VALWOOD

GO BEYOND

First Grade Math Curriculum

1st Grade Overview- Math

Course Description

In first grade, instructional time should focus on four critical areas: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

Topics at a Glance

- Numbers 0 - 120
- Fluently add and subtract within 10
- Solve a variety of addition and subtraction problems within 20
- Use place value and materials to add within 100
- Identify and combine coins
- Organize, represent, and interpret data
- Measure of lengths using non-standard units
- Time to the nearest hour/half hour
- Describe, compose, and decompose shapes

Assessments

- Assessment tasks from adopted instructional materials
- Teacher made tests and worksheets
- Teacher observations

Grade Level Expectations

Standard	Big Ideas for First Grade
1. Number Sense, properties, and operations	1. The whole number system describes place value relationships within and beyond 100 and forms the foundation for efficient algorithms 2. Number relationships can be used to solve addition and subtraction problems
2. Patterns, Functions, & Algebraic Structures	1. Expectations for this standard are integrated into the other standards at this grade level.
3. Data Analysis, Statistics, & Probability	1. Visual displays of information can be used to answer questions
4. Shape, Dimension, & Geometric Relationships	1. Shapes can be described by defining attributes and created by composing and decomposing 2. Measurement is used to compare and order objects and events

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

1. Number Sense, Properties, and Operations

Number sense provides students with a firm foundation in mathematics. Students build a deep understanding of quantity, ways of representing numbers, relationships among numbers, and number systems. Students learn that numbers are governed by properties, and understanding these properties leads to fluency with operations.

Valwood Graduate Competencies

The Valwood graduate competencies are the preschool through twelfth-grade concepts and skills that all graduates will be able to demonstrate.

Valwood Graduate Competencies in the Number Sense, Properties, and Operations Standard are:

- Understand the structure and properties of our number system. At their most basic level numbers are abstract symbols that represent real-world quantities
- Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error
- Are fluent with basic numerical and symbolic facts and algorithms, and are able to select and use appropriate (mental math, paper and pencil, and technology) methods based on an understanding of their efficiency, precision, and transparency
- Make both relative (multiplicative) and absolute (arithmetic) comparisons between quantities. Multiplicative thinking underlies proportional reasoning
- Understand that equivalence is a foundation of mathematics represented in numbers, shapes, measures, expressions, and equations
- Apply transformation to numbers, shapes, functional representations, and data

Content Area: Mathematics - First Grade

Standard: 1. Number Sense, Properties, and Operations

Valwood Graduates:

Understand the structure and properties of our number system. At their most basic level numbers are abstract symbols that represent real-world quantities.

GRADE LEVEL EXPECTATION

Concepts and skills students master:

1. The whole number system describes place value relationships within and beyond 100 and forms the foundation for efficient algorithms.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Count to 120 i. Count starting at any number less than 120. ii. Within 120, read and write numerals and represent a number of objects with a written numeral. b. Represent and use the digits of a two-digit number i. Represent the digits of a two-digit number as tens and ones. ii. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and iii. Compare two sets of objects, including pennies, up to at least 25 using language such as "three more or three fewer" c. Use place value and properties of operations to add and subtract. i. Add within 100, including adding a two-digit number and a one-digit number and adding a two-digit number and a multiple of ten, using concrete models or drawings, and/or the relationship between addition and subtraction. ii. Identify coins and find the value of a collection of two coins iii. Mentally find 10 more or 10 less than any two-digit number, without counting; explain the reasoning used. iv. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction v. Relate addition and subtraction strategies to a written method and explain the reasoning used.	**Inquiry Questions:** 1. Can numbers always be related to tens? 2. Why not always count by one? 3. Why was a place value system developed? 4. How does a position of a digit affect its value? 5. How big is 100? **Relevance and Application:** 1. The comparison of numbers helps to communicate and to make sense of the world. (For example, if someone has two more dollars than another, gets four more points than another, or takes out three fewer forks than needed. **Nature of Discipline:** 1. Mathematics involves visualization and representation of ideas. 2. Numbers are used to count and order both real and imaginary objects. 3. Mathematicians reason abstractly and quantitatively. 4. Mathematicians look for and make use of structure.

Content Area: Mathematics - First Grade

Standard: 1. Number Sense, Properties, and Operations

Valwood Graduates:

Apply transformation to numbers, shapes, functional representations, and data.

GRADE LEVEL EXPECTATION

Concepts and skills students master:

2. Number relationships can be used to solve addition and subtraction problems.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Represent and solve problems involving addition and subtraction. i. Use addition and subtraction within 20 to solve word problems. ii. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20. b. Apply properties of operations and the relationship between addition and subtraction. i. Apply properties of operations as strategies to add and subtract. ii. Relate subtraction to unknown-addend problem. c. Add and subtract within 20. i. Relate counting to addition and subtraction. ii. Add and subtract within 20 using multiple strategies. iii. Demonstrate fluency for addition and subtraction within 10. d. Use addition and subtraction equations to show number relationships. i. Use the equal sign to demonstrate equality in number relationships. ii. Determine the unknown whole number in an addition or subtraction equation relating three whole numbers.	**Inquiry Questions:** 1. What is addition and how is it used? 2. What is subtraction and how is it used? 3. How are addition and subtraction related? **Relevance and Application:** 1. Addition and subtraction are used to model real-world situations such as computing saving or spending, finding the number of days until a special day, or determining an amount needed to earn a reward. 2. Fluency with addition and subtraction facts helps to quickly find answers to important questions. **Nature of Discipline:** 1. Mathematicians use addition and subtraction to take numbers apart and put them back together in order to understand number relationships. 2. Mathematicians make sense of problems and persevere in solving them. 3. Mathematicians look for and make use of structure.

