

*MN Mathematics Standards
2007 Revision
Grades 3-6*

I. Number & Operation

<p>Grade 3 Standard 1.1: Compare and represent whole numbers up to 100,000 with an emphasis on place value and equity.</p>	<p>Grade 4 Standard 1.1: Demonstrate mastery of multiplication and division basic facts; multiply multi-digit numbers; solve real-world and mathematical problems using arithmetic.</p>	<p>Grade 5 Standard 1.1: Divide multi-digit numbers; solve real-world and mathematical problems using arithmetic.</p>	<p>Grade 6 Standard 1.1: Read, write, represent and compare positive rational numbers expressed as fractions, decimals, percents and ratios; write positive integers as products of factors; use these representations in real-world and mathematical situations.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.1.1.1 <i>Read, write and represent whole numbers up to 100,000. Representations may include numerals, expressions with operations, words, pictures, number lines, and manipulative such as bundles of sticks and base 10 blocks.</i></p> <p>3.1.1.2 <i>Use place value to describe whole numbers between 1000 and 100,000 in terms of ten thousands, thousands, hundreds, tens and ones.</i></p> <p>Example: Writing 54,873 is a shorter way of writing the following sums: 5 ten thousands + 4 thousands + 8 hundreds + 7 tens + 3 ones 54 thousands + 8 hundreds + 7 tens + 3 ones.</p> <p>3.1.1.3 <i>Find 10,000 more or 10,000 less than a given five-digit number. Find 1000 more or 1000 less than a given four- or five-digit number. Find 100 more or 100 less than a given four- or five-digit number.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>4.1.1.1 <i>Demonstrate fluency with multiplication and division facts.</i></p> <p>4.1.1.2 <i>Use an understanding of place value to multiply a number by 10, 100 and 1000.</i></p> <p>4.1.1.3 <i>Multiply multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms.</i></p> <p>4.1.1.4 <i>Estimate products and quotients of multi-digit whole numbers by using rounding, benchmarks and place value to assess the reasonableness of results.</i></p> <p>Example: 53×38 is between 50×30 and 60×40, or between 1500 and 2400, and $411/73$ is between 5 and 6..</p> <p>4.1.1.5 <i>Solve multi-step real-world and mathematical problems requiring the use of addition, subtraction and multiplication of multi-digit whole numbers. Use various strategies, including the relationship between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>5.1.1.1 <i>Divide multi-digit numbers, using efficient and generalizable procedures, based on knowledge of place value, including standard algorithms. Recognize that quotients can be represented in a variety of ways, including a whole number with a remainder, a fraction or mixed number, or a decimal.</i></p> <p>Example: Dividing 153 by 7 can be used to convert the improper fraction $\frac{153}{7}$ to the mixed number $21\frac{6}{7}$.</p> <p>5.1.1.2 <i>Consider the context in which a problem is situated to select the most useful form of the quotient for the solution and use the context to interpret the quotient appropriately.</i></p> <p>Example: If 77 amusement ride tickets are to be distributed equally among 4 children, each child will receive 19 tickets, and there will be one left over. If \$77 is to be distributed equally among 4 children, each will receive \$19.25, with nothing left over.</p> <p>5.1.1.3 <i>Estimate solutions to arithmetic problems in order to assess the reasonableness of results.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>6.1.1.1 <i>Locate positive rational numbers on a number line and plot pairs of positive rational numbers on a coordinate grid.</i></p> <p>6.1.1.2 <i>Compare positive rational numbers represented in various forms. Use the symbols < and >.</i></p> <p>Example: $\frac{1}{2} > 0.36$.</p> <p>6.1.1.3 <i>Understand that percent represents parts out of 100 and ratios to 100.</i></p> <p>Example: 75% is equivalent to the ratio 75 to 100, which is equivalent to the ratio 3 to 4.</p> <p>6.1.1.4 <i>Determine equivalences among fractions, decimals and percents; select among these representations to solve problems.</i></p> <p>Example: If a woman making \$25 an hour gets a 10% raise, she will make an additional \$2.50 an hour, because \$2.50 is $\frac{1}{10}$ or 10% of \$25.</p> <p>6.1.1.5 <i>Factor whole numbers; express a whole number as a product of prime factors with exponents.</i></p> <p>Example: $24 = 2^3 \times 3$</p>

