

Number and Operations

Michigan's Mathematic Grade Level Content Expectations in Number and Operation are categorized into three domains:

- Meaning, notation, place value, and comparisons (ME)
- Number relationships and meaning of operations (MR)
- Fluency with operations and estimation (FL)

Within each of these domains, the expectations build to progressively incorporate work with expanding sets of numbers: whole numbers, fractions, decimal fractions, ratio, percentages, rational numbers, and the real numbers. There is strong emphasis on using connections within the structure of number systems (such as the inverse relationship between addition and subtraction, or multiplication and division) as conceptual organizers for supporting student learning. The Grade Level Content Expectations in *Number and Operations* are also designed to enable teachers and students to take up clusters of related ideas and procedures within a given grade level, sometimes working from the basic informal introduction of a concept completely through computational fluency within a particular grade.

Several of these expectations call for fluency, by which we mean efficiency and accuracy in computation. Teachers should help students become fluent in calculation by building from experience with concrete objects and pictorial representations, encouraging use of strategies and algorithms that can be used generally, and by emphasizing conceptual relationships among operations, through such tools as fact families. Fluency may depend on recall and automaticity with basic number facts, or on use of computational strategies.

NUMBER & OPERATIONS

ALGEBRA

MEASUREMENT

GEOMETRY

DATA & PROBABILITY

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Professional organization whose members have contributed to the development of Michigan's K-8 Grade Level Content Expectations through their work on committees:



Michigan Council of Teachers of Mathematics



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Meaning, Notation, Place Value, and Comparisons

