VALWOOD

GO BEYOND

Fourth Grade Math Curriculum

4th Grade Math Overview

Course Description

In fourth grade instructional time should focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

Topics at a Glance

- Generalize place value understanding
- Addition and subtraction of multi-digit numbers
- Extend multiplication and division
- Number patterns
- Factors, multiples, and square, prime, and composite numbers
- Represent, order and compare fraction
- Factors and Multiples
- Create line plots to display data
- Attributes of geometric figures including angle measurement
- Add and subtract fractions with like denominators

Assessments

- Math Diagnostic Assessments
- State Assessments
- Assessment tasks from adopted instructional materials

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.

Grade Level Expectations

Standard	Big Ideas for Fourth Grade
1. Number Sense, properties, and operations	1. The decimal number system to the hundredths place describes place value patterns and relationships that are repeated in large and small numbers and forms the foundation for efficient algorithms 2. Different models and representations can be used to compare fractional parts 3. Formulate, represent, and use algorithms to compute with flexibility, accuracy, and efficiency
2. Patterns, Functions, & Algebraic Structures	1. Number patterns and relationships can be represented by symbols
3. Data Analysis, Statistics, & Probability	1. Visual displays are used to represent data
4. Shape, Dimension, & Geometric Relationships	1. Appropriate measurement tools, units, and systems are used to measure different attributes of objects and time 2. Geometric figures in the plane and in space are described and analyzed by their attributes

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 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 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 - Fourth 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 decimal number system to the hundredths place describes place value patterns and relationships that are repeated in large and small numbers and forms the foundation for efficient algorithms.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Generalize place value understanding for multi-digit whole numbers i. Explain that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. ii. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. iii. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. iv. Use place value understanding to round multi-digit whole numbers to any place. b. Use decimal notation to express fractions, and compare decimal fractions i. Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.[1] ii. Use decimal notation for fractions with denominators 10 or 100.[2] iii. Compare two decimals to hundredths by reasoning about their size.[3]	**Inquiry Questions:** 1. Why isn't there a "oneths" place in decimal fractions? 2. How can a number with greater decimal digits be less than one with fewer decimal digits? 3. Is there a decimal closest to one? Why? **Relevance and Application:** 1. Decimal place value is the basis of the monetary system and provides information about how much items cost, how much change should be returned, or the amount of savings that has accumulated. 2. Knowledge and use of place value for large numbers provides context for population, distance between cities or landmarks, and attendance at events. **Nature of Discipline:** 1. Mathematicians explore number properties and relationships because they enjoy discovering beautiful new and unexpected aspects of number systems. They use their knowledge of number systems to create appropriate models for all kinds of real-world systems. 2. Mathematicians reason abstractly and quantitatively. 3. Mathematicians look for and make use of structure. [1] For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100. [2] For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram. ([3] Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

Content Area: Mathematics - Fourth Grade

Standard: 1. Number Sense, Properties, and Operations

Valwood Graduates:

Understand that equivalence is a foundation of mathematics represented in numbers, shapes, measures, expressions, and equations.

GRADE LEVEL EXPECTATION: Fourth Grade

Concepts and skills students master:

2. Different models and representations can be used to compare fractional parts.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Use ideas of fraction equivalence and ordering to: i. Explain equivalence of fractions using drawings and models.[4] ii. Use the principle of fraction equivalence to recognize and generate equivalent fractions. iii. Compare two fractions with different numerators and different denominators,[5] and justify the conclusions.[6] b. Build fractions from unit fractions by applying understandings of operations on whole numbers. i. Apply previous understandings of addition and subtraction to add and subtract fractions.[7] 1. Compose and decompose fractions as sums and differences of fractions with the same denominator in more than one way and justify with visual models. 2. Add and subtract mixed numbers with like denominators.[8] 3. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.[9] ii. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. 1. Express a fraction a/b as a multiple of 1/b.[10] 2. Use a visual fraction model to express a/b as a multiple of 1/b, and apply to multiplication of whole number by a fraction.[11] 3. Solve word problems involving multiplication of a fraction by a whole number.[12]	**Inquiry Questions:** 1. How can different fractions represent the same quantity? 2. How are fractions used as models? 3. Why are fractions so useful? 4. What would the world be like without fractions? **Relevance and Application:** 1. The ability to read and write numbers allows communication about quantities such as the cost of items, number of students in a school, or number of people in a theatre. 2. Place value allows people to represent large quantities. For example, 725 can be thought of as 700 + 20 + 5. **Nature Of Discipline:** 1. Mathematicians explore number properties and relationships because they enjoy discovering beautiful new and unexpected aspects of number systems. They use their knowledge of number systems to create appropriate models for all kinds of real-world systems. 2. Mathematicians reason abstractly and quantitatively. 3. Mathematicians look for and make use of structure. [4] Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. [5] e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or < [6] e.g., by using a visual fraction model.

