GOAL 6: Demonstrate and apply a knowledge and sense of numbers, including numeration and operations (+, -, x, ÷) patterns, ratios, and proportions.
Standard A: Demonstrate knowledge and use of numbers and their representation in a broad range of theoretical and practical settings.

As a result of their schooling students will be able to…

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Identify, say and read numerals, 0-100. 2. Create sets to match number symbols 0-20. 3. Use number line for counting, addition, and subtraction, skip counting. 4. Compare numbers (equal, greater, less).	1. Count with understanding, including skip counting by 2's, 5's and 10's from zero to 100. 2. Recognize 'how many' in sets of objects. 3. Demonstrate the concept of odd and even using manipulatives. 4. Develop initial understanding of place value and the base-ten number system using manipulatives. 5. Describe numeric relationships using appropriate vocabulary. 6. Differentiate between cardinal and ordinal numbers in quantifying and ordering numbers. 7. Connect number words and numerals to the quantities they represent. 8. Describe parts of a whole using 1/2, 1/3 and 1/4. 9. Order concrete representations of unit fractions.	1. Count with understanding, including skip counting from any number by 2's and 10's. 2. Extend initial understanding of place value and the base-ten number system using multiple models (to 5 places, i.e. 10,000). 3. Describe numeric relationships using comparison notation. 4. Use cardinal and ordinal numbers appropriately. 5. Recognize and explain the concept of odd and even numbers. 6. Describe parts of a set using 1/2, 1/3 and 1/4. 7. Represent, order, label and compare unit fractions using concrete materials.	1. Read, write and say numbers with five digits. 2. Identify the place value of six digit numbers. 3. Compare and order numbers up to four digits. 4. Skip count and group multiples (2 through 10). 5. Recognize equivalent representations of whole numbers and generate them by composing and decomposing numbers (e.g., 123 = 100 + 20 + 3). 6. Recognize and write fractions; and compare parts to the whole with pictorial models. 7. Explore and talk about uses of decimals.	1. Represent, order and compare decimals to demonstrate understanding of the place-value structure in the base-ten number system (to .01). 2. Identify, represent, order and compare whole numbers up to seven digits. 3. Identify prime numbers through 100. 4. Recognize and generate equivalent representations for decimals (e.g., 0.15 = 0.1 + 0.05). 5. Explore fractions as parts of unit wholes, as parts of a set, as locations on a number line and as divisions of whole numbers. 6. Explore numbers less than zero by extending a number line and through familiar applications.

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Standard A: Demonstrate knowledge and use of numbers and their representation in a broad range of theoretical and practical settings.

As a result of their schooling students will be able to…

Grade 5	Grade 6	Grade 7	Grade 8/Pre-Algebra/ Algebra
1. Place mixed numbers and decimals on a number line. 2. Show equivalent representations of a number by changing from one form to another form (e.g., standard form to expanded form, fraction to decimal, decimal to percent). 3. Differentiate how fractions are used (part of a whole, part of a set, location on a number line, and division of a whole number). 4. Analyze how the size of the whole affects the size of the fraction (e.g., 1/2 of a large pizza is not the same as 1/2 of a small pizza). 5. Describe integers using familiar applications (e.g., a thermometer, above/below sea level). 6. Read, write, say, and compare whole numbers (to billions) and decimals (to thousandths). 7. Solve problems involving descriptions of numbers including characteristics and relationships (e.g., odd/even, factors/multiples, greater than, less than, square numbers).	1. Represent place values from units through billions using powers of ten. 2. Represent, order, compare, and graph integers. 3. Identify fractional pieces that have the same value but different shapes. 4. Compare and order fractions and decimals efficiently and find their approximate position on a number line. 5. Represent repeated factors using exponents.	1. Represent any large number using scientific notation. 2. Show relationships between sets of numbers, including rational numbers, whole numbers, natural numbers, and integers.	1. Read, write, and recognize equivalent representations of integer powers of 10. 2. Read, write, recognize, model, and interpret integers, including translating numerical expressions. 3. Recognize, translate between, and apply multiple representations of rational numbers (decimals, fractions, mixed numbers, percents, and roots). 4. Use scientific notation to represent numbers and solve problems. 5. Represent repeated factors using exponents. 6. Identify, locate, order, and compare rational and irrational numbers (e.g., π, $\sqrt{2}$, $\sqrt{5}$) using a number line. 7. Solve problems involving descriptions of numbers, including characteristics and relationships (e.g. exponents, roots, prime/composite, prime factorization, greatest common factor, least common multiple).

GOAL 6: Demonstrate and apply a knowledge and sense of numbers, including numeration and operations (+, -, x, ÷) patterns, ratios, and proportions.
Standard B: Investigate, represent and solve problems using number facts, operations (+, -, x, ÷) and their properties, algorithms, and relationships.