Meaning, Notation, Place Value, and Comparisons									
K	1	2	3	4	5	6	7	8	
Whole Numbers									
<p>N.ME.00.01 <i>Count objects in sets up to 30.</i></p> <p>N.ME.00.04 <i>Read and write numbers to 30 and connect them to the quantities they represent.</i></p> <p>N.ME.00.02 Use one-to-one correspondence to compare and order sets of objects to 30 using phrases such as “same number”, “more than”, or “less than”; use counting and matching.</p> <p>N.ME.00.03 Compare and order numbers to 30 using phrases such as “more than” or “less than.”</p> <p>N.ME.00.06 Understand the numbers 1 to 30 as having one, or two, or three groups of ten and some ones. Also count by tens with objects in ten-groups to 100.</p> <p>N.ME.00.05 Count orally to 100 by ones. Count to 30 by 2’s, 5’s and 10’s using grouped objects as needed.</p>	<p>N.ME.01.01 Count to 110 by 1’s, 2’s, 5’s, and 10’s, starting from any number in the sequence; count to 500 by 100’s and 10’s; use ordinals to identify position in a sequence, e.g., 1st, 2nd, 3rd.</p> <p>N.ME.01.02 Read and write numbers to 110 and relate them to the quantities they represent.</p> <p>N.ME.01.03 Order numbers to 110; compare using phrases such as “same as”, “more than”, “greater than”, “fewer than”; use = symbol. Arrange small sets of numbers in increasing or decreasing order, e.g., write the following from smallest to largest: 21, 16, 35, 8.</p> <p>N.ME.01.04 Identify one more than, one less than, 10 more than, and 10 less than for any number up to 100.</p> <p>N.ME.01.05 Understand that a number to the right of another number on the number line is bigger and that a number to the left is smaller.</p> <p>N.ME.01.07 <i>Compose and decompose numbers through 30, including using bundles of tens and units, e.g., recognize 24 as 2 tens and 4 ones, 10 and 10 and 4, 20 and 4, and 24 ones.</i></p> <p>N.ME.01.06 Count backward by 1’s starting from any number between 1 and 100.</p> <p>N.ME.01.08 List number facts (partners inside of numbers) for 2 through 10, e.g., $8 = 7 + 1 = 6 + 2 = 5 + 3 = 4 + 4$; $10 = 8 + 2 = 2 + 8$.</p>	<p>N.ME.02.01 Count to 1000 by 1’s, 10’s, and 100’s starting from any number in the sequence.</p> <p>N.ME.02.02 Read and write numbers to 1000 in numerals and words, and relate them to the quantities they represent.</p> <p>N.ME.02.03 Compare and order numbers to 1000; use the symbols $>$ and $<$.</p> <p>N.ME.02.05 <i>Express numbers through 999 using place value, e.g., 137 is 1 hundred, 3 tens, and 7 ones; use concrete materials.</i></p> <p>N.ME.02.04 <i>Count orally by 3’s and 4’s starting with 0, and by 2’s, 5’s, and 10’s starting from any whole number.</i></p>	<p>N.ME.03.01 Read and write numbers to 10,000 in both numerals and words, and relate them to the quantities they represent, e.g., relate numeral or written word to a display of dots or objects.</p> <p>N.ME.03.03 Compare and order numbers up to 10,000.</p> <p>N.ME.03.02 <i>Identify the place value of a digit in a number, e.g., in 3,241, 2 is in the hundreds place. Recognize and use expanded notation for numbers using place value through 9,999, e.g., 2,517 is $2,000 + 500 + 10 + 7$; 4 hundreds and 2 ones is 402.</i></p> <p>N.ME.03.04 Count orally by 6’s, 7’s, 8’s, and 9’s, starting with 0, making the connection between repeated addition and multiplication.</p> <p>N.ME.03.05 Know that even numbers end in 0, 2, 4, 6, or 8; name a whole number quantity that can be shared in two equal groups or grouped into pairs with no remainders; recognize even numbers as multiples of 2. Know that odd numbers end in 1, 3, 5, 7, or 9, and work with patterns involving even and odd numbers.</p>	<p>N.ME.04.01 Read and write numbers to 1,000,000; relate them to the quantities they represent; compare and order.</p> <p>N.ME.04.03 Understand the magnitude of numbers up to 1,000,000; recognize the place values of numbers and the relationship of each place value to the place to its right, e.g., 1,000 is 10 hundreds.</p> <p>N.ME.04.02 Compose and decompose numbers using place value to 1,000,000’s, e.g., 25,068 is 2 ten thousands, 5 thousands, 0 hundreds, 6 tens, and 8 ones.</p> <p>N.ME.04.05 <i>List the first ten multiples of a given one-digit whole number; determine if a whole number is a multiple of a given one-digit whole number.</i></p> <p>N.ME.04.04 <i>Find all factors of any whole number through 50, list factor pairs, and determine if a one-digit number is a factor of a given whole number.</i></p> <p>N.ME.04.09 Multiply two-digit numbers by 2, 3, 4, and 5 using the distributive property, e.g., $21 \times 3 = (1 + 20) \times 3 = (1 \times 3) + (20 \times 3) = 3 + 60 = 63$.</p>					

