Number and Operation standards: Book K

Count, write, and order numbers

N.ME.00.01 Count objects in sets up to 30.

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.

N.ME.00.03 Compare and order numbers to 30 using phrases such as "more than" or "less than."

N.ME.00.04 Read and write numbers to 30 and connect them to the quantities they represent.

N.ME.00.05 Count orally to 100 by ones. Count to 30 by 2's, 5's and10's using grouped objects as needed.

Compose and decompose numbers

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.

N.MR.00.07 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.

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.

Add and subtract numbers

N.MR.00.09 Record mathematical thinking by writing simple addition and subtraction sentences, e.g., 7 + 2 = 9, 10 - 8 = 2.

Explore number patterns

N.MR.00.10 Create, describe, and extend simple number patterns.

Number and Operation standards: Book 1

Count, write, and order numbers

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.

N.ME.01.02 Read and write numbers to 110 and relate them to the quantities they represent.

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.

N.ME.01.04 Identify one more than, one less than, 10 more than, and 10 less than for any number up to 100.

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.

N.ME.01.06 Count backward by 1's starting from any number between 1 and 100.

Explore place value

N.ME.01.07 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.

Add and subtract whole numbers

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.

N.MR.01.09 Compare two or more sets in terms of the difference in number of elements.

N.MR.01.10 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.

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.

N.FL.01.12 Know all the addition facts up to 10 + 10, and solve the related subtraction problems fluently.

N.MR.01.13 Apply knowledge of fact families to solve simple open sentences for addition and subtraction, such as: ☐+ 2 = 7 and 10 -☐= 6.

N.FL.01.14 Add three one-digit numbers.

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.

N.FL.01.16 Compute sums and differences through 30 using number facts and strategies, but no formal algorithm.

Number and Operation standards: Book 2

Count, write, and order whole numbers

N.ME.02.01 Count to 1000 by 1's, 10's and 100's starting from any number in the sequence.

N.ME.02.02 Read and write numbers to 1000 in numerals and words, and relate them to the quantities they represent.

N.ME.02.03 Compare and order numbers to 1000; use the symbols > and <.

N.ME.02.04 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.

Understand place value

N.ME.02.05 Express numbers through 999 using place value, e.g., 137 is 1 hundred, 3 tens, and 7 ones; use concrete materials.

Add and subtract whole numbers

N.FL.02.06 Decompose 100 into addition pairs, e.g., 99 + 1, 98 + 2…

N.MR.02.07 Find the distance between numbers on the number line, e.g., how far is 79 from 26?

N.MR.02.08 Find missing values in open sentences, e.g., 42 +☐ = 57; use relationship between addition and subtraction.

N.MR.02.09 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.

N.FL.02.10 Add fluently two numbers through 99, using strategies including formal algorithms; subtract fluently two numbers through 99.

N.FL.02.11 Estimate the sum of two numbers with three digits.

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.

Understand meaning of multiplication and division

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 x 5 gives the number of objects in 3 groups of 5 objects, or 3 x 5 = 5 + 5 + 5 = 15.

N.MR.02.14 Represent multiplication using area and array models.

N.MR.02.15 Understand division (÷) as another way of expressing multiplication, using fact families within the 5 x 5 multiplication table; emphasize that division "undoes" multiplication, e.g., 2 x 3 = 6 can be rewritten as 6 ÷ 2 = 3 or 6 ÷ 3 = 2.

N.MR.02.16 Given a situation involving groups of equal size or of sharing equally, represent with objects, words, and symbols; solve.

N.MR.02.17 Develop strategies for fluently multiplying numbers up to 5 x 5.

Work with unit fractions

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.

N.ME.02.19 Recognize, name, and write commonly used fractions: $\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{1}{4}$, $\frac{2}{4}$, and $\frac{3}{4}$.

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.

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 $\frac{1}{2}$.

N.ME.02.22 Recognize that fractions such $\frac{2}{2}$, $\frac{3}{3}$, and $\frac{4}{4}$ are equal to the whole (one).

Number and Operation standards: Book 3

Understand and use number notation and place value

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.

N.ME.03.02 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 2000+ 500+10+ 7; 4 hundreds and 2 ones is 402.

N.ME.03.03 Compare and order numbers up to 10,000.

Count in steps, and understand even and odd numbers

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.

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.

Add and subtract whole numbers

N.FL.03.06 Add and subtract fluently two numbers through 999 with regrouping and through 9,999 without regrouping.

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.

N.FL.03.08 Use mental strategies to fluently add and subtract two-digit numbers.

Multiply and divide whole numbers

N.MR.03.09 Use multiplication and division fact families to understand the inverse relationship of these two operations, e.g., because 3 x 8 = 24, we know that 24 ÷ 8 = 3 or 24 ÷ 3 = 8; express a multiplication statement as an equivalent division statement.

N.MR.03.10 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.

N.FL.03.11 Find products fluently up to 10 x 10; find related quotients using multiplication and division relationships.