2. Patterns, Functions, and Algebraic Structures

Pattern sense gives students a lens with which to understand trends and commonalities. Being a student of mathematics involves recognizing and representing mathematical relationships and analyzing change. Students learn that the structures of algebra allow complex ideas to be expressed succinctly.

Valwood Graduates
The Valwood graduate competencies are the preschool through twelfth-grade concepts and skills that all graduates will be able to demonstrate.

Valwood Graduate Competencies in the 2. Patterns, Functions, and Algebraic Structures Standard are:

- Are fluent with basic numerical and symbolic facts and algorithms, and are able to select and use appropriate (mental math, paper and pencil, and technology) methods based on an understanding of their efficiency, precision, and transparency
- Understand that equivalence is a foundation of mathematics represented in numbers, shapes, measures, expressions, and equations
- Make sound predictions and generalizations based on patterns and relationships that arise from numbers, shapes, symbols, and data
- Make claims about relationships among numbers, shapes, symbols, and data and defend those claims by relying on the properties that are the structure of mathematics
- Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions

*** Expectations for this standard are integrated into the other standards at preschool through third grade.**

3. Data Analysis, Statistics, and Probability

Data and probability sense provides students with tools to understand information and uncertainty. Students ask questions and gather and use data to answer them. Students use a variety of data analysis and statistics strategies to analyze, develop and evaluate inferences based on data. Probability provides the foundation for collecting, describing, and interpreting data.

Valwood Graduates
The Valwood graduate competencies are the preschool through twelfth-grade concepts and skills that all graduates will be able to demonstrate.

Valwood Graduate Competencies in the 3. Data Analysis, Statistics, and Probability Standard are:

- Recognize and make sense of the many ways that variability, chance, and randomness appear in a variety of contexts
- Solve problems and make decisions that depend on understanding, explaining, and quantifying the variability in data
- Communicate effective logical arguments using mathematical justification and proof. Mathematical argumentation involves making and testing conjectures, drawing valid conclusions, and justifying thinking
- Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions

Content Area: Mathematics - First Grade

Standard: 3. Data Analysis, Statistics, and Probability

Valwood Graduates:

Solve problems and make decisions that depend on understanding, explaining, and quantifying the variability in data.

GRADE LEVEL EXPECTATION

Concepts and skills students master:

1. Visual displays of information can be used to answer questions.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Represent and interpret data. i. Organize, represent, and interpret data with up to three categories. ii. Ask and answer questions about the total number of data points how many in each category, and how many more or less are in one category than in another.	**Inquiry Questions:** 1. What kinds of questions generate data? 2. What questions can be answered by a data representation? **Relevance and Application:** 1. People use graphs and charts to communicate information and learn about a class or community such as the kinds of cars people drive, or favorite ice cream flavors of a class. **Nature of Discipline:** 1. Mathematicians organize and explain random information 2. Mathematicians model with mathematics.

4. Shape, Dimension, and Geometric Relationships

Geometric sense allows students to comprehend space and shape. Students analyze the characteristics and relationships of shapes and structures, engage in logical reasoning, and use tools and techniques to determine measurement. Students learn that geometry and measurement are useful in representing and solving problems in the real world as well as in mathematics.

Valwood Graduates
The Valwood graduate competencies are the preschool through twelfth-grade concepts and skills that all graduates will be able to demonstrate.

Valwood Graduate Competencies in the 4. Shape, Dimension, and Geometric Relationships standard are:

- Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error
- Make sound predictions and generalizations based on patterns and relationships that arise from numbers, shapes, symbols, and data
- Apply transformation to numbers, shapes, functional representations, and data
- Make claims about relationships among numbers, shapes, symbols, and data and defend those claims by relying on the properties that are the structure of mathematics
- Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions

Content Area: Mathematics - First Grade

Standard: 4. Shape, Dimension, and Geometric Relationships

Valwood Graduates:

Make claims about relationships among numbers, shapes, symbols, and data and defend those claims by relying on the properties that are the structure of mathematics.

GRADE LEVEL EXPECTATION

Concepts and skills students master:

1. Shapes can be described by defining attributes and created by composing and decomposing.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Distinguish between defining attributes versus non-defining attributes. b. Build and draw shapes to possess defining attributes c. Compose two-dimensional shapes or three-dimensional shapes to create a composite shape, and compose new shapes from the composite shape. d. Partition circles and rectangles into two and four equal shares. i. Describe shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. ii. Describe the whole as two of, or four of the equal shares.	**Inquiry Questions:** 1. What shapes can be combined to create a square? 2. What shapes can be combined to create a circle? **Relevance and Application:** 1. Many objects in the world can be described using geometric shapes and relationships such as architecture, objects in your home, and things in the natural world. Geometry gives us the language to describe these objects. 2. Representation of ideas through drawing is an important form of communication. Some ideas are easier to communicate through pictures than through words such as the idea of a circle, or an idea for the design of a couch. **Nature of Discipline:** 1. Geometers use shapes to represent the similarity and difference of objects. 2. Mathematicians model with mathematics. 3. Mathematicians look for and make use of structure.

