**K-5 Computation and Estimation Progression**

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| **ADDITION AND SUBTRACTION (Whole Numbers)** |
| **K** | **1** | **2** |
| **K.6 The student will model and solve single-step story and picture problems with sums to 10 and differences within 10, using concrete objects.*** Model and solve various types of story and picture problems using 10 or fewer concrete objects. (Types of problems should include joining, separating, and part-part-whole scenarios.)
 | **1.6 The student will create and solve single-step story and picture problems using addition and subtraction within 20.*** Create and solve single-step oral or written story and picture problems, using addition and subtraction within 20.
* Identify a number sentence to solve an oral or written story and picture problem, selecting from among addition and/or subtraction equations (e.g., number sentences).
* Combine parts contained in larger numbers up to 20 by using related combinations (e.g., 9 + 7 can be thought of as 9 broken up into 2 and 7; using doubles, 7 + 7 = 14; 14 + 2 = 16 or 7 broken up into 1 and 6; making a ten, 1 + 9 = 10; 10 + 6 = 16).
* Explain strategies used to solve addition and subtraction problems within 20 using spoken words, objects, pictorial models, and number sentences.
 | **2.5 The student will** 1. **recognize and use the relationships between addition and subtraction to solve single-step practical problems, with whole numbers to 20; and**
2. **demonstrate fluency with addition and subtraction within 20.**
* Recognize and use the relationship between addition and subtraction to solve single-step practical problems, with whole numbers to 20. (a)
* Determine the missing number in an equation (number sentence) (e.g., 3 + = 5 or + 2 = 5; 5 – = 3 or 5 – 2 = ). (a)
* Write the related facts for a given addition or subtraction fact (e.g., given 3 + 4 = 7, write 7 – 4 = 3 and 7 – 3 = 4). (a)
* Demonstrate fluency with addition and subtraction within 20. (b)
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| *SOL K.4 from Kindergarten NNS Strand:***K.4 The student will**1. **recognize and describe with fluency part-whole relationships for numbers up to 5; and**
2. **investigate and describe part-whole relationships for numbers up to 10.**
* Recognize and describe with fluency part-whole relationships for numbers up to 5 in a variety of configurations. (a)
* Investigate and describe part-whole relationships for numbers up to 10 using a variety of configurations. (b)
 | **1.7 The student will** 1. **recognize and describe with fluency part-whole relationships for numbers up to 10; and**
2. **demonstrate fluency with addition and subtraction within 10.**
3. Recognize and describe with fluency part-whole relationships for numbers up to 10 in a variety of configurations. (a)
4. Identify + as a symbol for addition, − as a symbol for subtraction, and = as a symbol for equality. (b)
5. Demonstrate fluency with addition and subtraction within 10. (b)
 | **2.6 The student will**1. estimate sums and differences;
2. determine sums and differences, using various methods; and
3. create and solve single-step and two-step practical problems involving addition and subtraction.
