

# MSAD #53 Mathematics Curriculum Grade 6

## Overarching Processes: Problem Solving, Reasoning, Connections, and Communication

### Number and Operations Student Learning Goals:

*Students will understand that . . .*

- The meaning of numerals in many–digit numbers depends on their positions.
- Patterns can be found in numbers, and recognizing these patterns helps us to solve problems and to explain how things work.
- The operations addition and subtraction are inverses of each other – one undoes what the other does; likewise multiplication and division.
- Numbers can be written in different forms, depending on how they are being used.

Content MLR & NECAP Alignment	Skills: students will . . .	Materials & Resources
<p style="text-align: center;"><b>September &amp; October</b></p> <p><b>Numbers &amp; Operations</b> <b>Whole Numbers</b> MLR A.1, 2, 3 NECAP M(N &amp; O) 6-1, 6-2, 6-3</p> <p>NECAP Practice Items NWEA Universal Screening VMath Benchmark Test MCAP Benchmark Test</p> <p>Number notation Rounding Comparing and ordering numbers (magnitude) Place value Operations Order of operations Exponents Integers</p>	<ul style="list-style-type: none"> <li>• Review Mean, Median, Mode and Range</li> <li>• Review Circle Graphs, Line Plots and Stem-and-leaf Plots</li> <li>• Review multiples, factors, LCM, GCF, exponents, composite numbers and prime numbers</li> <li>• Practice NECAP released items</li> <li>• Take NWEA MAP assessment for math</li> <li>• Take Vmath Grade 6 Benchmark test</li> <li>• Take MCAP Benchmark</li> <li>• Take NECAP as scheduled (October)</li> <li>• Practice fluency in computation of whole numbers 0-12 for the operations addition, subtraction, multiplication, and division</li> <li>• Understand and use number notation to 10 million in numerals and words</li> <li>• Multiply and divide numbers up to four digits by numbers up to two digits, and by tens, hundreds, and thousands and interpret any remainders</li> <li>• Solve problems requiring multiple operations (add, sub, mult, div) and use the conventions of order of operations with and w/o parentheses</li> <li>• Demonstrate conceptual understanding of rational numbers by comparing two whole numbers by division <math>a/b</math>, <math>a : b</math>, and <math>a \div b</math>, where <math>b \neq 0</math>; and rates (e.g., a out of b, 25%) using models, explanations, or other representations.</li> <li>• Order or compare numbers with whole</li> </ul>	<p>FASTT Math NECAP Released Items <i>CMP2: Prime Time</i></p>

	<p>number bases and whole number exponents (e.g., <math>3^3</math>, <math>4^3</math>), integers, or rational numbers (fractions, decimals, or whole number percents from 1- 100) using number lines or equality and inequality symbols.</p> <ul style="list-style-type: none"> <li>Describe or illustrate the meaning of a power by representing the relationship between the base (whole number) and the exponent (whole number) (e.g., <math>3^3</math>, <math>4^3</math>).</li> </ul> <p>(IMPORTANT: Apply the conventions of order of operations with and without parentheses.)</p>	
<p style="text-align: center;"><b>November</b></p> <p><b>Number &amp; Operations</b>  <b>Rational Numbers</b>  MLR A  NECAP M(N&amp;O) 6-1, 6-2, 6-3, 6-4</p> <p>Adding Fractions  Subtracting Fractions  Multiplying Fractions  Dividing Fractions</p>	<ul style="list-style-type: none"> <li>Use benchmarks and other strategies to estimate the reasonableness of results of operations with fractions</li> <li>Develop ways to model sums, differences, products, and quotients with areas, strips, and number lines</li> <li>Use estimates and exact solutions to make decisions</li> <li>Look for and generalize patterns in numbers</li> <li>Use knowledge of fractions and equivalents of fractions to develop algorithms for adding, subtracting, multiplying and dividing fractions</li> <li>Recognize when addition, subtraction, multiplication, or division is the appropriate operation to solve a problem</li> <li>Accurately solve problems involving single or multiple operations on fractions (proper, improper, and mixed), or decimals; and addition or subtraction of integers; percent of a whole; or problems involving greatest common factor or least common multiple.</li> <li>Write fact families to show the inverse relationship between addition and subtraction, and between multiplication and division</li> <li>Solve problems using arithmetic operations on fractions</li> </ul>	<p><i>CMP2: Bits &amp; Pieces II</i>  Investigations 1-4 in depth</p>