* revised expectations in italics



Meaning, Notation, Place Value, and Comparisons

Fractions, Decimals, and Percentages					Rational Numbers, Exponents, and Real Numbers			
K	I	2	3	4	5	6	7	8
		<p>N.ME.02.18 Recognize, name, and represent commonly used unit fractions with denominators 12 or less; model $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ by folding strips.</p> <p>N.ME.02.20 Place 0 and halves, e.g., $\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$ on the number line; relate to a ruler.</p> <p>N.ME.02.22 Recognize that fractions such as $\frac{2}{2}$, $\frac{3}{3}$, and $\frac{4}{4}$ are equal to the whole (one).</p>	<p>N.ME.03.16 Understand that fractions may represent a portion of a whole unit that has been partitioned into parts of equal area or length; use the terms “numerator” and “denominator.”</p> <p>N.ME.03.18 Place fractions with denominators of 2, 4, and 8 on the number line; relate the number line to a ruler; compare and order up to three fractions with denominators 2, 4, and 8.</p> <p>N.ME.03.21 <i>Understand and relate decimal fractions to fractional parts of a dollar, e.g., $\frac{1}{2}$ dollar = \$0.50; $\frac{1}{4}$ dollar = \$0.25.</i></p>	<p>N.ME.04.20 Understand fractions as parts of a set of objects.</p> <p>N.ME.04.17 Locate tenths and hundredths on a number line.</p> <p>N.ME.04.15 Read and interpret decimals up to two decimal places; relate to money and place value decomposition.</p> <p>N.ME.04.18 Read, write, interpret, and compare decimals up to two decimal places.</p>	<p>N.ME.05.09 Understand percentages as parts out of 100, use % notation, and express a part of a whole as a percentage.</p> <p>N.ME.05.08 Understand the relative magnitude of ones, tenths, and hundredths and the relationship of each place value to the place to its right, e.g., one is 10 tenths, one tenth is 10 hundredths.</p>	<p>N.ME.06.05 Order rational numbers and place them on the number line.</p> <p>N.ME.06.17 Locate negative rational numbers (including integers) on the number line; know that numbers and their negatives add to 0, and are on opposite sides and at equal distance from 0 on a number line.</p>		
		<p>N.ME.02.19 Recognize, name, and write commonly used fractions: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$.</p> <p>N.ME.02.21 For unit fractions from $\frac{1}{12}$ to $\frac{1}{2}$, understand the inverse relationship between the size of a unit fraction and the size of the denominator; compare unit fractions from $\frac{1}{12}$ to $\frac{1}{2}$.</p>	<p>N.ME.03.17 Recognize, name, and use equivalent fractions with denominators 2, 4, and 8, using strips as area models.</p> <p>N.ME.03.19 Understand that any fraction can be written as a sum of unit fractions, e.g., $\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$.</p>	<p>N.ME.04.16 Know that terminating decimals represent fractions whose denominators are 10, 10×10, $10 \times 10 \times 10$, etc., e.g., powers of ten.</p> <p>N.ME.04.24 <i>Know that fractions of the form $\frac{m}{n}$ where m is greater than n, are greater than 1 and are called improper fractions; locate improper fractions on the number line.</i></p>	<p>N.ME.05.11 <i>Given two fractions, e.g., $\frac{1}{2}$ and $\frac{1}{4}$, express them as fractions with a common denominator, but not necessarily a least common denominator, e.g., $\frac{1}{2} = \frac{4}{8}$ and $\frac{3}{4} = \frac{6}{8}$; use denominators less than 12 or factors of 100.</i></p>	<p>N.ME.06.06 Represent rational numbers as fractions or terminating decimals when possible, and translate between these representations.</p>		<p>N.ME.08.03 Understand that in decimal form, rational numbers either terminate or eventually repeat, and that calculators truncate or round repeating decimals; locate rational numbers on the number line; know fraction forms of common repeating decimals, e.g., $0.\overline{1} = \frac{1}{9}$; $0.\overline{3} = \frac{1}{3}$.</p>
					<p>N.ME.05.12 <i>Find the product of two unit fractions with small denominators using an area model.</i></p>			
					<p>N.ME.05.10 Understand a fraction as a statement of division, e.g., $2 \div 3 = \frac{2}{3}$, using simple fractions and pictures to represent.</p>	<p>N.ME.06.07 Understand that a fraction or a negative fraction is a quotient of two integers, e.g., $-\frac{8}{3}$ is -8 divided by 3.</p> <p>N.ME.06.18 Understand that rational numbers are quotients of integers (non-zero denominators), e.g., a rational number is either a fraction or a negative fraction.</p> <p>N.ME.06.16 <i>Understand and use integer exponents, excluding powers of negative bases; express numbers in scientific notation.</i></p> <p>N.ME.06.19 Understand that 0 is an integer that is neither negative nor positive.</p> <p>N.ME.06.20 Know that the absolute value of a number is the value of the number ignoring the sign; or is the distance of the number from 0.</p>		<p>N.ME.08.04 Understand that irrational numbers are those that cannot be expressed as the quotient of two integers, and cannot be represented by terminating or repeating decimals; approximate the position of familiar irrational numbers, e.g., $\sqrt{2}$, $\sqrt{3}$, π, on the number line.</p> <p>N.ME.08.01 Understand the meaning of a square root of a number and its connection to the square whose area is the number; understand the meaning of a cube root and its connection to the volume of a cube.</p> <p>N.ME.08.02 Understand meanings for zero and negative integer exponents.</p>
						Rates, Ratio, and Proportion		
					<p>N.ME.05.23 Express ratios in several ways given applied situations, e.g., 3 cups to 5 people, 3:5, $\frac{3}{5}$; recognize and find equivalent ratios.</p>	<p>N.ME.06.11 Find equivalent ratios by scaling up or scaling down.</p>		