N.MR.03.12 Find solutions to open sentences, such as 7 x ☐ = 42 or 12 ÷ ☐ = 4, using the inverse relationship between multiplication and division.

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 x 6, or 400 ÷ 8.

N.MR.03.14 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.

Problem-solving with whole numbers

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.

Understand simple fractions, relation to the whole, and addition and subtraction of fractions

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."

N.ME.03.17 Recognize, name, and use equivalent fractions with denominators 2, 4, and 8, using strips as area models.

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.

N.ME.03.19 Understand that any fraction can be written as a sum of unit fractions, e.g., $\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$.

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.

Understand simple decimal fractions in relation to money

N.ME.03.21 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.

Number and Operation standards: Book 4

Understand and use number notation and place value

N.ME.04.01 Read and write numbers to 1,000,000; relate them to the quantities they represent; compare and order.

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.

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.

Use factors and multiples

N.ME.04.04 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.

N.ME.04.05 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.

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.

N.MR.04.07 Use factors and multiples to compose and decompose whole numbers.

Add and subtract whole numbers

N.FL.04.08 Add and subtract whole numbers fluently.

Multiply and divide whole numbers

N.ME.04.09 Multiply two-digit numbers by 2, 3, 4, and 5 using the distributive property, e.g., $21 \times 3 = (1 + 20) \times 3 = (1 \times 3) + (20 \times 3) = 3 + 60 = 63$.

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.

N.FL.04.11 Divide numbers up to four-digits by one-digit numbers and by 10.

N.FL.04.12 Find the value of the unknowns in equations such as a ÷ 10 = 25; 125 ÷ b = 25.

N.MR.04.13 Use the relationship between multiplication and division to simplify computations and check results.

N.MR.04.14 Solve contextual problems involving whole number multiplication and division.

Read, interpret and compare decimal fractions

N.ME.04.15 Read and interpret decimals up to two decimal places; relate to money and place value decomposition.

N.ME.04.16 Know that terminating decimals represents fractions whose denominators are 10, 10 x 10, 10 x 10 x 10, etc., e.g., powers of 10.

N.ME.04.17 Locate tenths and hundredths on a number line.

N.ME.04.18 Read, write, interpret, and compare decimals up to two decimal places.

N.MR.04.19 Write tenths and hundredths in decimal and fraction forms, and know the decimal equivalents for halves and fourths.

Understand fractions

N.ME.04.20 Understand fractions as parts of a set of objects.

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.

N.MR.04.22 Locate fractions with denominators of 12 or less on the number line; include mixed numbers.

N.MR.04.23 Understand the relationships among halves, fourths, and eighths and among thirds, sixths, and twelfths.

N.ME.04.24 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.

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., $\frac{5}{4} = 1 + \frac{1}{4} = 1\frac{1}{4}$.

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.

Add and subtract fractions

N.MR.04.27 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. $\frac{1}{12} + \frac{5}{12} = \frac{6}{12}$; $\frac{1}{6} + \frac{5}{12} = \frac{7}{12}$; $\frac{3}{10} - \frac{23}{100} = \frac{7}{100}$.

N.MR.04.28 Solve contextual problems involving sums and differences for fractions where one denominator is a multiple of the other (denominators 2 through 12, and 100).

N.MR.04.29 Find the value of an unknown in equations such as $\frac{1}{8} + x = \frac{5}{8}$ or $\frac{3}{4} - y = \frac{1}{2}$.

Multiply fractions by whole numbers

N.MR.04.30 Multiply fractions by whole numbers, using repeated addition and area or array models.

Add and subtract decimal fractions

N.MR.04.31 For problems that use addition and subtraction of decimals through hundredths, represent with mathematical statements and solve.

N.FL.04.32 Add and subtract decimals through hundredths.

Multiply and divide decimal fractions

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 ÷ 3 = 0.14, but not 5 ÷ 3 = 1.6.

Estimate

N.FL.04.34 Estimate the answers to calculations involving addition, subtraction, or multiplication.

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.

N.FL.04.36 Make appropriate estimations and calculations fluently with whole numbers using mental math strategies.

Number and Operation standards: Book 5

Understand division of whole numbers

N.MR.05.01 Understand the meaning of division of whole numbers with and without remainders; relate division to fractions and to repeated subtraction.

N.MR.05.02 Relate division of whole numbers with remainders to the form $a = bq + r$, e.g., $34 \div 5 = 6$ r 4, so $5 \cdot 6 + 4 = 34$; note remainder (4) is less than divisor (5).

N.MR.05.03 Write mathematical statements involving division for given situations.

Multiply and divide whole numbers

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.

N.FL.05.05 Solve applied problems involving multiplication and division of whole numbers.

N.FL.05.06 Divide fluently up to a four-digit number by a two-digit number.

Find prime factorizations of whole numbers

N.MR.05.07 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.

Understand meaning of decimal fractions and percentages

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.

N.ME.05.09 Understand percentages as parts out of 100, use % notation, and express a part of a whole as a percentage.