I. Number & Operation (continued)

<p>Grade 3 Standard 1.1 (cont): Compare and represent whole numbers up to 100,000 with an emphasis on place value and equity.</p>	<p>Grade 4 Standard 1.1 (cont): Demonstrate mastery of multiplication and division basic facts; multiply multi-digit numbers; solve real-world and mathematical problems using arithmetic.</p>	<p>Grade 5 Standard 1.1 (cont.): Divide multi-digit numbers; solve real-world and mathematical problems using arithmetic.</p>	<p>Grade 6 Standard 1.1 (cont.): Read, write, represent and compare positive rational numbers expressed as fractions, decimals, percents and ratios; write positive integers as products of factors; use these representations in real-world and mathematical situations.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.1.1.4 <i>Round numbers to the nearest 10,000, 1000, 100, and 10. Round up and round down to estimate sums and differences.</i></p> <p>Example: 8726 rounded to the nearest 1000 is 9000, rounded to the nearest 100 is 8700, and rounded to the nearest 10 is 8730.</p> <p>Example 473– 291 is between 400 – 300 and 500 – 200, or between 100 and 300.</p> <p>3.1.1.5 <i>Compare and order whole numbers up to 100,000.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>4.1.1.6 <i>Use strategies and algorithms based on knowledge of place value, equality and properties of operations to divide multi-digit whole numbers by one- or two-digit numbers. Strategies may include mental strategies, partial quotients, the commutative, associative, and distributive properties and repeated subtraction.</i></p> <p>Example: A group of 324 students is going to a museum in 6 buses. If each bus has the same number of students, how many students will be on each bus?</p>	<p>Benchmarks <i>The student will:</i></p> <p>5.1.1.4 <i>Solve real-world and mathematical problems requiring addition, subtraction, multiplication and division of multi-digit whole numbers. Use various strategies, including the inverse relationships between operations, the use of technology, and the context of the problem to assess the reasonableness of results.</i></p> <p>Example: The calculation $117 \div 9 = 13$ can be checked by multiplying 9 and 13.</p>	<p>Benchmarks <i>The student will:</i></p> <p>6.1.1.6 <i>Determine greatest common factors and least common multiples. Use common factors and common multiples to calculate with fractions and find equivalent fractions.</i></p> <p>Example: Factor the numerator and denominator of a fraction to determine an equivalent fraction.</p> <p>6.1.1.7 <i>Convert between equivalent representations of positive rational numbers.</i></p> <p>Example: Express $\frac{10}{7}$ as</p> $\frac{7+3}{7} = \frac{7}{7} + \frac{3}{7} = 1\frac{3}{7}.$

I. Number & Operation (continued)

<p>Grade 3 Standard 1.2: Add and subtract multi-digit whole numbers; represent multiplication and division in various ways; solve real-world and mathematical problems using arithmetic.</p>	<p>Grade 4 Standard 1.2: Represent and compare fractions and decimals in real-world and mathematical situations; use place value to understand how decimals represent quantities.</p>	<p>Grade 5 Standard 1.2: Read, write, represent and compare fractions and decimals; recognize and write equivalent fractions; convert between fractions and decimals; use fractions and decimals in real-world and mathematical situations.</p>	<p>Grade 6 Standard 1.2: Understand the concept of ratio and its relationship to fractions and to the multiplication and division of whole numbers. Use ratios to solve real-world and mathematical problems.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.1.2.1 Add and subtract multi-digit numbers, using efficient and generalizable procedures based on knowledge of place value, including standard algorithms.</p> <p>3.1.2.2 Use addition and subtraction to solve real-world and mathematical problems involving whole numbers. Use various strategies, including the relationship between addition and subtraction, the use of technology, and the context of the problem to assess the reasonableness of results.</p> <p>Example: The calculation $117 - 83 = 34$ can be checked by adding 83 and 34.</p> <p>3.1.2.3 Represent multiplication facts by using a variety of approaches, such as repeated addition, equal-sized groups, arrays, area models, equal jumps on a number line and skip counting. Represent division facts by using a variety of approaches, such as repeated subtraction, equal sharing and forming equal groups. Recognize the relationship between multiplication and division.</p>	<p>Benchmarks <i>The student will:</i></p> <p>4.1.2.1 Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.</p> <p>4.1.2.2 Locate fractions on a number line. Use models to order and compare whole numbers and fractions, including mixed numbers and improper fractions.</p> <p>Example: Locate $\frac{5}{3}$ and $1\frac{3}{4}$ on a number line and give a comparison statement about these two fractions, such as "$\frac{5}{3}$ is less than $1\frac{3}{4}$."</p> <p>4.1.2.3 Use fraction models to add and subtract fractions with like denominators in real-world and mathematical situations. Develop a rule for addition and subtraction of fractions with like denominators.</p>	<p>Benchmarks <i>The student will:</i></p> <p>5.1.2.1 Read and write decimals using place value to describe decimals in terms of groups from millionths to millions.</p> <p>Example: Possible names for the number 0.0037 are: 37 ten thousandths 3 thousandths + 7 ten thousandths; a possible name for the number 1.5 is 15 tenths.</p> <p>5.1.2.2 Find 0.1 more than a number and 0.1 less than a number. Find 0.01 more than a number and 0.01 less than a number. Find 0.001 more than a number and 0.001 less than a number.</p> <p>5.1.2.3 Order fractions and decimals, including mixed numbers and improper fractions, and locate on a number line.</p> <p>Example: Which is larger 1.25 or $\frac{6}{5}$?</p> <p>Example: In order to work properly, a part must fit through a 0.24 inch wide space. If a part is $\frac{1}{4}$ inch wide, will it fit?</p>	<p>Benchmarks <i>The student will:</i></p> <p>6.1.2.1: Identify and use ratios to compare quantities; understand that comparing quantities using ratios is not the same as comparing quantities using subtraction.</p> <p>Example: In a classroom with 15 boys and 10 girls, compare the numbers by subtracting (there are 5 more boys than girls) or by dividing (there are 2.5 times as many boys as girls). The comparison using division may be expressed as a ratio of boys to girls (3 to 2 or 3:2 or 1.5 to 1).</p> <p>6.1.2.2 Apply the relationship between ratios, equivalent fractions and percents to solve problems in various contexts, including those involving mixtures and concentrations.</p> <p>Example: If 5 cups of trail mix contains 2 cups of raisins, the ratio of raisins to trail mix is 2 to 5. This ratio corresponds to the fact that the raisins are $\frac{2}{5}$ of the total, or 40% of the total.</p> <p>And if one trail mix consists of 2 parts peanuts to 3 parts raisins, and another consists of 4 parts peanuts to 8 parts raisins, then the first mixture has a higher concentration of peanuts.</p>