As a result of their schooling students will be able to…

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
5. Order numerals to 100. 6. Explore addition and subtraction using manipulatives, pictures and other visual aids. 7. Solve one-step whole number problems.	1. Solve one-step addition and subtraction number sentences and word problems using concrete materials. 2. Construct number sentences to match word problems. 3. Demonstrate and describe the effects of adding and subtracting whole numbers using appropriate mathematical notation and vocabulary. 4. Explore and apply properties of addition and subtraction. 5. Compute using fact families. 6. Solve one-step addition and subtraction facts with answers up to 18.	1. Solve two-step addition and subtraction number sentences and word problems. 2. Demonstrate the relationship between addition and subtraction. 3. Explore multiplication and division through equal grouping and equal sharing of objects. 4. Connect repeated addition to multiplication. 5. Demonstrate fluency with basic addition and subtraction facts (up to 20). 6. Solve up to three-digit addition and subtraction with and without regrouping/renaming.	1. Add and subtract 4-digit numbers with and without regrouping. 2. Demonstrate fluency with basic multiplication and division facts through twelve. 3. Multiply and divide two digit numbers by one digit. 4. Solve simple addition or subtraction number sentences using fractions with <u>like</u> denominators. 5. Solve multi-step problems by choosing the correct operation addition, subtraction, or multiplication. 6. Explore, identify and use relationships between and among properties of operations (e.g., commutative property applies to addition but not to subtraction).	1. Describe classes of numbers according to characteristics such as factors and multiples. 2. Solve addition or subtraction number sentences and word problems using fractions with <u>like</u> denominators. 3. Solve multi-step number sentences and word problems using whole numbers and the four basic operations. 4. Select and use one of various algorithms to multiply (up to three digits by two digits). 5. Select and use one of various algorithms to divide (up to three digits by one digit). 6. Solve money problems up to $100.00 and make change.

GOAL 6: Demonstrate and apply a knowledge and sense of numbers, including numeration and operations (+, -, x, ÷) patterns, ratios, and proportions.
Standard B: Investigate, represent and solve problems using number facts, operations (+, -, x, ÷) and their properties, algorithms, and relationships.

As a result of their schooling students will be able to…

Grade 5	Grade 6	Grade 7	Grade 8/Pre-Algebra/ Algebra
1. Determine whether a number is prime or composite. 2. Identify all the whole number factors of a composite number. 3. Compute with powers of 10. 4. Explore and use divisibility rules. 5. Solve number sentences and word problems using addition and subtraction of decimals and fractions with unlike denominators.	1. Write prime factorizations of numbers. 2. Determine the least common multiple and the greatest common factor of a set of numbers. 3. Demonstrate the meaning of multiplication of fractions (e.g., 1/2 x 3 is 1/2 of a group of three objects). 4. Simplify basic arithmetic expressions with rational numbers using the field properties and the order of operations. 5. Recognize and use the inverse relationships of addition and subtraction, multiplication and division to simplify computations and solve problems. 6. Solve multiplication and division number sentences and word problems with whole numbers and familiar fractions.	1. Write prime factorizations of numbers. 2. Describe relationships between prime factorizations and properties of squares, primes, and composites. 3. Classify numbers according to the number of whole number factors (e.g., square numbers have an odd number of factors). 4. Demonstrate and describe the effects of multiplying or dividing by a fraction less than or greater than one. 5. Simplify arithmetic expressions containing exponents using the field properties and the order of operations. 6. Justify rules of divisibility for 2, 3, 4, 5, 6 and 10. 7. Solve multi-step number sentences and word problems with rational numbers using the four basic operations.	1. Solve problems and number sentences involving addition, subtraction, multiplication and division using rational numbers, exponents and roots. 2. Identify and apply order of operations to simplify numeric expressions involving integers (including exponents and roots), fractions and decimals. 3. Identify and apply the following properties of operations with rational numbers: ~ The commutative and associative properties for addition and multiplication; ~ The distributive property; ~ The additive and multiplicative identity properties; ~ The additive and multiplicative inverse properties; ~ The multiplicative property of zero. 4. Describe the effect of multiplying and dividing by numbers, including the effects of multiplying or dividing a rational number by: 1. A number less than zero; 2. Zero 3. A number between zero and one; 4. A number greater than one. 5. Select, use and justify appropriate operations, methods and tools to compute or estimate with rational numbers. Verify solutions and determine the reasonableness of results. 6. Estimate the square root of a number less than 1000 between two whole numbers (e.g., $2\sqrt{200}$ is between 14 & 15).

GOAL 6: Demonstrate and apply a knowledge and sense of numbers, including numeration and operations (+, -, x, ÷) patterns, ratios, and proportions.
Standard C: Compute and estimate using mental mathematics, paper-and-pencil methods, calculators and computers.