Content Area: Mathematics - First Grade

Standard: 4. Shape, Dimension, and Geometric Relationships

Valwood Graduates:

Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error.

GRADE LEVEL EXPECTATION: First Grade

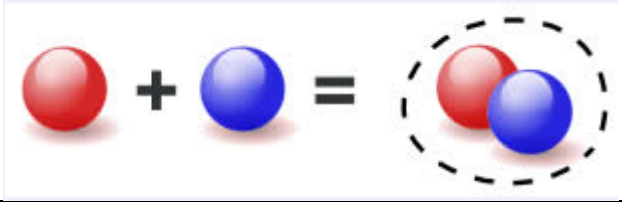
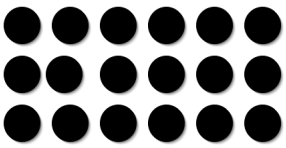
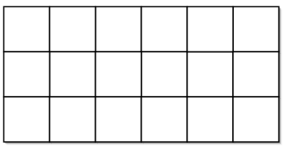
Concepts and skills students master:

2. Measurement is used to compare and order objects and events.

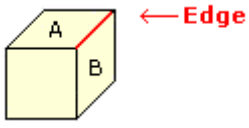
Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: i. Measure lengths indirectly and by iterating length units. ii. Order three objects by length; compare the lengths of two objects indirectly by using a third object. iii. Express the length of an object as a whole number of length units. a. Tell and write time. i. Tell and write time in hours and half-hours using analog and digital clocks.	**Inquiry Questions:** 1. How can you tell when one thing is bigger than another? 2. Why do we measure objects and time? 3. How are length and time different? How are they the same? **Relevance and Application:** 1. Time measurement is a means to organize and structure each day and our lives, and to describe tempo in music. 2. Measurement helps to understand and describe the world such as comparing heights of friends, describing how heavy something is, or how much something holds. **Nature of Discipline:** 1. With only a few words, mathematicians use measurable attributes to describe countless objects. 2. Mathematicians use appropriate tools strategically. 3. Mathematicians attend to precision.

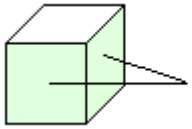
First Grade Academic Vocabulary for Students
Standard 1: Number Sense, Properties, and Operations add, addition, coins (coin names: penny, nickel, dime, quarter) circle, combine, compare, counting back, counting on, difference, digit, dollar, double (plus one), equal, equation, estimate, fourth of, greater than, groups, half, keep track, landmark number, less than, minus, number line, number words (e.g. one, two, etc., through one hundred twenty), number sentence, off/on decade counting, ordinal numbers (e.g. first, second, etc.), plus, quarter, separate, skip counting, strategy, subtract, sum
Standard 2: Patterns, Functions, and Algebraic Structures Expectations for this standard are integrated into the other standards at preschool through third grade.
Standard 3: Data Analysis, Statistics and Probability bar graph**,** data, compare, graph
Standard 4: Shape, Dimension and Geometric Relationships Attribute, cone, cube, cylinder, edge, face, hexagon, length, rectangle, rhombus, shape, side, solid, trapezoid, triangle

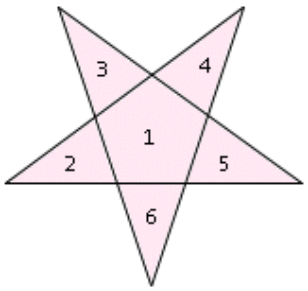
Math Reference Glossary for Pre-K – 5 Teachers

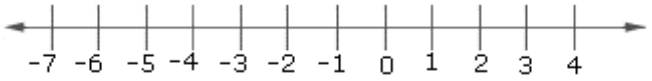
Word	Definition
Acute Angle	An angle smaller than 90 degrees.
Add	To bring two or more numbers (or things) together to make a new total. 
Addend	Any number being added.
Adding And Subtracting Through Ten	A non-unitary addition and subtraction strategy that uses ten and its multiples as landmark numbers. (e.g., 8+5 is thought of as 8+2=10 and 10+3=13; 23-7 is thought of 23-3=20 and 20-4=16).
Additive	Marked by, produced by, or involving addition.
Algorithm	A standardized step-by-step procedure for solving a problem.
Analog Clock	A clock with a face and hands.
Angle	Two rays that share an endpoint.
Area	The measure, in square units, of the inside of a plane figure.
Array	A rectangular arrangement of objects in rows and columns.  dot array (discrete array)  area model array
Associative Property	For any rational numbers: (a + b) + c =a +(b = c) and (a x b) x c = a x (b x c). The associative property does **not** apply to subtraction and division.
Attribute	A characteristic or quality.
Bar Graph	A graph that uses the height or length of rectangles to compare data.