* revised expectations in italics



Number Relationships and Meanings for Operation								
K	1	2	3	4	5	6	7	8
Whole Numbers								
<p>N.MR.00.07 <i>Compose and decompose numbers from 2 to 10, e.g., $5 = 4 + 1 = 2 + 3$, with attention to the additive structure of number systems, e.g., 6 is one more than 5, 7 is one more than 6.</i></p> <p>N.MR.00.08 Describe and make drawings to represent situations/stories involving putting together and taking apart for totals up to 10; use finger and object counting.</p> <p>N.MR.00.09 Record mathematical thinking by writing simple addition and subtraction sentences, e.g., $7 + 2 = 9$, $10 - 8 = 2$.</p> <p>N.MR.00.10 Create, describe, and extend simple number patterns.</p>	<p>N.MR.01.10 <i>Model addition and subtraction for numbers through 30 for a given contextual situation using objects or pictures; explain in words; record using numbers and symbols; solve.</i></p> <p>N.MR.01.09 Compare two or more sets in terms of the difference in number of elements.</p> <p>N.MR.01.13 Apply knowledge of fact families to solve simple open sentences for addition and subtraction, such as: $\square + 2 = 7$ and $10 - \square = 6$.</p> <p>N.MR.01.11 Understand the inverse relationship between addition and subtraction, e.g., subtraction “undoes” addition: if $3 + 5 = 8$, we know that $8 - 3 = 5$ and $8 - 5 = 3$; recognize that some problems involving combining, “taking away”, or comparing can be solved by either operation.</p>	<p>N.MR.02.09 <i>Given a contextual situation that involves addition and subtraction using numbers through 99; model using objects or pictures; explain in words; record using numbers and symbols; solve.</i></p> <p>N.MR.02.07 Find the distance between numbers on the number line, e.g., how far is 79 from 26?</p> <p>N.MR.02.08 Find missing values in open sentences, e.g., $42 + \square = 57$; use relationship between addition and subtraction.</p> <p>N.MR.02.15 Understand division (\div) as another way of expressing multiplication, using fact families within the 5×5 multiplication table; emphasize that division “undoes” multiplication, e.g., $2 \times 3 = 6$ can be rewritten as $6 \div 2 = 3$ or $6 \div 3 = 2$.</p>	<p>N.MR.03.12 Find solutions to open sentences, such as $7 \times \square = 42$ or $12 \div \square = 4$, using the inverse relationship between multiplication and division.</p> <p>N.MR.03.09 Use multiplication and division fact families to understand the inverse relationship of these two operations, e.g., because $3 \times 8 = 24$, we know that $24 \div 8 = 3$ or $24 \div 3 = 8$; express a multiplication statement as an equivalent division statement.</p>	<p>N.MR.03.10 <i>Recognize situations that can be solved using multiplication and division including finding “How many groups?” and “How many in a group?” and write mathematical statements to represent those situations.</i></p>	<p>N.MR.04.06 Know that some numbers, including 2, 3, 5, 7, and 11 have exactly two factors (1 and the number itself) and are called prime numbers.</p> <p>N.MR.04.07 <i>Use factors and multiples to compose and decompose whole numbers.</i></p>	<p>N.MR.05.01 Understand the meaning of division of whole numbers with and without remainders; relate division to fractions and to repeated subtraction.</p> <p>N.MR.05.02 Relate division of whole numbers with remainders to the form $a = bq + r$, e.g., $34 \div 5 = 6 \text{ r } 4$, so $5 \cdot 6 + 4 = 34$; note remainder (4) is less than divisor (5).</p> <p>N.MR.05.07 <i>Find the prime factorization of numbers from 2 through 50, express in exponential notation, e.g., $24 = 2^3 \times 3^1$, and understand that every whole number greater than 1 is either prime or can be expressed as a product of primes.</i></p>	<p>N.MR.06.08 <i>Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.</i></p>	
		<p>N.MR.02.13 Understand multiplication as the result of counting the total number of objects in a set of equal groups, e.g., 3×5 gives the number of objects in 3 groups of 5 objects, or $3 \times 5 = 5 + 5 + 5 = 15$.</p> <p>N.MR.02.14 Represent multiplication using area and array models.</p> <p>N.MR.02.17 <i>Develop strategies for fluently multiplying numbers up to 5×5.</i></p>	<p>N.MR.03.14 <i>Solve division problems involving remainders, viewing the remainder as the “number left over”; interpret based on problem context, e.g., when we have 25 children with 4 children per group then there are 6 groups with 1 child left over.</i></p> <p>N.MR.03.15 Given problems that use any one of the four operations with appropriate numbers, represent with objects, words (including “product” and “quotient”), and mathematical statements; solve.</p>	<p>N.MR.04.13 Use the relationship between multiplication and division to simplify computations and check results.</p> <p>N.MR.04.14 <i>Solve contextual problems involving whole number multiplication and division.</i></p>	<p>N.MR.05.03 Write mathematical statements involving division for given situations.</p>			