	[7] Understand a fraction a/b with a > 1 as a sum of fractions 1/b. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8. [8]e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. [9] e.g., by using visual fraction models and equations to represent the problem. [10] For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4). [11] For example, 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) [12] e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?

Content Area: Mathematics - Fourth Grade

Standard: 1. Number Sense, Properties, and Operations

Valwood Graduates:

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.

GRADE LEVEL EXPECTATION

Concepts and skills students master:

3. Formulate, represent, and use algorithms to compute with flexibility, accuracy, and efficiency.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Use place value understanding and properties of operations to perform multi-digit arithmetic. i. Fluently add and subtract multi-digit whole numbers using standard algorithms. ii. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. iii. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. iv. Illustrate and explain multiplication and division calculation by using equations, rectangular arrays, and/or area models. b. Use the four operations with whole numbers to solve problems. i. Interpret a multiplication equation as a comparison.[13] ii. Represent verbal statements of multiplicative comparisons as multiplication equations. iii. Multiply or divide to solve word problems involving multiplicative comparison.[14] iv. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations	**Inquiry Questions:** 1. Is it possible to make multiplication and division of large numbers easy? 2. What do remainders mean and how are they used? 3. When is the "correct" answer not the most useful answer? **Relevance and Application:** 1. Multiplication is an essential component of mathematics. Knowledge of multiplication is the basis for understanding division, fractions, geometry, and algebra. **Nature of Discipline:** 1. Mathematicians envision and test strategies for solving problems. 2. Mathematicians develop simple procedures to express complex mathematical concepts. 3. Mathematicians make sense of problems and persevere in solving them. 4. Mathematicians construct viable arguments and critique the reasoning of others. 5. Mathematicians look for and express regularity in repeated reasoning. [13] e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. [14] e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

v. Represent multistep word problems with equations using a variable to represent the unknown quantity. vi. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. vii. Using the four operations analyze the relationship between choice and opportunity cost.	

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

Content Area: Mathematics - Fourth Grade

Standard: 2. Patterns, Functions, and Algebraic Structures

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.

Make sound predictions and generalizations based on patterns and relationships that arise from numbers, shapes, symbols, and data.

GRADE LEVEL EXPECTATION: Fourth Grade

Concepts and skills students master:

1. Number patterns and relationships can be represented by symbols.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Generate and analyze patterns and identify apparent features of the pattern that were not explicit in the rule itself.[1] i. Use number relationships to find the missing number in a sequence ii. Use a symbol to represent and find an unknown quantity in a problem situation iii. Complete input/output tables iv. Find the unknown in simple equations b. Apply concepts of squares, primes, composites, factors, and multiples to solve problems i. Find all factor pairs for a whole number in the range 1–100. ii. Recognize that a whole number is a multiple of each of its factors. iii. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. iv. Determine whether a given whole number in the range 1–100 is prime or composite.	**Inquiry Questions:** 1. What characteristics can be used to classify numbers into different groups? 2. How can we predict the next element in a pattern? 3. Why do we use symbols to represent missing numbers? 4. Why is finding an unknown quantity important? **Relevance and Application:** 1. Use of an input/output table helps to make predictions in everyday contexts such as the number of beads needed to make multiple bracelets or number of inches of expected growth. 2. Symbols help to represent situations from everyday life with simple equations such as finding how much additional money is needed to buy a skateboard, determining the number of players missing from a soccer team, or calculating the number of students absent from school. 3. Comprehension of the relationships between primes, composites, multiples, and factors develop number sense. The relationships are used to simplify computations with large numbers, algebraic expressions, and division problems, and to find common denominators. **Nature of Discipline:** 1. Mathematics involves pattern seeking. 2. Mathematicians use patterns to simplify calculations. 3. Mathematicians model with mathematics. [1] For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

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 - Fourth 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 are used to represent data.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). b. Solve problems involving addition and subtraction of fractions by using information presented in line plots.[1]	**Inquiry Questions:** 1. What can you learn by collecting data? 2. What can the shape of data in a display tell you? **Relevance and Application:** 1. The collection and analysis of data provides understanding of how things work. For example, measuring the weather every day for a year helps to better understand weather. **Nature of Discipline:** 1. Mathematics helps people use data to learn about the world. 2. Mathematicians model with mathematics. 3. Mathematicians use appropriate tools strategically. 4. Mathematicians attend to precision.