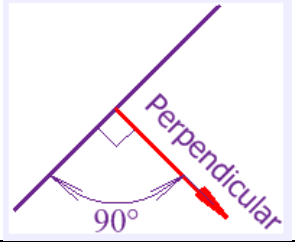
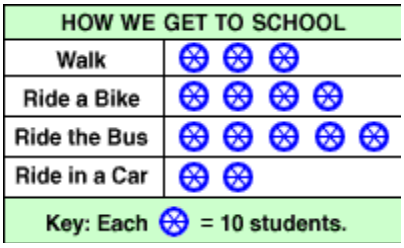
Base (Geometric)	The base is the side or face that is perpendicular to the height of the figure. In a solid figure it is the polygon that defines the shape (i.e, the circular base of a cylinder or the triangles of a triangular prism.
Base Ten	A number system in which each place has 10 times the value of the next place to its right.
Benchmark Fractions	Fractions used in estimation and mental calculation; commonly halves and whole numbers. (e.g. 0, ½, 1, 1½, 2)
Benchmark Numbers	Numbers used in estimation and mental calculation; most commonly multiples of 10, but also including numbers like 25 with which can be readily manipulated.
Braces	A symbol used outside of parentheses [ ] to denote order of operations.
Brackets	A symbol used to denote order of operations used outside of braces.{ }
Capacity	The maximum amount that can be contained by an object, usually measured in liquid units. (i.e. tablespoons, cups, gallons. "A vase can hold 3 cups of water.)
Cardinal Number	A number that is used in simple counting and that indicates how many elements there are in a set.
Cardinality	The cardinality of a set is the number of elements or members (numerosity) of a set. The Cardinality Principal is the connection that the last number word of the count indicates the amount of the set.
Categorical Data	Data that is grouped by category or attribute (e.g., What kind of pets do you have? Cats, dogs, rabbits, etc.).
Circle	A 2-dimensional shape made by drawing a curve that is always the same distance from the center.
Clusters	Data that are grouped around a value in a set of values.
Combination	A pair or group of items or events. Placing these items or events in a different order does not create a new combination.
Combine	Put together.
Common Denominator	A denominator that is the same for two or more fractions.
Commutative Property	For any rational numbers: a + b = b + a and a x b = b x a. (changing the order of the addends or factors does not affect the sum or product (e.g. 7 + 5 = 5 + 7 and 7 x 5 = 5 x 7))
Compare	Estimate, measure, or note similarities or differences.
Compose	Put together or combine quantities.
Composite Number	A positive whole number that has more than two factors (e.g., The factors of 10 are 1, 2, 5, and 10).
Computation Algorithm	A set of predefined steps applicable to a class of problems that gives the correct result in every case when the steps are carried out correctly.
Computation Strategy	Purposeful manipulations that may be chosen for specific problems, may not have a fixed order, and may be aimed at converting one problem into another.
Cone	A solid (3-dimensional) object that has a circular base and one vertex.
Congruent	Having exactly the same size and shape.
Conjecture	A mathematical hypothesis that has not been proved or disproved.
Constant	Consistent or unchanging. Constant change refers to linear change.
Conversion	To change the form but not the value of a particular number or quantity.
Coordinates	An ordered pair of numbers that identify a point on the coordinate plane. (coordinate pair)
Count	To tell or name one by one or by groups, for the purpose of determining the whole number of units in a collection; to number or enumerate. (see also cardinality, number word sequence, order irrelevance, and one to one correspondence)
Counting Back	Counting back from or to a number. Example of counting back from: 11-3 is solved by counting back from 11: "10, 9, 8." Example of counting back to: 11- __=8 is solved by counting back to 8 and keeping track of three counts.