* revised expectations in italics



Number Relationships and Meanings for Operation

Fractions, Decimals, and Percentages					Rational Numbers, Exponents, and Real Numbers			
K	1	2	3	4	5	6	7	8
				<p>N.MR.04.19 Write tenths and hundredths in decimal and fraction forms, and know the decimal equivalents for halves and fourths.</p> <p>N.MR.04.21 Explain why equivalent fractions are equal, using models such as fraction strips or the number line for fractions with denominators of 12 or less, or equal to 100.</p> <p>N.MR.04.22 <i>Locate fractions with denominators of 12 or less on the number line; include mixed numbers.</i></p> <p>N.MR.04.23 Understand the relationships among halves, fourths, and eighths and among thirds, sixths, and twelfths.</p> <p>N.MR.04.25 Write improper fractions as mixed numbers, and understand that a mixed number represents the number of “wholes” and the part of a whole remaining, e.g., $\frac{5}{4} = 1 + \frac{1}{4} = 1\frac{1}{4}$.</p> <p>N.MR.04.26 Compare and order up to three fractions with denominators 2, 4, and 8, and 3, 6, and 12, including improper fractions and mixed numbers.</p>	<p>N.MR.05.22 Express fractions and decimals as percentages and vice versa.</p>		<p>N.MR.07.06 Understand the concept of square root and cube root, and estimate using calculators.</p>	
			<p>N.MR.03.20 Recognize that addition and subtraction of fractions with equal denominators can be modeled by joining or taking away segments on the number line.</p>	<p>N.MR.04.27 <i>Add and subtract fractions less than 1 with denominators through 12 and/or 100, in cases where the denominators are equal or when one denominator is a multiple of the other, e.g., $\frac{1}{12} + \frac{5}{12} = \frac{6}{12}$; $\frac{1}{6} + \frac{5}{12} = \frac{7}{12}$; $\frac{3}{10} - \frac{23}{100} = \frac{7}{100}$.</i></p> <p>N.MR.04.28 <i>Solve contextual problems involving sums and differences for fractions where one denominator is a multiple of the other (denominators 2 through 12, and 100).</i></p> <p>N.MR.04.29 <i>Find the value of an unknown in equations such as $\frac{1}{8} + x = \frac{5}{8}$ or $\frac{3}{4} - y = \frac{1}{2}$.</i></p>	<p>N.MR.05.19 <i>Solve contextual problems that involve finding sums and differences of fractions with unlike denominators using knowledge of equivalent fractions.</i></p> <p>N.MR.05.21 <i>Solve for the unknown in equations such as $\frac{1}{4} + x = \frac{7}{12}$.</i></p> <p>N.MR.05.13 <i>Divide a fraction by a whole number and a whole number by a fraction, using simple unit fractions.</i></p>	<p>N.MR.06.03 Solve for the unknown in equations such as $\frac{1}{4} + \square = 1$, $\frac{3}{4} \div \square = \frac{1}{4}$, and $\frac{1}{2} = 1 \cdot \square$.</p> <p>N.MR.06.01 Understand division of fractions as the inverse of multiplication, e.g., if $\frac{4}{5} \div \frac{2}{3} = \square$, then $\frac{2}{3} \cdot \square = \frac{4}{5}$, so $\square = \frac{4}{5} \cdot \frac{3}{2} = \frac{12}{10}$.</p>	Rates, Ratio, and Proportion	
				<p>N.MR.04.30 Multiply fractions by whole numbers, using repeated addition and area or array models.</p> <p>N.MR.04.31 <i>For problems that use addition and subtraction of decimals through hundredths, represent with mathematical statements and solve.</i></p>	<p>N.MR.05.15 Multiply a whole number by powers of 10: 0.01, 0.1, 1, 10, 100, 1,000; and identify patterns.</p> <p>N.MR.05.17 Multiply one-digit and two-digit whole numbers by decimals up to two decimal places.</p>	<p>N.MR.06.13 <i>Solve contextual problems involving percentages such as sales taxes and tips.</i></p>	<p>N.MR.07.04 Convert ratio quantities between different systems of units, such as feet per second to miles per hour.</p> <p>N.MR.07.02 <i>Solve problems involving derived quantities such as density, velocity, and weighted averages.</i></p>	<p>N.MR.08.07 Understand percent increase and percent decrease in both sum and product form, e.g., 3% increase of a quantity x is $x + .03x = 1.03x$.</p> <p>N.MR.08.08 Solve problems involving percent increases and decreases.</p> <p>N.MR.08.10 Calculate weighted averages such as course grades, consumer price indices, and sports ratings.</p>