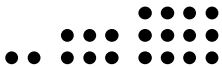
I. Number & Operation (continued)

<p>Grade 3 Standard 1.2 (cont.): Add and subtract multi-digit whole numbers; represent multiplication and division in various ways; solve real-world and mathematical problems using arithmetic.</p>	<p>Grade 4 Standard 1.2 (cont.): Represent and compare fractions and decimals in real-world and mathematical situations; use place value to understand how decimals represent quantities.</p>	<p>Grade 5 Standard 1.2 (cont.): Read, write, represent and compare fractions and decimals; recognize and write equivalent fractions; convert between fractions and decimals; use fractions and decimals in real-world and mathematical situations.</p>	<p>Grade 6 Standard 1.2 (cont.): Understand the concept of ratio and its relationship to fractions and to the multiplication and division of whole numbers. Use ratios to solve real-world and mathematical problems.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.1.2.4 <i>Solve real-world and mathematical problems involving multiplication and division, including both “how many in each group” and “how many groups” division problems.</i></p> <p>Example: You have 27 people and 9 tables. If each table seats the same number of people, how many people will you put at each table?</p> <p>Example: If you have 27 people and tables that will hold 9 people, how many tables will you need?</p> <p>3.1.2.5 <i>Use strategies and algorithms based on knowledge of place value, equality and properties of addition and multiplication to multiply a two- or three-digit number by a one-digit number. Strategies may include mental strategies, partial products, the standard algorithm, and the commutative, associative, and distributive properties.</i></p> <p>Example: $9 \times 26 = 9 \times (20 + 6) = 9 \times 20 + 9 \times 6 = 180 + 54 = 234.$</p>	<p>Benchmarks <i>The student will:</i></p> <p>4.1.2.4 <i>Read and write decimals with words and symbols; use place value to describe decimals in terms of thousands, hundreds, tens, ones, tenths, hundredths and thousandths.</i></p> <p>Example: Writing 362.45 is a shorter way of writing the sum: 3 hundreds + 6 tens + 2 ones + 4 tenths + 5 hundredths, which can also be written as: three hundred sixty-two and forty-five hundredths.</p> <p>4.1.2.5 <i>Compare and order decimals and whole numbers using place value, a number line and models such as grids and base 10 blocks.</i></p> <p>4.1.2.6 <i>Read and write tenths and hundredths in decimal and fraction notations using words and symbols; know the fraction and decimal equivalents for halves and fourths.</i></p> <p>Example: $\frac{1}{2} = 0.5 = 0.50$ and $\frac{7}{4} = 1\frac{3}{4} = 1.75$, which can also be written as one and three-fourths or one and seventy-five hundredths.</p> <p>4.1.2.7 <i>Round decimals to the nearest tenth.</i></p> <p>Example: The number 0.36 rounded to the nearest tenth is 0.4.</p>	<p>Benchmarks <i>The student will:</i></p> <p>5.1.2.4 <i>Recognize and generate equivalent decimals. Fractions, mixed numbers and improper fractions in various contexts.</i></p> <p>Example: When comparing 1.5 and $\frac{19}{12}$, note that $1.5 = 1\frac{1}{2} = 1\frac{6}{12} = \frac{18}{12}$, so $1.5 < \frac{19}{12}$.</p> <p>5.1.2.5 <i>Round numbers to the nearest 0.1, 0.01 and 0.001.</i></p> <p>Example: Fifth grade students used a calculator to find the mean of the monthly allowance in their class. The calculator display shows 25.80645161. Round this number to the nearest cent.</p>	<p>Benchmarks <i>The student will:</i></p> <p>6.1.2.3 <i>Determine the rate for ratios of quantities with different units.</i></p> <p>Example: 60 miles for every 3 hours is equivalent to 20 miles for every one hour (20 mph).</p> <p>6.1.2.4 <i>Use reasoning about multiplication and division to solve ratio and rate problems.</i></p> <p>Example: If 5 items cost \$3.75, and all items are the same price, then 1 item costs 75 cents, so 12 items cost \$ 9.00.</p>