As a result of their schooling students will be able to…

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Use manipulatives to solve problems with numbers 0-10. 2. Estimate and check guesses using manipulatives. 3. Identify and explore use of a calculator. 4. Solve simple math problems as applied to daily activities.	1. Develop and use strategies for whole number computations with a focus on addition and subtraction. 2. Use mental math counting strategies. 3. Describe reasonable and unreasonable sums and differences. 4. Explore and utilize a calculator for counting patterns. 5. Solve horizontal and vertical sums and differences.	1. Explain and use mental math strategies to solve simple addition and subtraction problems. 2. Estimate sums and differences of one- or two-digit numbers. 3. Analyze situations to determine whether exact numbers or estimates are appropriate. 4. Explore and utilize a calculator to solve addition and subtraction problems.	1. Use mental math to solve two-digit addition and subtraction without regrouping. 2. Round to the nearest ten, hundred and thousand. 3. Estimate to determine reasonable answers. 4. Use calculators, computers and other technology for drill and practice and to solve problems.	1. Develop and use strategies (e.g., compatible numbers, front-end estimation) to estimate the results of whole-number computations and to judge the reasonableness of such results. 2. Estimate the sum or difference of a number sentence containing decimals using a variety of strategies. 3. Use calculators, computers, and other technology to solve problems.

GOAL 6: Demonstrate and apply a knowledge and sense of numbers, including numeration and operations (+, -, x, ÷) patterns, ratios, and proportions.
Standard C: Compute and estimate using mental mathematics, paper-and-pencil methods, calculators and computers.

As a result of their schooling students will be able to…

Grade 5	Grade 6	Grade 7	Grade8/Pre-Algebra/ Algebra
1. Select and use appropriate operation(s) and tool(s) (e.g., mental math, pencil-and-paper, estimation, calculator, computer) to perform calculations on whole numbers, fractions and decimals. 2. Use strategies to estimate answers. 3. Determine and justify whether exact answers or estimates are appropriate.	1. Select and use appropriate operations, methods and tools to compute or estimate using whole numbers with natural number exponents. 2. Analyze algorithms for computing with whole numbers, familiar fractions and decimals and develop fluency in their use.	1. Select, use and justify appropriate operations, methods and tools to compute or estimate with integers and familiar rational numbers. 2. Develop, use and explain strategies to compute exact answers mentally with integers and simple rational numbers using a variety of techniques (e.g., estimate and compensate, halve and double, compatible numbers, decomposition and recomposition using the distributive property). 3. Analyze algorithms for computing with percents, proportions and rational numbers; develop fluency in their use.	See Goal 6, Standard B (combined Standards B and C)

GOAL 6: Demonstrate and apply a knowledge and sense of numbers, including numeration and operations (+, -, x, ÷) patterns, ratios, and proportions.
Standard D: Solve problems using comparison of quantities, ratios, proportions and percents.

As a result of their schooling students will be able to…

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Compare the number of objects in groups.	1. Compare two or more sets, using manipulatives, to solve problems.	1. Compare unit fractions, using manipulatives, to solve problems.	1. Compare quantities using "greater than," " less than," "equal to" and "not equal to" as well as their symbols ">," "<" and "=," "≠".	1. Compare quantities using "greater than," " less than," "equal to" and "not equal to" as well as their symbols ">," "<" and "=," "≠". 2. Determine 50% and 100% of a given group in context.

GOAL 6: Demonstrate and apply a knowledge and sense of numbers, including numeration and operations (+, -, x, ÷) patterns, ratios, and proportions.
Standard D: Solve problems using comparison of quantities, ratios, proportions and percents.

As a result of their schooling students will be able to…

Grade 5	Grade 6	Grade 7	Grade 8/Pre-Algebra/ Algebra
1. Identify and express ratios using appropriate notation (i.e., a/b, a to b, a:b). 2. Model the concept of percent using manipulatives or drawings. 3. Solve problems involving proportional relationships, including unit pricing (e.g., one apple costs 20 cents, so four apples cost 80 cents).	1. Solve number sentences and word problems using percents. 2. Demonstrate and explain the meaning of percents, including greater than 100 and less than 1. 3. Create and explain a pattern that shows a constant ratio. 4. Analyze situations to determine whether ratios are appropriate to solve problems. 5. Determine equivalent ratios.	1. Work flexibly with fractions, decimals and percents to solve number sentences and word problems (e.g., 50% of 10 is the same as 0.5 x 10). 2. Create and explain ratios and proportions that represent quantitative relationships and equivalent ratios that represent given situations; develop, use, analyze and explain methods for solving numeric or word problems involving proportions.	1. Use ratios to describe problem situations. 2. Develop, use, analyze and explain methods for solving number sentences, geometric similarities or word problems involving proportions with rational numbers. 3. Read, write, recognize, model and interpret percents, including those less than 1% and grater than 100%. 4. Solve number sentences and problems involving fractions, decimals and percents (e.g., percent increase and decrease, interest rates, tax, discounts, tips).