* revised expectations in italics



Fluency with Operations and Estimation

	K	1	2	3	4	5	6	7	8	
	Whole Numbers									
	<p>N.FL.01.12 Know all the addition facts up to $10 + 10$, and solve the related subtraction problems fluently.</p> <p>N.FL.01.16 Compute sums and differences through 30 using number facts and strategies, but no formal algorithm.</p> <p>N.FL.01.14 Add three one-digit numbers.</p>	<p>N.FL.02.06 Decompose 100 into addition pairs, e.g., $99 + 1$, $98 + 2$...</p> <p>N.FL.02.10 Add fluently two numbers through 99, using strategies including formal algorithms; subtract fluently two numbers through 99.</p> <p>N.FL.02.11 Estimate the sum of two numbers with three digits.</p>	<p>N.FL.03.06 Add and subtract fluently two numbers through 999 with regrouping and through 9,999 without regrouping.</p> <p>N.FL.03.07 Estimate the sum and difference of two numbers with three digits (sums up to 1,000), and judge reasonableness of estimates.</p>	<p>N.FL.04.08 Add and subtract whole numbers fluently.</p>						
	<p>N.FL.01.15 Calculate mentally sums and differences involving: a two-digit number and a one-digit number without regrouping; a two-digit number and a multiple of 10.</p>	<p>N.FL.02.12 Calculate mentally sums and differences involving: three-digit numbers and ones; three-digit numbers and tens; three-digit numbers and hundreds.</p>	<p>N.FL.03.08 Use mental strategies to fluently add and subtract two-digit numbers.</p> <p>N.FL.03.13 Mentally calculate simple products and quotients up to a three-digit number by a one-digit number involving multiples of 10, e.g., 500×6, or $400 \div 8$.</p>	<p>N.FL.04.36 Make appropriate estimations and calculations fluently with whole numbers using mental math strategies.</p>	<p>N.FL.05.16 Divide numbers by 10's, 100's, 1,000's using mental strategies.</p>					
			<p>N.FL.03.11 Find products fluently up to 10×10; find related quotients using multiplication and division relationships.</p>	<p>N.FL.04.10 Multiply fluently any whole number by a one-digit number and a three-digit number by a two-digit number; for a two-digit by one-digit multiplication use distributive property to develop meaning for the algorithm.</p> <p>N.FL.04.11 Divide numbers up to four-digits by one-digit numbers and by 10.</p> <p>N.FL.04.12 Find the value of the unknowns in equations such as $a \div 10 = 25$; $125 \div b = 25$.</p>	<p>N.FL.05.04 Multiply a multi-digit number by a two-digit number; recognize and be able to explain common computational errors such as not accounting for place value.</p> <p>N.FL.05.06 Divide fluently up to a four-digit number by a two-digit number.</p>					
				<p>N.FL.04.34 Estimate the answers to calculations involving addition, subtraction, or multiplication.</p> <p>N.FL.04.35 Know when approximation is appropriate and use it to check the reasonableness of answers; be familiar with common place-value errors in calculations.</p>	<p>N.FL.05.05 Solve applied problems involving multiplication and division of whole numbers.</p>					