[1] For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.

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 - Fourth 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

Concepts and skills students master:

1. Appropriate measurement tools, units, and systems are used to measure different attributes of objects and time.

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. i. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. ii. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.[1] iii. Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. iv. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. v. Apply the area and perimeter formulas for rectangles in real world and mathematical problems.[2]	**Inquiry Questions:** 1. How do you decide when close is close enough? 2. How can you describe the size of geometric figures? **Relevance and Application:** 1. Accurate use of measurement tools allows people to create and design projects around the home or in the community such as flower beds for a garden, fencing for the yard, wallpaper for a room, or a frame for a picture. **Nature of Discipline:** 1. People use measurement systems to specify the attributes of objects with enough precision to allow collaboration in production and trade. 2. Mathematicians make sense of problems and persevere in solving them. 3. Mathematicians use appropriate tools strategically. 4. Mathematicians attend to precision.

[1] For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36),

[2] For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.

b. Use concepts of angle and measure angles. i. Describe angles as geometric shapes that are formed wherever two rays share a common endpoint, and explain concepts of angle measurement.[3] ii. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. iii. Demonstrate that angle measure as additive.[4] iv. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems.[5]	[3] An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. An angle that turns through n one-degree angles is said to have an angle measure of n degrees. [4] When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. [5] e.g., by using an equation with a symbol for the unknown angle measure.

Content Area: Mathematics - Fourth 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

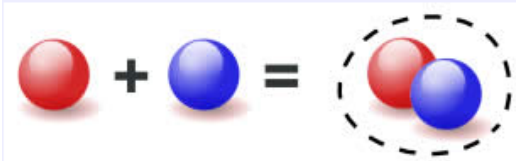
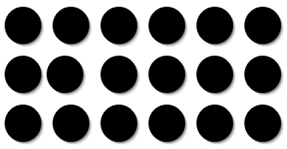
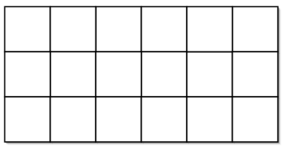
Concepts and skills students master:

2. Geometric figures in the plane and in space are described and analyzed by their attributes.

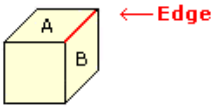
Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. b. Identify points, line segments, angles, and perpendicular and parallel lines in two-dimensional figures. c. Classify and identify two-dimensional figures according to attributes of line relationships or angle size.[6] d. Identify a line of symmetry for a two-dimensional figure.[7]	**Inquiry Questions:** 1. How do geometric relationships help us solve problems? 2. Is a square still a square if it's tilted on its side? 3. How are three-dimensional shapes different from two-dimensional shapes? 4. What would life be like in a two-dimensional world? 5. Why is it helpful to classify things like angles or shapes? **Relevance and Application:** 1. The understanding and use of spatial relationships helps to predict the result of motions such as how articles can be laid out in a newspaper, what a room will look like if the furniture is rearranged, or knowing whether a door can still be opened if a refrigerator is repositioned. 2. The application of spatial relationships of parallel and perpendicular lines aid in creation and building. For example, hanging a picture to be level, building windows that are square, or sewing a straight seam **Nature of Discipline:** 1. Geometry is a system that can be used to model the world around us or to model imaginary worlds. 2. Mathematicians look for and make use of structure. 3. Mathematicians look for and express regularity in repeated reasoning. 6. Based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. 7. as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Fourth Grade Academic Vocabulary for students
Standard 1: algorithm, approximate, array, base ten, benchmark numbers, benchmark fractions, change (from a purchase), choice and opportunity cost, common denominator, compare, compose, composite, decimal number, decimal fraction, decimal notation, decimal number, decompose, denominator, difference, digit, dividend, division, divisor, divisible, equal, equality, equivalent, estimate, estimation strategies, expanded form, factors, fraction equivalence, greater than, improper fraction, landmark number, less than (fewer than), minuend, mixed number, multiple, multiplication, multiplicative comparison, number line, number sentence, numerator, operation, pictorial representation, place value, powers of ten, product, proper fraction, quotient, rational number, remainder, rounding, square number, standard form, sum, variable, whole number
Standard 2:, composite number, distributive property, expression, factor, input/output table, inverse operation, number sentence/equation, operation, prime number, quantity, rule, square number, table, unknown, variable
Standard 3:, data, key, line plot, scale
Standard 4: 2-dimensional, angle (acute, right, obtuse), analog clock, area, attribute, capacity, conversion, degree, diagram, edge, hexagon, interval, length, line, line segment, mass, metric system, parallel, perimeter, perpendicular, point, polygon, protractor, quadrilateral, ray, regular polygon, segment, side, solid, standard units of measurement (know names), symmetry, vertex, vertices, volume, weight

