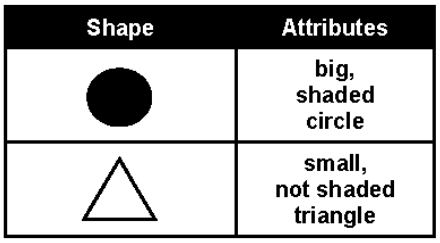
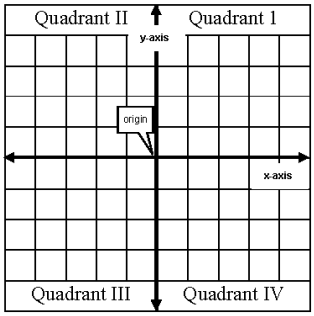
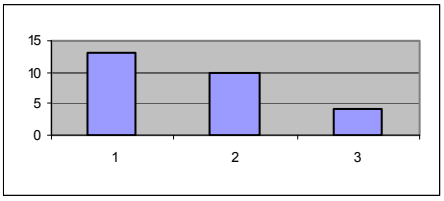
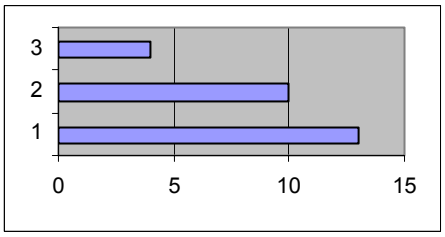
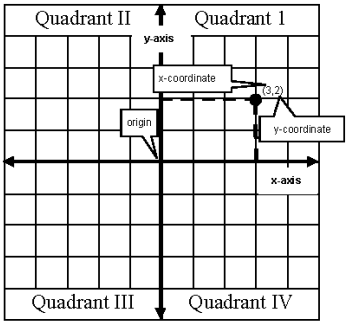
Mathematics Glossary

- A Mathematics Toolkit, including curriculum guidance materials and resources is located on the Department's Web site. Please see:
    - Mathematics Toolkit for Grades Prekindergarten–8 http://www.emsc.nysed.gov/ciai/mst/math/toolkit.html
    - Mathematics Toolkit Grades 9–12: http://www.emsc.nysed.gov/ciai/mst/math/toolkit.html#grade

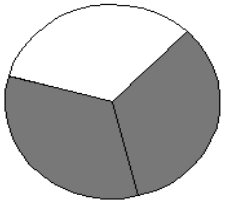
Term	Definition
Algebraic (or Numeric) equations or inequalities **(also referred to as sentence)**	Equation: mathematical sentence (numeric/algebraic) where the left side of the equal sign has the same value as the right side. Example: 6 + 4 = 10 Inequality: mathematical sentence (numeric/algebraic) built from expressions using one or more of the symbols ≠, >, <, ≥, and/or ≤. Example: x – 3 ≥ 4 **Note regarding equations or inequalities:** An equation or inequality is made up of two or more expressions. Must be presented, written, shown, etc. in a horizontal format. **Examples:** 4 + x = 10; a + b = c + d; 2 + 3 < 7; 4 – 1< 1 + 1; 5 + 5 = n; 4 ≤ n ≤ 7 • verbal sentence is given in words, for example, "the sum of eight and a number equals twenty-eight" • written sentence is given in words and/or numbers, for example, "8 plus some number is 28" • algebraic sentence is the translation of a verbal expression into numbers and/or variables (letters) and operation symbol(s), for example, "8 + n = 28" is the algebraic expression of the verbal and written expressions given above. Note: if a variable is present, it can be on either side of the equality/inequality sign. Examples: 5 – x = 2 or 2 = 5 – x or 5 – 2 = x • numeric sentence is a mathematical combination made from mathematical symbols. Examples: 5 + 5 = 10; 1 + 1 = 0 + 2; (6 - 1) x 3 ≠25; 30 + 30 + 30 < 40 + 2 **Note regarding translating:** Student must show/select the numeric/algebraic equation (sentence). For the translated equation to be considered correct it must be horizontal. **Note regarding evaluating, solving, or simplifying:** Equation must be presented horizontally; however, student may solve it by putting it into a vertical (working format) before indicating the answer. For further information see *Evaluate/Solve in expression (numeric/algebraic) and equation (numeric/algebraic) (also referred to as "find the value")* or *Simplify in expression (numeric/algebraic) and equation (numeric/algebraic)*