I. Number & Operation (continued)

<p>Grade 3 Standard 1.3: Understand meanings and uses of fractions in real-world and mathematical situations.</p>	<p>Grade 4 Standard</p>	<p>Grade 5 Standard 1.3: Add and subtract fractions, mixed numbers and decimals to solve real-world and mathematical problems.</p>	<p>Grade 6 Standard 1.3: Multiply and divide decimals, fractions and mixed numbers; solve real-world and mathematical problems using arithmetic with positive rational numbers.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.1.3.1 <i>Read and write fractions with words and symbols. Recognize that fractions can be used to represent parts of a whole, parts of a set, points on a number line, or distances on a number line.</i></p> <p>Example: Parts of a shape ($\frac{3}{4}$ of a pie), parts of a set (3 out of 4 people), and measurements ($\frac{3}{4}$ of an inch).</p> <p>3.1.3.2 <i>Understand that the size of a fractional part is relative to the size of the whole.</i></p> <p>Example: One-half of a small pizza is smaller than one-half of a large pizza, but both represent one-half.</p> <p>3.1.3.3 <i>Order and compare units of fractions and fractions with like denominators by using models and an understanding of the concept of numerator and denominator.</i></p>	<p><i>There are no further standards in this category for 4th grade.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>5.1.3.1 <i>Add and subtract decimals and fractions, using efficient and generalizable procedures, including standard algorithms.</i></p> <p>5.1.3.2 <i>Model addition and subtraction of fractions and decimals using a variety of representations.</i></p> <p>Example: Represent $\frac{2}{3} + \frac{1}{4}$ and $\frac{2}{3} - \frac{1}{4}$ by drawing a rectangle divided into 4 columns and 3 rows and shading the appropriate parts or by using fraction circles or bars.</p> <p>5.1.3.3 <i>Estimate sums and differences of decimals and fractions to assess the reasonableness of results.</i></p> <p>Example: Recognize that $12\frac{2}{5} - 3\frac{3}{4}$ is between 8 and 9 (since $\frac{2}{5} < \frac{3}{4}$).</p> <p>5.1.3.4 <i>Solve real-world and mathematical problems requiring addition and subtraction of decimals, fractions and mixed numbers, including those involving measurement geometry and data.</i></p> <p>Example: Calculate the perimeter of the soccer field when the length is 109.7 meters and the width is 73.1 meters.</p>	<p>Benchmarks <i>The student will:</i></p> <p>6.1.3.1 <i>Multiply and divide decimals and fractions, using efficient and generalizable procedures, including standard algorithms.</i></p> <p>6.1.3.2 <i>Use the meanings of fractions, multiplication, division, and the inverse relationship between multiplication and division to make sense of procedures for multiplying and dividing fractions.</i></p> <p>Example: Just as $\frac{12}{4} = 3$ means $12 = 3 \times 4$, $\frac{2}{3} \div \frac{4}{5} = \frac{5}{6}$ means $\frac{5}{6} \times \frac{4}{5} = \frac{2}{3}$.</p> <p>6.1.3.3 <i>Calculate the percent of a number and determine what percent one number is of another number to solve problems in various contexts.</i></p> <p>Example: If John has \$45 and spends \$15, what percent of his money did he keep?</p> <p>6.1.3.4 <i>Solve real-world and mathematical problems requiring arithmetic with decimals, fractions, and mixed numbers.</i></p> <p>6.1.3.5 <i>Estimate solutions to problems with whole numbers, fractions and decimals and use the estimates to assess the reasonableness of results in the context of the problem.</i></p> <p>Example: The sum $\frac{1}{3} + 0.25$ can be estimated to be between $\frac{1}{2}$ and 1, and this estimate can be used to check the result of a more detailed calculation.</p>