## **Geometry and Measurement Student Learning Goals:**

*Students will understand that . . .*

- Length can be thought of as unit lengths joined together; area as a collection of unit squares, and volume as a set of unit cubes
- Shapes can be described and compared in terms of concepts such as parallel and perpendicular, congruence, similarity, and symmetry.
- Symmetry can be found by reflection or rotation (flips, turns, slides).
- Some shapes have special properties.
- Lines can be parallel or perpendicular.
- When people care about what is being counted or measured, it is important for them to say what the units are and to measure carefully and consistently.
- Most measurements are approximations and that taking repeated measurements reveals this variability.
- A number without a unit is not a measurement, and an appropriate unit must always be attached to a number to provide a measurement.
- The precision and accuracy of a measurement depends on selecting the appropriate tools and units.

<b>Content MLR &amp; NECAP Alignment</b>	<b>Skills: students will . . .</b>	<b>Materials &amp; Resources</b>
<p><b>December - January</b></p> <p><b>Geometry &amp; Measurement</b> MLR C NECAP M(G&amp;M) 6-1, 6-6, 6-7</p> <p>Properties of polygons and circles Area, Perimeter/Circumference of polygons and circles Volume of Rectangular Prisms Pythagorean Theorem Similarity Congruence Parallelism Perpendicularity</p>	<ul style="list-style-type: none"> <li>• Understand area and relate area to covering a figure</li> <li>• Understand perimeter and relate perimeter to surrounding a figure</li> <li>• Develop strategies for finding areas and perimeters of rectangular shapes and non- rectangular shapes</li> <li>• Discover relationships between perimeter and area, including that each can vary while the other stays</li> <li>• Understand how the areas of simple geometric figures relate to each other (e.g. the area of a parallelogram is twice the area of a triangle with the same base and height)</li> <li>• Develop formulas and procedures- stated in words and/or symbols- for finding areas and perimeters of rectangles, parallelograms, triangles, and circles</li> <li>• Develop techniques for estimating the area and perimeter of an irregular figure</li> <li>• Recognize situations in which measuring perimeter or area will help answer practical questions</li> <li>• Use properties or attributes of angles (right, acute, or obtuse) or sides (number of congruent sides, parallelism, or perpendicularity) to identify,</li> </ul>	<p>CMP2 <i>Covering and Surrounding</i> Investigation 1 (1.3 only) Investigation 2 (skip 2.2) Investigation 3; 3.1, 3.2; address content in 3.3 and 3.4 Focus on vocabulary: isosceles, scalene, right triangles Investigations 4-5 (skip 5.4) Use Saxon Math textbook (5<sup>th</sup> grade): Lesson 103 for volume See Ron Dorman for Pythagorean Theorem worksheet</p> <p>←Needs to be reviewed using <i>Shapes &amp; Designs</i> or the Saxon textbook</p>

