

Grades 3–5: Number and Operations

STANDARD **I.** **Understand numbers, ways of representing numbers, relationships among numbers, and number systems.**

EXPECTATION **A.** **Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals.**

3	4	5
*1. Explain the place value structure of whole numbers through hundred thousands.	1. Explain the place value structure of whole numbers including periods (thousands, millions, billions, etc.).	
2. Read and write whole numbers.		
3. Compare whole numbers using symbols ($>$, $<$, $=$) and words (<i>is greater than</i> , <i>is less than</i> , and <i>equals</i>).		
4. Identify the place value of decimals through hundredths using concrete and pictorial models.		1. Describe the place value structure of decimals.
5. Read and write decimals through hundredths based on concrete and pictorial models.		2. Read and write decimals.
6. Compare decimals (through hundredths) using symbols ($>$, $<$, and $=$) and words (<i>is greater than</i> , <i>is less than</i> , and <i>equals</i>) with concrete and pictorial models.	*2. Compare decimals (through hundredths) using symbols ($>$, $<$, and $=$) and words (<i>is greater than</i> , <i>is less than</i> , and <i>equals</i>).	*3. Order lists of three or more numbers that contain whole numbers, decimals, or both.
7. Read and write amounts of money using the dollar sign (\$) and decimal notation (.		

EXPECTATION B. Recognize equivalent representations for the same number and generate them by decomposing and composing numbers.

3	4	5
<p>*1. Recognize equivalent representations for the same whole number by decomposing and composing whole numbers up through three digits.</p> <p>2. Write three-digit whole numbers in standard form, in expanded form, and in words.</p>	<p>1. Write whole numbers in standard form, in expanded form, and in words.</p>	<p>1. Write decimals (ten thousandths) in standard form, in expanded form, and in words.</p>

EXPECTATION C. Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers.

3	4	5
<p>*1. Describe fractional parts of a unit or a group of objects ($1/100$, $1/10$, $1/8$, $1/6$, $1/5$, $1/4$, $1/3$, and $1/2$).</p>	<p>1. Describe fractional parts of collections of objects.</p> <p>2. Locate points on a number line corresponding to a unit fraction and its multiples between 0 and 1.</p>	<p>1. Name and write mixed numbers and improper fractions shown in concrete and pictorial models.</p> <p>2. Locate points on a number line corresponding to mixed numbers and improper fractions.</p> <p>3. Explain the relationship between fractions and division.</p>

EXPECTATION D. Use models, benchmarks, and equivalent forms to judge the size of fractions.

3	4	5
	<p>1. Relate the size of fractions to the benchmark fractions of 0, $1/2$, and 1.</p> <p>2. Compare concrete or pictorial models of fractions using the symbols $>$, $<$, and $=$.</p>	<p>1. Relate the size of fractions to the benchmark fractions 0, $1/4$, $1/2$, $3/4$, and 1.</p> <p>*2. Compare fractions using symbols ($>$, $<$, and $=$) and words (<i>is greater than</i>, <i>is less than</i>, and <i>equals</i>).</p>

EXPECTATION E. Recognize and generate equivalent forms of commonly used fractions, decimals, and percents.

3	4	5
*1. Represent equivalent forms of commonly used fractions using concrete and pictorial models.	1. Write equivalent forms of commonly used fractions. 2. Write equivalent forms of decimals.	1. Represent fractions as decimals and percents using concrete and pictorial models. *2. Identify equivalent relationships among fractions, decimals, and percents such as $1/4 = .25 = 25\%$, $1/3 = .33 = 33\ 1/3\%$, $2/5 = .40 = 40\%$, $1/2 = .50 = 50\%$, and $3/4 = .75 = 75\%$.
	*3. Identify and represent common fraction-decimal equivalents.	

EXPECTATION F. Explore numbers less than 0 by extending the number line and through familiar applications.

3	4	5
	1. Identify situations in which numbers less than 0 are used.	1. Describe numbers less than 0 using real world models.

EXPECTATION G. Describe classes of numbers according to characteristics such as the nature of their factors.

3	4	5
1. Describe and identify the characteristics of even and odd numbers by examining their divisibility by 2.	*1. Determine the factors of a given number up to 50. *2. Determine common multiples of pairs of whole numbers each of which is less than or equal to 12.	1. Identify a number as prime, composite, or neither. *2. Explain the characteristics of prime numbers and composite numbers. *3. Determine the least common multiple of two whole numbers.

STANDARD II. Understand meanings of operations and how they relate to one another.