II. Algebra

<p>Grade 3 Standard 2.1: Use single-operation input-output rules to represent patterns and relationships and to solve real-world and mathematical problems.</p>	<p>Grade 4 Standard 2.1: Use input-output rules, tables and charts to represent patterns and relationships and to solve real-world and mathematical problems.</p>	<p>Grade 5 Standard 2.1: Recognize and represent patterns of change; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p>	<p>Grade 6 Standard 2.1: Recognize and represent relationships between varying quantities; translate from one representation to another; use patterns, tables, graphs and rules to solve real-world and mathematical problems.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.2.1.1 <i>Create, describe, and apply single-operation input-output rules involving addition, subtraction and multiplication to solve problems in various contexts.</i></p> <p>Example: Describe the relationship between number of chairs and number of legs by the rule that the number of legs is four times the number of chairs.</p>	<p>Benchmarks <i>The student will:</i></p> <p>4.2.1.1 <i>Create and use input-output rules involving addition, subtraction, multiplication and division to solve problems in various contexts. Record the inputs and outputs in a chart or table.</i></p> <p>Example: If the rule is "multiply by 3 and add 4," record the outputs for given inputs in a table.</p> <p>Example: A student is given these three arrangements of dots:</p> <div style="text-align: center;">  </div> <p>Identify a pattern that is consistent with these figures, create an input-output rule that describes the pattern, and use the rule to find the number of dots in the 10th figure.</p>	<p>Benchmarks <i>The student will:</i></p> <p>5.2.1.1 <i>Create and use rules, tables, spreadsheets and graphs to describe patterns of change and solve problems.</i></p> <p>Example: An end-of-the-year party for 5th grade costs \$100 to rent the room and \$4.50 for each student. Know how to use a spreadsheet to create an input-output table that records the total cost of the party for any number of students between 90 and 150.</p> <p>5.2.1.2 <i>Use a rule or table to represent ordered pairs of positive integers and graph these ordered pairs on a coordinate system.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>6.2.1.1 <i>Understand that a variable can be used to represent a quantity that can change, often in relationship to another changing quantity. Use variables in various contexts.</i></p> <p>Example: If a student earns \$7 an hour in a job, the amount of money earned can be represented by a variable and is related to the number of hours worked, which also can be represented by a variable.</p> <p>6.2.1.2 <i>Represent the relationship between two varying quantities with function rules, graphs and tables; translate between any two of these representations.</i></p> <p>Example: Describe the terms in the sequence of perfect squares $t = 1, 4, 9, 16, \dots$ by using the rule $t = n^2$ for $n = 1, 2, 3, 4, \dots$</p>

II. Algebra (continued)

<p>Grade 3 Standard 2.2: Use number sentences involving multiplication and division basic facts and unknowns to represent and solve real-world and mathematical problems; create real-world situations corresponding to number sentences.</p>	<p>Grade 4 Standard 2.2: Use number sentences involving multiplication, division and unknowns to represent and solve real-world and mathematical problems; create real-world situations corresponding to number sentences.</p>	<p>Grade 5 Standard 2.2: Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving whole numbers.</p>	<p>Grade 6 Standard 2.2: Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving positive rational numbers.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.2.2.1 <i>Understand how to interpret number sentences involving multiplication and division basic facts and unknowns. Create real-world situations to represent number sentences.</i></p> <p>Example: The number sentence $8 \times m = 24$ could be represented by the question "How much did each ticket to a play cost if 8 tickets totaled \$24?"</p> <p>3.2.2.2 <i>Use multiplication and division basic facts to represent a given problem situation using a number sentence. Use number sense and multiplication and division basic facts to find values for the unknowns that make the number sentences true.</i></p> <p>Example: Find values of the unknowns that make each number sentence true</p> $6 = p \div 9$ $24 = a \times b$ $5 \times 8 = 4 \times t$ <p>Example: How many math teams are competing if there is a total of 45 students with 5 students on each team? This situation can be represented by $5 \times n = 45$ or $\frac{45}{5} = n$ or</p> $\frac{45}{n} = 5.$	<p>Benchmarks <i>The student will:</i></p> <p>4.2.2.1 <i>Understand how to interpret number sentences involving multiplication, division and unknowns. Use real-world situations involving multiplication or division to represent number sentences.</i></p> <p>Example: The number sentence $a \times b = 60$ can be represented by the situation in which chairs are being arranged in equal rows and the total number of chairs is 60.</p> <p>4.2.2.2 <i>Use multiplication, division and unknowns to represent a given problem situation using a number sentence. Use number sense, properties of multiplication, and the relationship between multiplication and division to find values for the unknowns that make the number sentences true.</i></p> <p>Example: If \$84 is to be shared equally among a group of children, the amount of</p> <p>money each child receives can be determined using the number sentence $84 \div n = d$.</p> <p>Example: Find values of the unknowns that make each number sentence true:</p> $12 \times m = 36$ $s = 256 \div t$	<p>Benchmarks <i>The student will:</i></p> <p>5.2.2.1 <i>Apply the commutative, associative and distributive properties and order of operations to generate equivalent numerical expressions and to solve problems involving whole numbers.</i></p> <p>Example: Purchase 5 pencils at 19 cents and 7 erasers at 19 cents. The numerical expression is $5 \times 19 + 7 \times 19$ which is the same as $(5 + 7) \times 19$.</p>	<p>Benchmarks <i>The student will:</i></p> <p>6.2.2.1 <i>Apply the associative, commutative and distributive properties and order of operations to generate equivalent expressions and to solve problems involving positive rational numbers.</i></p> <p>Example:</p> $\frac{32}{15} \times \frac{5}{6} = \frac{32 \times 5}{15 \times 6} = \frac{2 \times 16 \times 5}{3 \times 5 \times 3 \times 2} = \frac{16}{9} \times \frac{2}{2} \times \frac{5}{5} = \frac{16}{9}$ <p>Example: Use the distributive law to write:</p> $\frac{1}{2} + \frac{1}{3} \left(\frac{9}{2} - \frac{15}{8} \right) = \frac{1}{2} + \frac{1}{3} \times \frac{9}{2} - \frac{1}{3} \times \frac{15}{8} = \frac{1}{2} + \frac{3}{2} - \frac{5}{8} = 2 - \frac{5}{8} = 1\frac{3}{8}$