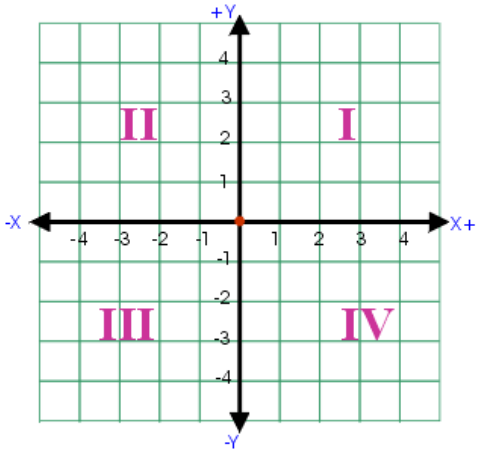
Counting On	Counting up from or to a number. Example of counting up from: 7+5 is solved by counting up 5 from 7: 8, 9, 10, 11, 12. Example of counting up to: 7 +__=12 is solved by counting from 7 up to 12 and keeping track of 5 counts.
Cube	A box-shaped solid object that has six identical square faces.
Cubic Unit	A unit such as a cubic meter used to measure volume or capacity.
Cylinder	A solid object with two identical flat ends that are circular and one curved face. It has the same cross-section from one end to the other.
Data	Information, usually numerical information.
Decimal Fraction	A fraction or decimal number (as 0.25 = 25/100 or 0.025 = 25/1000) or mixed number (as 3.025 = 3 25/1000) in which the denominator is a power of 10 usually expressed by the use of a decimal point.
Decimal Number	A number that uses a decimal point to indicate parts of a whole (e.g., 3.25).
Decompose	Breaking quantities into useful chunks.
Degrees	A unit of measurement as of an angle or temperature.
Denominator	The number below or to the right of the line in a fraction, indicating the number of equal parts into which one whole is divided. For example, in the fraction 2/7 , 7 is the denominator.
Diagram	A visual representation.
Difference	The amount that remains after one quantity is subtracted from another.
Digit	Any one of the ten symbols: 0, 1, 2. 3, 4, 5, 6, 7, 8, 9.
Dimension	The property of an object that is measureable in space. A line has one dimension because it can only be measured once. A rectangle has two dimensions that can be measured.
Directional And Positional	Words that describe a position or place of an object or number in space
Distributive Property	a(b + c) = ab + ac and a(b — c) = ab — ac, where a, b, and c are any real numbers. The distributive property is used to multiply multi-digit numbers 3x34=(3x30)+(3x4)
Dividend	In a division problem, the number of items you are separating – "the whole" (see also partitive and quotative division)
Division	The action of separating something into parts, or the process of being separated.
Divisor	The number by which a dividend is divided
Doubles Plus One	An addition strategy that utilizes knowledge of doubles facts to add two numbers that are one away from each other (e.g., 5 + 6 can be found by knowing that 5 + 5=10 and one more would be 11.)
Edge	The segment on a three-dimensional geometric figure that is formed by the intersection of two faces. 
Elements (Of Patterns)	The individual items in a set.
Equal	Exactly the same amount or value.
Equality	Represented by an equal sign. In an equation, the equal sign represents a relationship between two expressions that have the same value
Equal Partitions/Part	Pieces of an object or set that are equivalent in amount.
Equivalence	Capable of being put into a one-to-one relationship. Having virtually identical or corresponding parts.
Equivalent	Equal partitions/parts, equal to each other, the same amount.
Equivalent Fractions	Fractions that represent the same amount but have different numerators and denominators. For example ½ = 2/4 = 3/6= 4/8 = 5/10

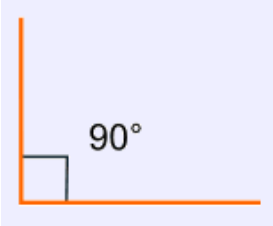
Estimate	(noun)A number close to an exact amount. An estimate tells about how much or about how many. (verb) To find a number close to an exact amount
Even Number	A whole number that has 2 as a factor. All even numbers are divisible by two and have 0, 2, 4, 6, or 8 in the ones place.
Expanded Form	A way to write numbers that shows the place value of each digit (e.g., 789= 700+80+9).
Exponents	A number used to tell how many times a number or variable is used as a factor. (i.e., 5^3 indicates that 5 is a factor 3 times, that is, 5 x 5 x 5. The value of 5^3 is 125. 5 is the base number and 3 is the exponent.)
Expression	A group of characters or symbols representing a quantity (example: 5+6=11, 7x8, 3x+6).
Face	A face is a flat surface of a three-dimensional figure.  Faces of the cube
Factors	Numbers that are multiplied together to form a product (e.g., 6 x 7 = 42, 6 and 7 are factors).
Fluency	Efficiency, accuracy, and flexibility in solving computation problems.
Fraction	A number that describes a part of a whole or group, usually in the form a/b where "a" is any real number and "b" is any real number >0.
Frequency Table	A table that depicts the number of times that something occurs in an interval or set of data.
Function Table	A table that matches each input value with an output value. The output values are determined by the function. Couldn't paste diagrams
Generalizable	The ability to extend a number of results to form a rule. For example 5+3=3+5 and 1.5+2.7=2.7+1.5 can be generalized to a+b=b+a.
Graph	A drawing that shows a relationship between sets of data.
Greater Than	Larger. The special symbol used to show one number is larger than another is >. a>b indicates that a is larger than b.
Height	The vertical distance from top to bottom.
Hexagon	A polygon with six sides.
Horizontal	Parallel to the horizon.
Identify (Numeral Identification)	To give the name of a written numeral or other symbol in isolation (e.g., When presented a card with the numeral 563, the child says "five hundred sixty-three). (compare to recognize)
Identity Property	Of Addition: for any number n; n+0=0 Of Subtraction: for any number n; n-0=n Of Multiplication: for any number n, nx1=n Of Division: for any number n, n/1=n
Improper Fraction	A fraction with a value greater than 1 that is not written as a mixed number.
In And Out Tables (Function Tables)	A table that matches each input value with an output value. The output values are determined by the function.
Integer	Any positive or negative whole number and the number zero.
Interval Of Time	A definite length of time marked off by two instants.
Inverse Operation	An operation that undoes another operation (e.g. addition and subtraction are inverse operations).
Landmark Number	Numbers that are familiar landing places that make for simple calculations and to which other numbers can be related (e.g., 10, 50, and 100 are commonly used landmarks).
Length	The distance along a line or figure from one point to another. One dimension of a two-or three-dimensional figure.