EXPECTATION A. Understand various meanings of multiplication and division.

3	4	5
*1. Describe the meaning of multiplication using concrete and pictorial models.		*1. Solve problems using multiplication and division.
*2. Describe the meaning of division using concrete and pictorial models.	1. Explain the meaning of a remainder.	

EXPECTATION B. Understand the effects of multiplying and dividing whole numbers.

3	4	5
	1. Explain the effect on the product when one of the factors is changed.	1. Describe and explain the effect on the product when both factors are changed.
	2. Compare the size of the quotient to the dividend when dividing two whole numbers.	2. Describe and explain the effect on the quotient when the divisor is changed.

EXPECTATION C. Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems.

3	4	5
*1. Use the inverse relationships between addition and subtraction to solve problems.	*1. Use the inverse relationships between multiplication and division to solve problems.	*1. Describe the relationships among the four operations.
		2. Solve multiplication problems such as rates and applications of the Fundamental Counting Principle.

EXPECTATION D. Understand and use properties of operations, such as the distributivity of multiplication over addition.

3	4	5
1. Recognize commutativity in the addition facts.	1. Recognize commutativity in the multiplication facts.	
2. Use the associative property to add efficiently.	*2. Use the associative and distributive properties to multiply efficiently.	
	3. Apply divisibility rules for 2, 5, and 10.	1. Apply the divisibility rules for 3, 6, and 9.

STANDARD III. Compute fluently and make reasonable estimates.

EXPECTATION A. Develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 30 x 50.

3	4	5
1. Recall multiplication and division facts through 9.		
*2. Use basic number combinations to compute related problems in multiplication and division using multiples of 10 (e.g., using 3 x 5 to compute 30 x 5).	1. Use basic number combinations to compute related problems in multiplication and division using multiples of 100 and 1,000.	

EXPECTATION B. Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.

3	4	5
1. Compare and contrast different addition and subtraction algorithms to select the most efficient one for solving a given problem.	*1. Construct and analyze algorithms for all operations on whole numbers.	
2. Construct and analyze concrete models (rectangular arrays) for multiplication of one- and two-digit numbers.		1. Find the quotient and a remainder given a dividend of four digits or less and a divisor of two digits or less.
*3. Demonstrate fluency in the use of both addition and subtraction algorithms and explain the steps involved.	*2. Demonstrate fluency in the use of a multiplication algorithm and explain the steps involved.	*2. Demonstrate fluency in the use of a division algorithm and explain the steps involved.
		3. Explain computational strategies used to solve mathematical problem situations.

EXPECTATION C. Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results.

3	4	5
1. Round whole numbers to the nearest 10, 100, and 1,000.	1. Round whole numbers to the nearest 10,000, 100,000, and 1,000,000.	
2. Estimate whole number sums and differences, describe the method used, and determine the reasonableness of the results.	*2. Estimate and determine the reasonableness of the product of whole numbers (one factor with two digits or less and the other factor with three digits or less).	1. Use estimation as a tool for judging the reasonableness of calculator, mental, and paper-and-pencil computations.
	3. Estimate the quotient of whole numbers with a one-digit divisor, a two-digit divisor, and multiples of 10 and determine the reasonableness of results.	*2. Apply a variety of computational estimation strategies to solve problems involving whole numbers.
	4. Refine estimates using terms such as <i>closer to</i> , <i>between</i> , and <i>a little more than</i> .	

EXPECTATION D. Develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience.

3	4	5
	1. Round decimals to the nearest tenth and hundredth. 2. Develop and use strategies to estimate sum and difference of decimals.	1. Round decimals to the nearest tenth, hundredth, and thousandth. *2. Estimate the sum and difference of decimals through thousandths and determine the reasonableness of the results.

EXPECTATION E. Use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals.

3	4	5
		*1. Add and subtract commonly used fractions using concrete models, pictorial models, and equivalent forms. 2. Multiply commonly used fractions (including decimals) using area models. 3. Relate connections between products of fractions and products of decimals using area models. *4. Add and subtract decimals through thousandths.
	1. Add and subtract decimals through hundredths using concrete and pictorial models.	

EXPECTATION F. Select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculation, and paper and pencil according to the context and nature of the computation and use the selected method or tool.

3	4	5
*1. Select appropriate methods and tools and use the selected method or tool to solve addition and subtraction problems.	*1. Explain why a particular method or tool may be the most appropriate one to use in solving a given problem.	*1. Create and solve problems involving addition, subtraction, multiplication, and division of whole numbers using appropriate methods and tools.