* Estimate the sum of two whole numbers whose sum is 99 or less and recognize whether the estimation is reasonable (e.g., 27 + 41 is about 70, because 27 is about 30 and 41 is about 40, and 30 + 40 is 70). (a)
* Estimate the difference between two whole numbers each 99 or less and recognize whether the estimate is reasonable. (a)
* Determine the sum of two whole numbers whose sum is 99 or less, using various methods. (b)
* Determine the difference of two whole numbers each 99 or less, using various methods. (b)
* Create and solve single-step practical problems involving addition or subtraction. (c)
* Create and solve two-step practical problems involving addition, subtraction, or both addition and subtraction. (c)
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| **OPERATIONS WITH WHOLE NUMBERS** |
| **3** | **4** | **5** |
| **3.3 The student will** 1. **estimate and determine the sum or difference of two whole numbers; and**
2. **create and solve single-step and multistep practical problems involving sums or differences of two whole numbers, each 9,999 or less.**
* Determine whether an estimate or an exact answer is an appropriate solution for practical addition and subtraction problems involving single-step and multistep problems. (a, b)
* Estimate the sum of two whole numbers with sums to 9,999. (a)
* Estimate the difference of two whole numbers, each 9,999 or less. (a)
* Apply strategies, including place value and the properties of addition, to add two whole numbers with sums to 9,999. (a, b)
* Apply strategies, including place value and the properties of addition, to subtract two whole numbers, each 9,999 or less. (a, b)
* Use inverse relationships between addition and subtraction facts to solve practical problems. (b)
* Create and solve single-step and multistep practical problems involving the sum or difference of two whole numbers, each 9,999 or less. (b)

**3.4 The student will** 1. **represent multiplication and division through 10 × 10, using a variety of approaches and models;**
2. **create and solve single-step practical problems that involve multiplication and division through 10 × 10;**
3. **demonstrate fluency with multiplication facts of 0, 1, 2, 5, and 10; and**

**d) solve single-step practical problems involving multiplication of whole numbers, where one factor is 99 or less and the second factor is 5 or less.*** Represent multiplication using a variety of approaches and models (e.g., repeated addition, equal-sized groups, arrays, equal jumps on a number line, skip counting). (a)
* Represent division using a variety of approaches and models (e.g., repeated subtraction, equal sharing, equal groups). (a)
* Write three related equations (fact sentences) when given one equation (fact sentence) for multiplication or division (e.g., given 6 x 7 = 42, write 7 x 6 = 42, 42 ÷ 7 = 6, and 42 ÷ 6 = 7. (a)
* Create practical problems to represent a multiplication or division fact. (b)
* Use multiplication and division basic facts to represent a given situation, using a number sentence. (b)
* Recognize and use the inverse relationship between multiplication and division to solve practical problems. (b)
* Solve single-step practical problems that involve multiplication and division of whole numbers through 10 × 10. (b)
* Demonstrate fluency with multiplication facts of 0, 1, 2, 5, and 10. (c)
* Solve single-step practical problems involving multiplication of whole numbers, where one factor is 99 or less and the second factor is 5 or less. (d)
 | **4.4 The student will**1. demonstrate fluency with multiplication facts through 12 × 12, and the corresponding division facts;
2. estimate and determine sums, differences, and products of whole numbers;
3. estimate and determine quotients of whole numbers, with and without remainders; and
4. create and solve single-step and multistep practical problems involving addition, subtraction, and multiplication, and single-step practical problems involving division with whole numbers.
* Demonstrate fluency with multiplication through 12 × 12, and the corresponding division facts. (a)
* Estimate whole number sums, differences, products, and quotients, with and without context. (b, c)
* Apply strategies, including place value and the properties of addition to determine the sum or difference of two whole numbers, each 999,999 or less. (b)
* Apply strategies, including place value and the properties of multiplication and/or addition, to determine the product of two whole numbers when both factors have two digits or fewer. (b)
* Apply strategies, including place value and the properties of multiplication and/or addition, to determine the quotient of two whole numbers, given a one-digit divisor and a two- or three-digit dividend, with and without remainders. (c)
* Refine estimates by adjusting the final amount, using terms such as *closer to, between*, and *a little more than*. (b, c)
* Create and solve single-step and multistep practical problems involving addition, subtraction, and multiplication with whole numbers. (d)
* Create and solve single-step practical problems involving division with whole numbers. (d)
* Use the context in which a practical problem is situated to interpret the quotient and remainder. (d)
 | **5.4 The student will create and solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of whole numbers.*** Create single-step and multistep practical problems involving addition, subtraction, multiplication, and division of whole numbers, with and without remainders.
* Estimate the sum, difference, product, and quotient of whole numbers.
* Apply strategies, including place value and application of the properties of addition and multiplication, to solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of whole numbers, with and without remainders, in which:
* sums, differences, and products do not exceed five digits;
* factors do not exceed two digits by three digits;
* divisors do not exceed two digits; or
* dividends do not exceed four digits.
* Use the context of a practical problem to interpret the quotient and remainder.

**5.7 The student will simplify whole number numerical expressions using the order of operations.*** Use the order of operations to simplify whole number numerical expressions, limited to addition, subtraction, multiplication, and division. Expressions may contain parentheses.
* Given a whole number numerical expression involving more than one operation, describe which operation is completed first, which is second, etc.