	<p>describe, classify, or distinguish among different types of triangles (right, acute, obtuse, equiangular, scalene, isosceles, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).</p> <ul style="list-style-type: none"> <li>• Review M(G&amp;M) 5-3 to cover M(G&amp;M) 6-3: Identify, compare, or describe 3-D shapes (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones,) using shapes of bases, number of lateral faces, number of bases, number of edges, or number of vertices.</li> <li>• Describe the proportional effect on the linear dimensions of polygons or circles when scaling up or down while preserving the angles of polygons (similarity), or by solving related problems (including applying scales on maps). Describe effects using models or explanations.</li> <li>• Demonstrate conceptual understanding of perimeter of polygons, the area of quadrilaterals or triangles, and the volume of rectangular prisms by using models, formulas, or by solving problems; demonstrate understanding of the relationships of circle measures (radius to diameter and diameter to circumference) by solving related problems. Express all measures using appropriate units.</li> <li>• Measure and use units of measures appropriately and consistently, and make conversions within systems across the content strands.</li> </ul>	
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## **Number and Operations: Rational Numbers Student Learning Goals**

*Students will understand that . . .*

- Numbers can be written in different forms, depending on how they are being used.
- Decimals are often associated with measurements in real world situations.

<b>Content MLR &amp; NECAP Alignment</b>	<b>Skills: students will . . .</b>	<b>Materials &amp; Resources</b>
<p style="text-align: center;"><b>February – March</b></p> <p><b>Number &amp; Operations Rational Numbers</b> MLR A NECAP M(N&amp;O) 6-1, 6-2, 6-3, 6-4</p> <p>Adding Decimals Subtracting Decimals Multiplying Decimals Dividing Decimals Percent Problems</p>	<ul style="list-style-type: none"> <li>• Build on knowledge of operations on fractions and whole numbers</li> <li>• Develop and use benchmarks and other strategies to estimate the answers to computations with decimals</li> <li>• Develop meaning of and algorithms for operations with decimals</li> <li>• Use the relationship between decimals and fractions to develop and understand why decimal algorithms work</li> <li>• Use the place value interpretation of decimals to make sense of short-cut algorithms for operations</li> <li>• Generalize number patterns to help make sense of decimal operations</li> <li>• Choose between addition, subtraction, multiplication or division as an appropriate operation to use to solve a problem</li> <li>• Solve problems using operations on decimals</li> <li>• Use understanding of operations and the meaning of percents to solve percent problems of the form <math>a\%</math> of <math>b</math> equals <math>c</math> for any one of the variables <math>a</math>, <math>b</math>, or <math>c</math>.</li> <li>• Create and interpret circle graphs</li> </ul>	<p><i>CMP2 Bits &amp; Pieces III</i> Investigations 1-5</p>

**Functions and Algebra Student Learning Goals:**

*Students will understand that . . .*

- Letters and other symbols are used in mathematics to represent numbers.
- Tables and graphs can show how values of one quantity are related to values of another.

<p style="text-align: center;"><b>April—May</b></p> <p><b>Functions &amp; Algebra</b> MLR D NECAP M(F&amp;A)</p> <p>Variables Representations of Relationships in tables, graphs, words &amp; symbols</p>	<ul style="list-style-type: none"> <li>• Collect experimental data and organize it in a table</li> <li>• Identify patterns and relationships between variables using information in a table</li> <li>• Create a coordinate graph of data in a table</li> <li>• Identify patterns and relationships between variables using information in a graph</li> <li>• Compare table and graph representations of the same data</li> <li>• Consider data values between plotted points</li> <li>• Create a table from data in a coordinate graph</li> <li>• Compare patterns of change in a table and graph</li> <li>• Interpret narrative notes to make a table and a graph</li> </ul> <p>Note: NECAP GLEs 6-1, 6-2, 6-3, and 6-4 will be addressed through CMP2 Variables and Patterns, Investigations 2-4, in the Fall of grade 7. (See Grade 7 curriculum). Investigation 1 is intended to introduce students to Algebra.</p>	<p><i>CMP2 Variables &amp; Patterns</i> Investigation 1</p>
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**Data, Statistics, and Probability Student Learning Goals:**

*Students will understand that . . .*

- Most measurements are approximations and that taking repeated measurements reveals this variability.
- A number without a unit is not a measurement, and an appropriate unit must always be attached to a number to provide a measurement.
- The precision and accuracy of a measurement depends on selecting the appropriate tools and units.
- Often a person can find out about a group of things by studying just a few of them.
- Some events can be predicted well and some cannot.
- Graphing data helps to see what the extremes are, where they pile up, and where the gaps are. A summary of data includes where the middle is and how much spread is around it.
- Events can be described in terms of being more or less likely, impossible, or certain.

