-style-type: none"> • The probability of an event’s occurrence can be predicted with varying degrees of confidence. • The chance of an event occurring can be described numerically by a number between 0 and 1 inclusive and used to make predictions about other events. 		
Grade 6	Grade 7	Grade 8
<p>13.1. Express probabilities as fractions, ratios, decimals and percents.</p> <p>13.2. Solve problems involving simple probabilities and fairness percents in familiar contexts.</p> <p>13.3. Explore the relationship between the number of trials in an experiment and the predicted outcomes.</p> <p>13.4. Design and conduct simple probability experiments.</p> <p>13.5. Make predictions about outcomes that are equally likely or not equally likely.</p> <p>13.6. Use systematic listing and counting strategies to solve problems.</p>	<p>13.1. Identify the two ways of obtaining probabilities—by gathering data from experiments (experimental probability) and by analyzing the possible and likely outcomes (theoretical probability).</p> <p>13.2. Conduct experiments in order to compare experimental to theoretical probabilities.</p> <p>13.3. Solve problems involving the probability of simple and compound events expressed as fractions, decimals, or percents in familiar contexts.</p> <p>13.4. Interpret statements of probability to make decisions or answer questions.</p> <p>13.5. Explore the difference between combinations and permutations as ways to predict possible outcomes.</p>	<p>13.1. Determine the probability of compound events.</p> <p>13.2. Distinguish between combinations and permutations as ways to predict possible outcomes in certain situations.</p> <p>13.3. Use combinations and permutations, trees, networks (counting strategies) in a variety of contexts.</p>
<p>CMT Objectives</p> <p>21a. Identify correct solutions to problems involving elementary notions of probability and fairness.</p> <p>21b. Solve problems involving elementary notions of probability and fairness, including justifying solutions.</p>	<p>CMT Objectives</p> <p>21a. Identify correct solutions to problems involving elementary notions of probability and fairness expressed as fractions, decimals, or percents.</p> <p>21b. Solve problems involving elementary notions of probability and fairness expressed as fractions, decimals, or percents and justify the answer.</p> <p>21c. Solve problems involving expected outcomes or predictions and justify solutions.</p>	<p>CMT Objectives</p> <p>21a. Identify correct solutions to problems involving elementary notions of probability and fairness expressed as fractions, decimals, or percents.</p> <p>21b. Solve problems involving elementary notions of probability and fairness expressed as fractions, decimals, or percents and justify the solutions.</p> <p>21c. Solve problems involving expected outcomes or predictions, and justify solutions.</p>