Less Than	Smaller. The special symbol used to show one number is smaller than another is <. a<b indicates that a is smaller than b.
Linear Measurement	A unit or system of units for the measurement of length.
Line	An infinite set of points forming a straight path in 2 directions.
Line Plot	A graph showing frequency of data on a number line.
Line Segment	A part of a line defined by 2 end points.
Line Of Symmetry	A line that divides a figure into two halves that are mirror images of each other.
Mass	Quantity of matter in an object. Usually measured in weight.
Mean	The average of a set of data. It is the number found by dividing the sum of the numbers in a set of data by the number of addends. (calculation of the mean is not a expectation of this elementary curriculum)
Measure	To find the quantity, length, area, volume, capacity, weight, duration, etc. of something.
Measurement Words	Words used to describe differences in objects being measured (i.e. heavier/lighter, shorter/longer).
Median	In a set of data, the number in the middle when the data is organized from least to greatest. When there are an even number of data, the median is the mean of the two middle values. (e.g. For the set of numbers 2, 4, 6, 8, 10, 12 the median is 7)
Mental Computation	Computing an exact answer without using paper and pencil or other physical aids.
Metric System	An international system of measurement based on tens. The basic units of measure are meter, liter, gram, degrees Celsius.
Minuend	The number you subtract from (e.g., 8-3=5; 8 is the minuend).
Mixed Number	A number consisting of an integer and a fraction.
Mode	The number or item that appears most often in a set of data. There may be one, more than one, or no mode. (when there are 2 modes we say that the data set is bimodal. When there are more than 2 modes we say that there is no mode.)
More Than	Greater than (informal)
Multiple	The product of the number and any whole number (e.g., The multiples of 4 are 0, 4, 8, 12, 16…).
Multiplicative Comparison	Interpret that 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5.
Net	A two-dimensional shape that can be folded into a three-dimensional figure. The following is the net of a pentagonal pyramid. 

Non-Standard Units	Units other than customary or metric units used for measurement (e.g. a paper clip might be used as a non-standard unit of length).
Number Line	A diagram that represents numbers as points on a line, marked at intervals. 
Number Sentence	An equation or inequality with numbers (e.g., 6 + 3 = 9 or 8 + 1 < 12).
Number Sense	A person's ability to use and understand numbers: knowing relative values; how to use numbers to make judgments; how to use numbers in flexible ways when adding, subtracting, multiplying or dividing; how to develop useful strategies when counting, measuring, or estimating. This would include number meanings, number relationships, number size, and the relative effect of operations on numbers.
Number Word Sequence	A regular sequence of number words, typically, but not necessarily, by ones. (both forward and backward). An element of counting.
Numeral	A symbol used to represent a number.
Numerator	A number written above or to the left of the line in a common fraction to indicate the number of parts of the whole. For example, 2 is the numerator in the fraction $^{2}/_{7}$.
Numeric Expression	A mathematical combination of numbers, variables, and operations. (e.g,. a box with an amount of pencils, x, with 3 missing is x-3).
Numerical Data	Data expressed in or involving numbers.
Obtuse Angle	An angle greater than 90 and less than 180 degrees.
Odd Number	A whole number that is not divisible by 2. All odd numbers have 1, 3, 5, 7, or 9 in the ones place.
Open Number Sentence	A number sentence in which one or more numerical values is missing (e.g., __+6=13).
Off-Century Counting	Counting forward or backward by 100, starting at any number that is not a multiple of one hundred (e.g., 125, 225, 325…).
Off-Decade Counting	Counting forward or backward by 10, starting at any number that is not a multiple of 10 (e.g. 54, 44, 34 . . .).
On-Century Counting	Counting forward or backward by 100 starting at any multiple of 100. (e.g. 100, 200, 300 …)
On-Decade Counting	Counting forward or backward by 10, starting at any multiple of ten (e.g. 10, 20. 30 . . .).
One-To-One Correspondence	In counting, assigning one counting number for each object counted in order to determine how many in a set.
Open Number Sentence	A number sentence in which one or more numerical values is missing (e.g., __+6=13).
Operation	A mathematical process; addition, subtraction, multiplication, division, and raising a number to a power are some mathematical operations.
Order	The arrangement of people or things in relation to each other according to a particular sequence, pattern or method.
Order Of Operations	The customary order in which operations must be performed in order to arrive at the intended result. They are, in order, brackets, braces, parentheses, multiplication and division, addition and subtraction. Calculations always move from left to right when no other indication is made, for instance 8 – 3 + 5 = (8-3)+5.
Order Irrelevance (In Counting)	The understanding that the number of objects in a set is unchanged regardless of the order in which the members of the set are counted. (an element of counting)