<p><b>Data, Statistics, &amp; Probability</b>          MLR B.1, 2, 3          NECAP M (DSP) 6-1, 602, 6-4, 6-5</p>	<ul style="list-style-type: none"> <li>• Interprets graphs (circle, line, or stem-and-leaf plots) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems.</li> <li>• Analyzes patterns, trends or distributions in data in a variety of contexts by determining or using measures or central tendency (mean, median, or mode) or dispersion (range) to analyze situations or to solve problems.</li> <li>• Uses counting techniques to solve problems in context involving combinations or simple permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, or Fundamental Counting Principle.)</li> <li>• For a probability event in which the sample space may or may not contain equally likely outcomes, determines the experimental probability of an event in a problem-solving situation.</li> </ul>	<p>Teacher created unit/materials</p>
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**NECAP Benchmark Measurements for Grade 6:**

<b>Benchmark Measures</b>	<b>Grade 6-8</b>
Length	Units (accuracy): Inch (to 1/16 inch); Foot; Centimeter (to 1/10 centimeter); Meter (to 1/100 meter); Yard; Mile (use in scale and rate questions); Kilometer (use in scale and rate questions) Equivalencies: 12 inches in 1 foot; 100 centimeters in 1 meter; 3 feet in 1 yard; 36 inches in 1 yard; 10 millimeters in 1 centimeter; 1000 millimeters in 1 meter
Time	Hour (to 1 minute); Day; Year Equivalencies: 24 hours in 1 day; 7 days in 1 week; 365 days in 1 year; 60 seconds in 1 minute; 60 minutes in 1 hour
Temperature	Unit (accuracy): C° and F° (to 1 degree)
Capacity	Unit (accuracy): Quarts (to 1 ounce); Gallon; Pint; Liter Equivalencies: 32 ounces in 1 quart; 4 quarts in 1 gallon; 2 pints in 1 quart; 1000 milliliters in 1 liter
Mass	Unit (accuracy): Kilogram; Gram (to 1/10 gram)
Weight	Unit (accuracy): Pound (to 1 ounce) Equivalencies: 16 ounces in 1 pound
Angles and Rotation	Unit (accuracy): Degree (to 2 degrees) Equivalencies: 360° in 1 circle; 90° in 1 right angle

**Essential Vocabulary:**

Algorithm	Height
Benchmark	Length
Denominator	Linear Dimensions
Equivalent Fractions	Perimeter
Fact Family	Perpendicular Lines
Inverse Relationship	Pi
Numerator	Radius
Reciprocal	Width
Unit Fraction	Triangle
Sum	Parallelogram
Difference	Congruent
Product	Rectangle
Quotient	Square
Overestimate	Quadrilateral
Underestimate	Maximum
Math Sentence	Minimum
Number Sentence	Trapezoid
Interpretation	Change
Divisor	Coordinate Graph
Dividend	Coordinate Pair
Powers of Ten	Dependent Variable
Repeating Decimal	Equation/Formula
Terminating Decimal	Independent Variable
Decimal	Pattern
Percent	Relationship
Number Line	Rule
Decimal Notation	Scale
Fraction Notation	Table
Area	Variable
Base Circle	X-axis
Circumference	Y-axis
Diameter	

**Assessment:**

- NWEA MAP Assessment for Math (all students Fall and Spring)
- VMath Grade Level Benchmark Test (all students Fall and Spring)
- CMP unit quizzes and tests
- MCAP Benchmark Test

\*Review homework should be given Monday through Thursday.