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| **OPERATIONS WITH FRACTIONS** |
| **3** | **4** | **5** |
| **3.5 The student will solve practical problems that involve addition and subtraction with proper fractions having like denominators of 12 or less.**• Solve practical problems that involve addition and subtraction with proper fractions having like denominators of 12 or less, using concrete and pictorial models representing area/regions (e.g., circles, squares, and rectangles), length/measurements (e.g., fraction bars and strips), and sets (e.g., counters).  | **4.5 The student will**a) determine common multiples and factors, including least common multiple and greatest common factor;b) add and subtract fractions and mixed numbers having like and unlike denominators; andc) solve single-step practical problems involving addition and subtraction with fractions and mixed numbers.* Determine common multiples and common factors of numbers. (a)
* Determine the least common multiple and greatest common factor of no more than three numbers. (a)
* Determine a common denominator for fractions, using common multiples. Common denominators should not exceed 60. (b)
* Estimate the sum or difference of two fractions. (b, c)
* Add and subtract fractions (proper or improper) and/or mixed numbers, having like and unlike denominators limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction. (Subtraction with fractions will be limited to problems that do not require regrouping). (b)
* Solve single-step practical problems that involve addition and subtraction with fractions (proper or improper) and/or mixed numbers, having like and unlike denominators limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction. (Subtraction with fractions will be limited to problems that do not require regrouping). (c)
 | **5.6 The student will** 1. **solve single-step and multistep practical problems involving addition and subtraction with fractions and mixed numbers; and**
2. **solve single-step practical problems involving multiplication of a whole number, limited to 12 or less, and a proper fraction, with models.**
* Solve single-step and multistep practical problems involving addition and subtraction with fractions (proper or improper) having like and unlike denominators and/or mixed numbers. Denominators in the problems should be limited to 12 or less (e.g., $\frac{5}{8}$ + $\frac{1}{4}$, $\frac{5}{6} $− $\frac{2}{3}$, 3$\frac{3}{4}$ + 2$\frac{5}{12} $) and answers should be expressed in simplest form. (a)
* Solve single-step practical problems involving multiplication of a whole number, limited to 12 or less, and a proper fraction (e.g., 6 × $\frac{1}{3}$, $\frac{1}{4}$ × 8, 9 × $\frac{2}{3}$), with models. The denominator will be a factor of the whole number and answers should be expressed in simplest form. (b)
* Apply the inverse property of multiplication in models. (For example, use a visual fraction model to represent $\frac{4}{4}$ or 1 as the product of 4 × $\frac{1}{4}$). (b)
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| **OPERATIONS WITH DECIMALS** |
| **4** | **5** |
| **4.6 The student will**1. add and subtract decimals; and
2. solve single-step and multistep practical problems involving addition and subtraction with decimals.
* Estimate sums and differences of decimals. (a)
* Add and subtract decimals through thousandths, using concrete materials, pictorial representations, and paper and pencil. (a)
* Solve single-step and multistep practical problems that involve adding and subtracting with decimals through thousandths. (b)
 | **5.5 The student will**1. estimate and determine the product and quotient of two numbers involving decimals; and
2. create and solve single-step and multistep practical problems involving addition, subtraction, and multiplication of decimals, and create and solve single-step practical problems involving division of decimals.
* Estimate and determine the product of two numbers in which:
* the factors do not exceed two digits by two digits (e.g., 2.3 × 4.5, 0.08 × 0.9, 0.85 × 2.3, 1.8 × 5); and
* the products do not exceed the thousandths place. (Leading zeroes will not be considered when counting digits.) (a)
* Estimate and determine the quotient of two numbers in which
* quotients do not exceed four digits with or without a decimal point;
* quotients may include whole numbers, tenths, hundredths, or thousandths;
* divisors are limited to a single digit whole number or a decimal expressed as tenths; and
* no more than one additional zero will need to be annexed. (a)
* Use multiple representations to model multiplication and division of decimals and whole numbers. (a)
* Create and solve single-step and multistep practical problems involving addition, subtraction, and multiplication of decimals. (b)
* Create and solve single-step practical problems involving division of decimals. (b)
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