II. Algebra (continued)

Grade 3 Standards	Grade 4 Standards	Grade 5 Standard 2.2: Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving whole numbers.	Grade 6 Standard 2.2: Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving positive rational numbers.
<p><i>There are no further standards in this category for 3rd grade.</i></p>	<p><i>There are no further standards in this category for 2nd grade.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>5.2.2.1 <i>Apply the commutative, associative and distributive properties and order of operations to generate equivalent numerical expressions and to solve problems involving whole numbers.</i></p> <p>Example: Purchase 5 pencils at 19 cents and 7 erasers at 19 cents. The numerical expression is $5 \times 19 + 7 \times 19$ which is the same as $(5 + 7) \times 19$.</p>	<p>Benchmarks <i>The student will:</i></p> <p>6.2.2.1 <i>Apply the associative, commutative and distributive properties and order of operations to generate equivalent expressions and to solve problems involving positive rational numbers.</i></p> <p>Example:</p> $\frac{32}{15} \times \frac{5}{6} = \frac{32 \times 5}{15 \times 6} = \frac{2 \times 16 \times 5}{3 \times 5 \times 3 \times 2} = \frac{16}{9} \times \frac{2}{2} \times \frac{5}{5} = \frac{16}{9}$ <p>Example: Use the distributive law to write:</p> $\frac{1}{2} + \frac{1}{3} \left(\frac{9}{2} - \frac{15}{8} \right) = \frac{1}{2} + \frac{1}{3} \times \frac{9}{2} - \frac{1}{3} \times \frac{15}{8} = \frac{1}{2} + \frac{3}{2} - \frac{5}{8} = 2 - \frac{5}{8} = 1\frac{3}{8}$

II. Algebra (continued)

Grade 3 Standards	Grade 4 Standard	Grade 5 Standard 2.3: Understand and interpret equations and inequalities involving variables and whole numbers, and use them to represent and solve real-world and mathematical problems.	Grade 6 Standard 2.3: Understand and interpret equations and inequalities involving variables and positive rational numbers. Use equations and inequalities to represent real-world and mathematical problems; use the idea of maintaining equality to solve equations. Interpret solutions in the original context.
<p><i>There are no further standards in this category for 3rd grade.</i></p>	<p><i>There are no further standards in this category for 2nd grade.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>5.2.3.1 Determine whether an equation or inequality involving a variable is true or false for a given value of the variable.</p> <p>Example: Determine whether the inequality $1.5 + x < 10$ is true for $x = 2.8$, $x = 8.1$, or $x = 9.2$. same as $(5 + 7) \times 19$.</p> <p>5.2.3.2 Represent real-world situations using equations and inequalities involving variables. Create real-world situations corresponding to equations and inequalities.</p> <p>Example: $250 - 27 \times a = b$ can be used to represent the number of sheets of paper remaining from a packet of 250 sheets when each student in a class of 27 is given a certain number of sheets.</p> <p>5.2.3.3 Evaluate expressions and solve equations involving variables when values for the variables are given.</p> <p>Example: Using the formula, $A = \ell w$, determine the area when the length is 5, and the width 6, and find the length when the area is 24 and the width is 4.</p>	<p>Benchmarks <i>The student will:</i></p> <p>6.2.3.1 <i>Represent real-world or mathematical situations using equations and inequalities involving variables and positive rational numbers.</i></p> <p>Example: The number of miles m in a k kilometer race is represented by the equation $m = 0.62 k$.</p> <p>6.2.3.2 <i>Solve equations involving positive rational numbers using number sense, properties of arithmetic and the idea of maintaining equality on both sides of the equation. Interpret a solution in the original context and assess the reasonableness of results.</i></p> <p>Example: A cellular phone company charges \$0.12 per minute. If the bill was \$11.40 in April, how many minutes were used?</p>