Understand fractions as division statements; find equivalent fractions

N.ME.05.10 Understand a fraction as a statement of division, e.g., 2 ÷ 3 = $\frac{2}{3}$, using simple fractions and pictures to represent.

N.ME.05.11 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.

Multiply and divide fractions

N.ME.05.12 Find the product of two unit fractions with small denominators using an area model.

N.MR.05.13 Divide a fraction by a whole number and a whole number by a fraction, using simple unit fractions.

Add and subtract fractions using common denominators

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., $\frac{3}{8} + \frac{7}{10}$: use 80 as the common denominator.

Multiply and divide by powers of ten

N.MR.05.15 Multiply a whole number by powers of 10: 0.01, 0.1, 1, 10, 100, 1,000; and identify patterns.

N.FL.05.16 Divide numbers by 10's, 100's, 1,000's using mental strategies.

N.MR.05.17 Multiply one-digit and two-digit whole numbers by decimals up to two decimal places.

Solve applied problems with fractions

N.FL.05.18 Use mathematical statements to represent an applied situation involving addition and subtraction of fractions.

N.MR.05.19 Solve contextual problems that involve finding sums and differences of fractions with unlike denominators using knowledge of equivalent fractions.

N.FL.05.20 Solve applied problems involving fractions and decimals; include rounding of answers and checking reasonableness.

N.MR.05.21 Solve for the unknown in equations such as $\frac{1}{4} + x = \frac{7}{12}$.

Express, interpret, and use ratios; find equivalences

N.MR.05.22 Express fractions and decimals as percentages and vice versa.

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.

Number and Operation standards: Book 6

Multiply and divide fractions

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 $\square = \frac{4}{5} \cdot \frac{3}{2} = \frac{12}{10}$.

N.FL.06.02 Given an applied situation involving dividing fractions, write a mathematical statement to represent the situation.

N.MR.06.03 Solve for the unknown in equations such as $\frac{1}{4} \div \square = 1$, $\frac{3}{4} \div \square = \frac{1}{4}$, and $\frac{1}{2} = 1 \cdot \square$.

N.FL.06.04 Multiply and divide any two fractions, including mixed numbers, fluently.

Represent rational numbers as fractions or decimals

N.ME.06.05 Order rational numbers and place them on the number line.

N.ME.06.06 Represent rational numbers as fractions or terminating decimals when possible, and translate between these representations.

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.

Add and subtract integers and rational numbers

N.MR.06.08 Understand integer subtraction as the inverse of integer addition. Understand integer division as the inverse of integer multiplication.

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.

N.FL.06.10 Add, subtract, multiply and divide positive rational numbers fluently.

Find equivalent ratios

N.ME.06.11 Find equivalent ratios by scaling up or scaling down.

Solve decimal, percentage and rational number problems

N.FL.06.12 Calculate part of a number given the percentage and the number.

N.MR.06.13 Solve contextual problems involving percentages such as sales taxes and tips.

N.FL.06.14 For applied situations, estimate the answers to calculations involving operations with rational numbers.

N.FL.06.15 Solve applied problems that use the four operations with appropriate decimal numbers.

Use exponents

N.ME.06.16 Understand and use integer exponents, excluding powers of negative bases; express numbers in scientific notation.

Understand rational numbers and their location on the number line

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.

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.

N.ME.06.19 Understand that 0 is an integer that is neither negative nor positive.

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.

Number and Operation standards: Book 7

Understand derived quantities

N.MR.07.02 Solve problems involving derived quantities such as density, velocity, and weighted averages.

Understand and solve problems involving rates, ratios, and proportions

N.FL.07.03 Calculate rates of change including speed.

N.MR.07.04 Convert ratio quantities between different systems of units, such as feet per second to miles per hour.

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.

Recognize irrational numbers

N.MR.07.06 Understand the concept of square root and cube root, and estimate using calculators.

Compute with rational numbers

N.FL.07.07 Solve problems involving operations with integers.

N.FL.07.08 Add, subtract, multiply, and divide positive and negative rational numbers fluently.

N.FL.07.09 Estimate results of computations with rational numbers.

Number and Operation standards: Book 8

Understand real number concepts

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.

N.ME.08.02 Understand meanings for zero and negative integer exponents.

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., $0.\overline{1} = \frac{1}{9}$; $0.\overline{3} = \frac{1}{3}$.

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.

N.FL.08.05 Estimate and solve problems with square roots and cube roots using calculators.

N.FL.08.06 Find square roots of perfect squares and approximate the square roots of non-perfect squares by locating between consecutive integers, e.g., $\sqrt{130}$ is between 11 and 12.

Solve problems

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.

N.MR.08.08 Solve problems involving percent increases and decreases.

N.FL.08.09 Solve problems involving compounded interest or multiple discounts.

N.MR.08.10 Calculate weighted averages such as course grades, consumer price indices, and sports ratings.

N.FL.08.11 Solve problems involving ratio units, such as miles per hour, dollars per pound, or persons per square mile.