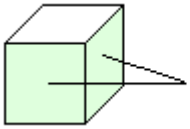
Math Reference Global Glossary for Pre-K – 5 Teachers

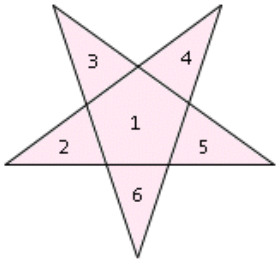
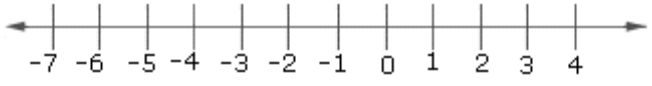
Word	Definition
Acute Angle	An angle smaller than 90 degrees.
Add	To bring two or more numbers (or things) together to make a new total. 
Addend	Any number being added.
Adding And Subtracting Through Ten	A non-unitary addition and subtraction strategy that uses ten and its multiples as landmark numbers. (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)

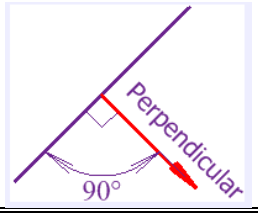
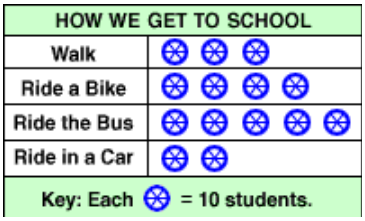
Counting Back	Counting back from or to a number. Example of counting back from: 11-3 is solved by counting back from 11: "10, 9, 8." Example of counting back to: 11- __=8 is solved by counting back to 8 and keeping track of three counts.
Counting On	Counting up from or to a number. Example of counting 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 usuallyu 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 A Pattern)	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.

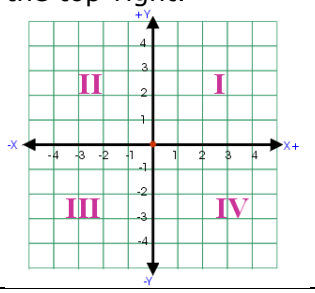
Equivalence	Capable of being put into a one-to-one relationship. Having virtually identical or corresponding parts.
Equivalent	Equal partitions/parts, equal to each other, the same amount.
Equivalent Fractions	Fractions that represent the same amount but have different numerators and denominators. For example ½ = 2/4 = 3/6= 4/8 = 5/10

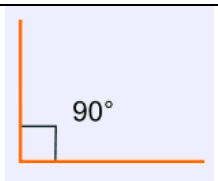
Estimate	(noun)A number close to an exact amount. An estimate tells about how much or about how many. (verb) To find a number close to an exact amount
Even Number	A whole number that has 2 as a factor. All even numbers are divisible by two and have 0, 2, 4, 6, or 8 in the ones place.
Expanded Form	A 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.

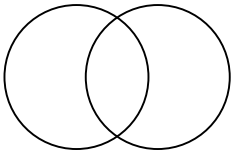
Less Than	Smaller. The special symbol used to show one number is smaller than another is <. a<b indicates that a is smaller than b.
Linear Measurement	A unit or system of units for the measurement of length.
Line	An Infinite Set Of Points Forming A Straight Path In 2 Directions.
Line Plot	A Graph Showing 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. 
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.
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.