Fluency with Operations and Estimation

* revised expectations in italics



Fluency with Operations and Estimation

Fractions, Decimals, and Percentages					Rational Numbers, Exponents, and Real Numbers			
K	1	2	3	4	5	6	7	8
					<p>N.FL.05.14 Add and subtract fractions with unlike denominators through 12 and/or 100, using the common denominator that is the product of the denominators of the 2 fractions, e.g., $\frac{3}{8} + \frac{1}{5}$: use 80 as the common denominator.</p>			
						<p>N.FL.06.04 Multiply and divide any two fractions, including mixed numbers, fluently.</p>		
				<p>N.FL.04.32 Add and subtract decimals through hundredths.</p> <p>N.FL.04.33 Multiply and divide decimals up to two decimal places by a one-digit whole number where the result is a terminating decimal, e.g., $0.42 \div 3 = 0.14$, but not $5 \div 3 = 1.6$.</p>		<p>N.FL.06.09 Add and multiply integers between -10 and 10; subtract and divide integers using the related facts. Use the number line and chip models for addition and subtraction.</p> <p>N.FL.06.10 Add, subtract, multiply and divide positive rational numbers fluently.</p> <p>N.FL.06.12 Calculate part of a number given the percentage and the number.</p>	<p>N.FL.07.08 Add, subtract, multiply, and divide positive and negative rational numbers fluently.</p>	
					<p>N.FL.05.18 Use mathematical statements to represent an applied situation involving addition and subtraction of fractions.</p>	<p>N.FL.06.02 Given an applied situation involving dividing fractions, write a mathematical statement to represent the situation.</p>		
					<p>N.FL.05.20 Solve applied problems involving fractions and decimals; include rounding of answers and checking reasonableness.</p>	<p>N.FL.06.14 For applied situations, estimate the answers to calculations involving operations with rational numbers.</p> <p>N.FL.06.15 Solve applied problems that use the four operations with appropriate decimal numbers.</p>	<p>N.FL.07.09 Estimate results of computations with rational numbers.</p> <p>N.FL.07.07 Solve problems involving operations with integers.</p>	<p>N.FL.08.05 Estimate and solve problems with square roots and cube roots using calculators.</p> <p>N.FL.08.06 Find square roots of perfect squares and approximate the square roots of non-perfect squares by locating them between consecutive integers, e.g., $\sqrt{130}$ is between 11 and 12.</p>
							Rates, Ratio, and Proportion	
							<p>N.FL.07.03 Calculate rates of change including speed.</p> <p>N.FL.07.05 Solve proportion problems using such methods as unit rate, scaling, finding equivalent fractions, and solving the proportion equation $a/b = c/d$; know how to see patterns about proportional situations in tables.</p>	<p>N.FL.08.09 Solve problems involving compounded interest or multiple discounts.</p> <p>N.FL.08.11 Solve problems involving ratio units, such as miles per hour, dollars per pound, or persons per square mile.</p>

* revised expectations in italics