III. Geometry & Measurement

<p>Grade 3 Standard 3.1: Use geometric attributes to describe and create shapes in various contexts.</p>	<p>Grade 4 Standard 3.1: Name, describe, classify and sketch polygons.</p>	<p>Grade 5 Standard 3.1: Describe, classify, and draw representations of three-dimensional figures.</p>	<p>Grade 6 Standard 3.1: Calculate perimeter, area, surface area and volume of two- and three-dimensional figures to solve real-world mathematical problems.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.3.1.1 <i>Identify parallel and perpendicular lines in various contexts, and use them to describe and create geometric shapes, such as right triangles, rectangles, parallelograms and trapezoids.</i></p> <p>3.3.1.2 <i>Sketch polygons with a given number of sides or vertices (corners), such as pentagons, hexagons and octagons.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>4.3.1.1 <i>Describe, classify and sketch triangles, including equilateral, right, obtuse and acute triangles. Recognize triangles in various contexts.</i></p> <p>4.3.1.2 <i>Describe, classify and draw quadrilaterals, including squares, rectangles, trapezoids, rhombuses, parallelograms and kites. Recognize quadrilaterals in various contexts.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>5.3.1.1 <i>Describe and classify three-dimensional figures including cubes, prisms and pyramids by the number of edges, faces or vertices as well as the types of faces.</i></p> <p>5.3.1.2 <i>Recognize and draw a net for a three-dimensional figure.</i></p> <p>Example: 50 cents can be made up of 2 quarters, or 4 dimes and 2 nickels, or many other combinations.</p>	<p>Benchmarks <i>The student will:</i></p> <p>6.3.1.1 <i>Calculate the surface area and volume of prisms and use appropriate units, such as cm^2 and cm^3. Justify the formulas used. Justifications may involve decomposition, nets or other models.</i></p> <p>Example: The surface area of a triangle prism can be found by decomposing the surface into two triangles and three rectangles.</p> <p>6.3.1.2 <i>Calculate the area of quadrilaterals. Quadrilaterals include squares, rectangles, rhombuses, parallelograms, trapezoids and kites. When formulas are used, be able to explain why they are valid.</i></p> <p>Example: The area of a kite is one-half the product of the lengths of the diagonals, and this can be justified by decomposing the kite into two triangles.</p> <p>6.3.1.3 <i>Estimate the perimeter and area of irregular figures on a grid when they cannot be decomposed into common figures and use correct units, such as cm and cm^2.</i></p>

III. Geometry & Measurement (continued)

<p>Grade 3 Standard 3.2: Understand perimeter as a measurable attribute of real-world and mathematical objects. Use various tools to measure distances.</p>	<p>Grade 4 Standard 3.2: Understand angle and area as measurable attributes of real-world and mathematical objects. Use various tools to measure angles and areas.</p>	<p>Grade 5 Standard 3.2: Determine the area of triangles and quadrilaterals; determine the surface area and volume of rectangular prisms in various contexts.</p>	<p>Grade 6 Standard 3.2: Understand and use relationships between angles in geometric figures.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.3.2.1 <i>Use half units when measuring distances.</i></p> <p>Example: Measure a person's height to the nearest half inch.</p> <p>3.3.2.2 <i>Find the perimeter of a polygon by adding the lengths of the sides.</i></p> <p>3.3.2.3 <i>Measure distances around objects.</i></p> <p>Example: Measure the distance around a classroom, or measure a person's wrist size.</p>	<p>Benchmarks <i>The student will:</i></p> <p>4.3.2.1 <i>Measure angles in geometric figures and real-world objects with a protractor or angle ruler.</i></p> <p>4.3.2.2 <i>Compare angles according to size. Classify angles as acute, right and obtuse.</i></p> <p>Example: Compare different hockey sticks according to the angle between the blade and the shaft.</p> <p>4.3.2.3 <i>Understand that the area of a two-dimensional figure can be found by counting the total number of same size square units that cover a shape without gaps or overlaps. Justify why length and width are multiplied to find the area of a rectangle by breaking the rectangle into one unit by one unit squares and viewing these as grouped into rows and columns.</i></p> <p>Example: How many copies of a square sheet of paper are needed to cover the classroom door? Measure the length and width of the door to the nearest inch and compute the area of the door.</p> <p>4.3.2.4 <i>Find the areas of geometric figures and real-world objects that can be divided into rectangular shapes. Use square units to label area measurements.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>5.3.2.1 <i>Develop and use formulas to determine the area of triangles, parallelograms and figures that can be decomposed into triangles.</i></p> <p>5.3.2.2 <i>Use various tools and strategies to measure the volume and surface area of objects that are shaped like rectangular prisms.</i></p> <p>Example: Use a net or decompose the surface into rectangles.</p> <p>Example: Measure the volume of a cereal box by using a ruler to measure its height, width and length, or by filling it with cereal and then emptying the cereal into containers of known volume.</p> <p>5.3.2.3 <i>Understand that the volume of a three-dimensional figure can be found by counting the total number of same-sized cubic units that fill a shape without gaps or overlaps. Use cubic units to label volume measurements.</i></p> <p>Example: Use cubes to find the volume of a small box.</p> <p>5.3.2.4 <i>Develop and use the formulas $V = lwh$ and $V = Bh$ to determine the volume of rectangular prisms. Justify why base area B and height h are multiplied to find the volume of a rectangular prism by breaking the prism into layers of unit cubes.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>6.3.2.1 <i>Solve problems using the relationships between the angles formed by intersecting lines.</i></p> <p>Example: If two streets cross, forming four corners such that one of the corners forms an angle of 120°, determine the measures of the remaining three angles.</p> <p>Example: Recognize that pairs of interior and exterior angles in polygons have measures that sum to 180°.</p> <p>6.3.2.2 <i>Determine missing angle measures in a triangle using the fact that the sum of the interior angles of a triangle is 180°. Use models of triangles to illustrate this fact.</i></p> <p>Example: Cut a triangle out of paper, tear off the corners and rearrange these corners to form a straight line.</p> <p>Example: Recognize that the measures of the two acute angles in a right triangle sum to 90°.</p> <p>6.3.2.3 <i>Develop and use formulas for the sums of the interior angles of polygons by decomposing them into triangles.</i></p>