Ordered Pair	A pair of numbers used to name a location on coordinate plane (x,y); the first number is the horizontal distance from the origin, the second is the vertical distance from the origin. (see also coordinates)
Ordinal Number	Indicates the relative position of an object in an ordered set (e.g., 1st, 2nd, 5th).
Origin	The intersection of the x and y axes in a coordinate plane. Its coordinates are (0,0).
Outcome	A possible result of a random process (e.g., Heads and tails are the two possible outcomes of flipping a coin.)
Outlier	An item of data that is significantly greater or less than all the other items of data.
Oval	Any curve that looks like an egg or an ellipse.
Parallel Lines	Lines that are always the same distance apart; never meeting.
Parallelogram	A polygon with opposite sides that are parallel and equal in length, and opposite angles that are equal. NOTE: squares, rectangles and rhombuses are all parallelograms.
Partition	Breaking quantities into useful chunks in order to solve problems.
Partitive Division	A partitive division problem is one where you know the total number of groups, and you are trying to find the number of items in each group. If you have 30 popsicles and want to divide them equally among 5 friends you are figuring out how many popsicles each friend would get. (see also quotative division)
Part-Part-Whole	See Elementary Math Curriculum, Table A.
Pattern	An ordered set of numbers, shapes or other mathematical objects, arranged according to a rule.
Pentagon	A geometric figure with five sides.
Perimeter	The sum of the measures of the lines forming a polygon.
Perpendicular	When two lines intersect to make a right angle. 
Perpendicular Pictograph	A graph using pictures or symbols to show data.
Pictograph	A graph using pictures or symbols to show data. 
Pictorial Representation	Using a picture to model a solution strategy or mathematical idea.
Place Value	The value of the place of a digit of a number (e.g., In the number 7324, 4 is 4x1, 2 is 2 x 10, 3 is 3 x 100, and 7 is 7 x 1,000) The understanding that each place to the left of the next is valued at 10x the place to then right, and conversely that those to the right are 1/10 of those to the left. Place value understandings are a key element of number sense.
Plane Figure	A two-dimensional shape.

Polygon	A closed figure formed by three or more line segments that do not cross.
Powers Of Ten	Any number that can be expressed as repeated multiplication of 10 (e.g., 10, 100, 1000)
Prime Number	A whole number that has exactly two different positive factors, itself and 1 (e.g., 7 is a prime number because its only factors are 7 and 1). 1 is not a prime number because it does not have 2 factors.
Prism	A polyhedron with two polygonal faces lying in parallel planes and with the other faces parallelograms
Problem-Solving Situations	Contexts in which problems are presented that apply mathematics to practical situations in the real world, or problems that arise from the investigation of mathematical ideas
Product	The result of multiplication
Proper Fraction	A fraction less than one.
Property (Geometry)	A defining attribute of a geometric figure. Parallel opposite sides is a property of rectangles.
Protractor	A measurement tool used to measure an angle.
Quadrant One	The x and y axes of the coordinate plane divide the plane into four regions called quadrants. These regions are labeled counter-clockwise, starting from the top-right. 
Quadrilateral	A polygon with four sides.
Qualitative	Of, or relating to descriptions based on some quality rather than quantity. (e.g. "Today is hotter than yesterday." "It is very likely to rain today")
Quantitative	Data of, relating to, or expressible in numeric terms. (e.g. "It is 98° outside." "There is an 85% chance of rain today")
Quantity	How much there is of something.
Quotative Division	Quotative division is when you know the total number of each set and you are determining how many sets you can make. If you have 30 students and you need to make groups of 5, how many groups will you make? (see also partitive division)
Quotient	The result of division.
Range	The difference between the least and greatest values in a set of data.
Rational Number	A number that can be expressed in the form a/b, where a and b are integers and b,0, for example, 3/4, 2/1, or 11/3. Every integer is a rational number, since it can be expressed in the form a/b, for example, 5 = 5/1. Rational numbers may be expressed as fractional or decimal numbers, for example, 3/4 or .75. Finite decimals, repeating decimals, and mixed numbers all represent rational numbers. Any number in the sets of whole numbers, fractions, decimals or percentages.
Ray	A part of a line that has one endpoint and extends indefinitely in one direction.

Real-World Problems (also called real-world experiences)	Quantitative problems that arise from a wide variety of human experience which may take into consideration contributions from various cultures (for example, Mayan or American pioneers), problems from abstract mathematics, and applications to various careers (for example, making change or calculating the sale price of an item). These may also be called real-world experiences, story problems, story contexts and word problems.
Rectangle	A quadrilateral with two pairs of congruent, parallel sides and four right angles.
Rectilinear Figure	Consisting of, bounded by, or formed by a straight line or lines. (rectilinear means having straight lines)
Regular Polygon	A polygon with all sides the same length and all angles the same measure.
Remainder	What is left over when the dividend is not a multiple of the divisor.
Repeating Pattern	A pattern of items, shapes or numbers, that repeats itself.
Rhombus	A parallelogram with all four sides equal in length.
Right Angle	An angle with a measure of 90°; a square corner. 
Round	To express a number in a simplified form by finding the nearest whole number, ten, hundred, thousand, etc. (e.g., 537 to the nearest hundred rounds to 500, to the nearest 10 rounds to 540).
Rule	A principle to which an action conforms or is required to conform. In mathematical relationships rules are often described or defined by operations. (e.g. add 6) (see also in and out tables)
Sample Space	The set of all possible outcomes of an experiment.
Scale	The ratio between the actual size of an object and a proportional representation. A system of marks at fixed intervals used in measurement or graphing.
Separate	See Table A below
Shape (Plane)	A two-dimensional figure having length and width.
Shape (Solid)	A three-dimensional figure having length, width and height. (examples include, spheres, cubes, pyramids and cylinders.
Side	Any one of the line segments that make up a polygon.
Skip Counting	When you count forwards or backwards by a number other than 1.
Solid	A geometric figure with three dimensions, length, width and height.
Sort	To arrange or group in a special way (such as by size, type, or alphabetically).
Sphere	A 3-dimensional object shaped like a ball. Every point on the surface is the same distance from the center.
Square	A parallelogram with four congruent sides and four right angles.
Square Number	A number that is the result of multiplying an integer by itself.
Standard Form	A number written with one digit for each place value (e.g., The standard form for the number two hundred six is 206).
Standard Units	Units from the customary system or metric system used for measurement (e.g. inch and centimeter are standard units of length).

Standards For Mathematical Practice	The working practices of mathematicians. In the Common Core State Standards they are: 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Stress Counting	Counting by ones, emphasizing a multiplicative pattern (1, 2, **3**, 4, 5, **6**). (related to and often preliminary to skip counting)
Subitize	Instantly quantifying a small collection without counting.
Subtrahend	In subtraction, the number being subtracted (e.g., In 8 — 5 = 3, 5 is the subtrahend).
Sum	The result of addition.
Symmetry	The property of exact balance in a figure; having the same size and shape across a dividing line (line/mirror symmetry) or around a point (rotational).
Symbolic Notation	A mathematical idea represented with symbols.
Table	An organized way to list data. Tables usually have rows and columns of data.
Tally Marks	Marks used to keep track of things being counted, usually organized in groups of five.
Take Away	Subtract – to take one number away from another.
T-Chart	A chart showing the relationship between two variables.
Three-Dimensional	An object that has height, width and depth.
Transformation **Slides (Translations)** **Flips (Reflections)** **Turns (Rotations)**	A rule for moving every point in a plane figure to a new location. Three types of transformations are A transformation that moves a figure a given distance in a given direction. A transformation that creates a mirror image of a figure on the opposite side of a line. A transformation in which a figure is turned a given angle and direction around a point.
Trapezoid	A quadrilateral with one pair of parallel sides.
Tree Diagram	An organized way of listing all the possible outcomes of an experiment.
Triangle	A 3-sided polygon.
Two-Dimensional	A shape that only has two dimensions (such as width and height) and no thickness.
Unit Fraction	A rational number written as a fraction where the numerator is one and the denominator is a positive integer. For example, ¼ , ½ , 1/3 , 1/8
Unit Of Measurement	A quantity used as a standard of measurement. For example units of time are second, minute, hour, day, week, month, year and decade.
Unknown	A value that is missing in a problem.

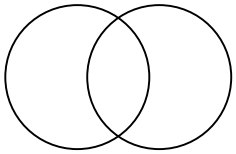
Variable	A value represented by a symbol, most often a letter, in an expression, equation, or formula. (e.g. in the expression y+3, y is the variable).
Venn Diagram	A drawing that uses circles to show relationships among sets. 
Vertex	The point where two or more straight lines meet.
Vertices	Plural of vertex.
Vertical	Upright; perpendicular to the horizon.
Volume	A measure of the amount of space occupied by a three-dimensional figure, generally expressed in cubic units.
Weight	The measure of the heaviness of an object.
Whole Numbers	The set of natural numbers plus the number zero (0, 1, 2, 3 . . .).
Width	The distance from side to side.

Table A **Types of Addition and Subtraction Problems**			
Problem Type	(Result Unknown)	(Change Unknown)	(Start Unknown)
Join	Connie had 5 marbles. Juan gave her 8 more marbles. How many marbles does Connie have altogether?	Connie has 5 marbles. How many more marbles does she need to have 13 marbles altogether?	Connie had some marbles. Juan gave her 5 more marbles. Now she has 13 marbles. How many marbles did Connie have to start with?
Separate	Connie had 13 marbles. She gave 5 to Juan. How many marbles does Connie have left?	Connie had 13 marbles. She gave some to Juan. Now she has 5 marbles left. How many marbles did Connie give to Juan?	Connie had some marbles. She gave 5 to Juan. Now she has 8 marbles left. How many marbles did Connie have to start with?
Part-Part-Whole	(Whole Unknown)		(Part Unknown)
	Connie has 5 red marbles and 8 blue marbles. How many marbles does she have?		Connie has 13 marbles. 5 are red and the rest blue. How many blue marbles does Connie have?
Compare	(Difference Unknown)	(Compare Quantity Unknown)	(Referent Unknown)
	Connie has 13 marbles. Juan has 5 marbles. How many more marbles does Connie have than Juan?	Juan has 5 marbles. Connie has 8 more than Juan. How many marbles does Connie have?	Connie has 13 marbles. She has 5 more marbles than Juan. How many marbles does Juan have?
Reference: Carpenter, T.P., Fennema, E., Franke, M.L., Levi, L., & Empson, S.B., (1999) *Children's Mathematics: Cognitively Guided Instruction,* Reston, NCTM, (p.12)			