III. Geometry & Measurement (continued)

<p>Grade 3 Standard 3.3: Use time, money and temperature to solve real-world and mathematical problems.</p>	<p>Grade 4 Standard 3.3: Use translations, reflections and rotations to establish congruency and understand symmetries.</p>	<p>Grade 5 Standard</p>	<p>Grade 6 Standard 3.3: Choose appropriate units of measurement and use ratios to convert within measurement systems to solve real-world and mathematical problems.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.3.3.1 <i>Tell time to the minute, using digital and analog clocks. Determine elapsed time to the minute.</i></p> <p>Example: Your trip began at 9:50 a.m. and ended at 3:10 p.m. How long were you traveling?</p> <p>3.3.3.2 <i>Know relationships among units of time.</i></p> <p>Example: Know the number of minutes in an hour, days in a week and months in a year.</p> <p>3.3.3.3 <i>Make change up to one dollar in several different ways, including with as few coins as possible.</i></p> <p>Example: A chocolate bar costs \$1.84. You pay for it with \$2. Give two possible ways to make change.</p> <p>3.3.3.4 <i>Use an analog thermometer to determine temperature to the nearest degree in Fahrenheit and Celsius.</i></p> <p>Example: Read the temperature in a room with a thermometer that has both Fahrenheit and Celsius scales. Use the thermometer to compare Celsius and Fahrenheit readings.</p>	<p>Benchmarks <i>The student will:</i></p> <p>4.3.3.1 <i>Apply translations (slides) to figures.</i></p> <p>4.3.3.2 <i>Apply reflections (flips) to figures by reflecting over vertical or horizontal lines and relate reflections to lines of symmetry.</i></p> <p>4.3.3.3 <i>Apply rotations (turns) of 90° clockwise or counter clockwise.</i></p> <p>4.3.3.4 <i>Recognize that translations, reflections and rotations preserve congruency and use them to show that two figures are congruent.</i></p>	<p><i>There are no further standards in this category for 5th grade.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>6.3.3.1 <i>Solve problems in various contexts involving conversion of weights, capacities, geometric measurements and times within measurement systems using appropriate units.</i></p> <p>6.3.3.2 <i>Estimate weights, capacities and geometric measurements using benchmarks in measurement systems with appropriate units.</i></p> <p>Example: Estimate the height of a house by comparing to a 6-foot man standing nearby.</p>

IV. Data Analysis

<p>Grade 3 Standard 4.1: Collect, organize, display, and interpret data. Use labels and a variety of scales and units in displays.</p>	<p>Grade 4 Standard 4.1: Collect, organize, display and interpret data, including data collected over a period of time and data represented by fractions and decimals.</p>	<p>Grade 5 Standard 4.1: Display and interpret data; determine mean, median and range.</p>	<p>Grade 6 Standard 4.1: Use probabilities to solve real-world and mathematical problems; represent probabilities using fractions, decimals and percents.</p>
<p>Benchmarks <i>The student will:</i></p> <p>3.4.1.1 <i>Collect, display and interpret data using frequency tables, bar graphs, picture graphs and number line plots having a variety of scales. Use appropriate titles, labels and units.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>4.4.1.1 <i>Use tables, bar graphs, timelines and Venn diagrams to display data sets. The data may include fractions or decimals. Understand that spreadsheet tables and graphs can be used to display data.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>5.4.1.1 <i>Know and use the definitions of the mean, median and range of a set of data. Know how to use a spreadsheet to find the mean, median and range of a data set. Understand that the mean is a “leveling out” of data.</i></p> <p>Example: The set of numbers 1, 1, 4, 6 has mean 3. It can be leveled by taking one unit from the 4 and three units from the 6 and adding them to the 1s, making four 3s.</p> <p>5.4.1.2 <i>Create and analyze double-bar graphs and line graphs by applying understanding of whole numbers, fractions and decimals. Know how to create spreadsheet tables and graphs to display data.</i></p>	<p>Benchmarks <i>The student will:</i></p> <p>6.4.1.1 <i>Determine the sample size (set of possible outcomes) for a given experiment and determine which members of the sample space are related to certain events. Sample space may be determined by the use of tree diagrams, tables or pictorial representations.</i></p> <p>Example: A 6 × 6 table with entries such as (1,1), (1,2), (1,3), ..., (6,6) can be used to represent the sample space for the experiment of simultaneously rolling two number cubes.</p> <p>6.4.1.2 <i>Determine the probability of an event using the ratio between the size of the event and the size of the sample space; represent probabilities a percents, fractions and decimals between 0 and 1 inclusive. Understand that probabilities measure likelihood.</i></p> <p>Example: Each outcome for a balanced number cube has probability $\frac{1}{6}$, and the probability of rolling an even number is $\frac{1}{2}$.</p>