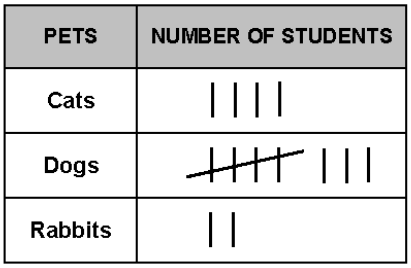
Term	Definition
Algebraic (or Numeric) expression **(also referred to as phrase)**	A mathematical expression (numeric/algebraic) is one or a group of mathematical symbols representing a number or quantity. It may include numbers, variables, constants, operators, and grouping symbols. One side of an equation is also an expression. Generally, an expression does not contain an equality symbol (=), except when comparing or evaluating/solving/simplifying. **Note regarding equations or inequalities:** Must be presented, written, shown, etc. in a horizontal format. **Examples:** 25 + 5; 10 – 6; 7 + 1 + 1; 8x + 4; 3m + 4b; 5 x 5; 2 + 8 – 4; 10 – 3 – (2 + 4) • verbal expression is given in words, for example, “the sum of ten and a number” • written expression is given in words and/or numbers, for example, “some number plus 10” • algebraic expression is the translation of a verbal expression into numbers and/or variables (letters) and operation symbol(s), for example, “x + 10” is the algebraic expression of the verbal and written expressions given above. • numeric expression is a mathematical combination made from mathematical symbols. Examples: - 6 + 4; 3 x 4; (10 + 10) x 3; 1 + 1 + 1 **Note regarding translating:** Student must show/select the numeric/algebraic expression (phrase). For the translated expression to be considered correct it must be horizontal and does not include an = sign. Also, the student only needs to translate the verbal/written expression and does not need to solve it. **Note regarding translating verbal or written expressions (phrases) into algebraic expressions given word problems:** This is one of the steps of solving a word problem—deciding on the plan, deciding on the operation and which numbers and/or variables to use, thus, translating the words into mathematical expressions. In this case the student does not need to solve the problem, just develop the plan to solve by showing/selecting the appropriate expression in horizontal format and does not include an = sign in order for it to be considered correct. **Note regarding evaluating, solving, or simplifying:** Expression must be presented horizontally; however, student may put it into a vertical (working format) before indicating the answer. For further information see *Evaluate/Solve in expression (numeric/algebraic) and equation (numeric/algebraic) (also referred to as “find the value”)* or *Simplify in expression (numeric/algebraic) and equation (numeric/algebraic)*.
Analog clock	A clock, usually with a round face, twelve numbers, and two hands (one pointing to the hour and the other pointing to the minute).
Angle	The union of two rays and their common endpoint.
Array	A set of objects or numbers arranged in order, commonly in rows and columns.

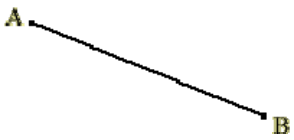
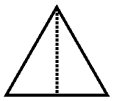
Term	Definition
Attributes	A characteristic of an object. For example, sorting by color when playing a sorting game. Example: 
Axes on a graph	The x-axis is the horizontal line on the coordinate plan that intersects at the origin with the y-axis. The y-axis is the vertical line on the coordinate plane that intersects the x-axis at the origin. Example: 
Bar graph	A graph that uses horizontal or vertical bars to represent numbers in the data. Examples:  
Biased data	Data gathered from a sample that is not representative of the entire population that is being sampled. If the sample is representative of the entire population being sampled, that data is unbiased. It is important to note that bias, or the lack thereof in a set of data, results from how the data was collected, and not from the data itself.
Capacity	The maximum amount a container can hold (volume).
Chart	Another name for a graph; a sheet giving graphical, tabular, or diagrammatical information. See *Graph* or *Table*.
Circle	A collection of points in a plane that are all the same distance from a fixed point.
Common factors	Numbers that are factors of two or more numbers. Example: The factors of 12 are 1, 2, 3, 4, 6, and 12. The factors of 10 are 1, 2, 5, and 10. The common factors of 12 and 10 are 1 and 2.

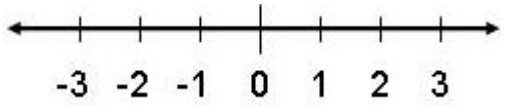
Term	Definition
Commutative principle (addition or multiplication)	In addition and multiplication, numbers may be added or multiplied in any order. This term is also referred to as commutative property, law, or rule.
Commutative property of addition	The sum stays the same when the order of the addends is changed. Example: 6 + 4 = 4 + 6
Compare numbers	Given two numbers, determine if one number is greater than, less than, or equal to the other number.
Complementary angles	A pair of angles whose measures have a sum of 90°.
Congruent angles	Angles that have the same measure. If you lay one angle on top of the other, they are congruent if they fit exactly.
Congruent figures	Figures that have the same shape and same size. Example:  These two shapes are congruent figures.
Congruent sides of a triangle	The sides of a triangle that are equal in length.
Coordinates	An ordered pair of numbers that identifies an exact location of a point or object on a grid, coordinate plane, or map (written as x, y). Example:  The coordinates of the point on the graph are (3, 2).
Coordinate system	A system that uses coordinates (x,y) to establish position.
Customary units of length	Miles, yards, meters, feet, inches centimeters, etc.
Customary units of liquid capacity	Cups, milliliter, pints, liter, quarts, gallons, cubic inch, cubic yard, etc.
Customary units of mass	Ton, pound, kilogram, gram, ounces, etc.
Data	Information that has been collected, such as from a survey. For further information see *Qualitative Data* or *Quantitative Data*.

Term	Definition
Decimal	A linear array of digits that represents a real number, every decimal place indicating a multiple of a negative power of 10. For example, the decimal 0.1 = $^{1}/_{10}$, 0.12 = $^{12}/_{100}$, 0.003 = $^{3}/_{1000}$. Also called decimal fraction; a number written using the base 10. **Place value of decimals:** 0.123 with 1 in the tenths place, 2 in the hundredths place, and 3 in the thousandths place. **How to read/write decimals (non-money context):** 49.8 is read/written as forty-nine and eight tenths; 9.1 is read/written as nine and one tenth; 5.23 is read/written as five and twenty-three hundredths; 14.72 is read/written as fourteen and seventy-two hundredths; 2.918 is read/written as two and nine hundred eighteen thousandths; 0.5 is read/written as five tenths; 0.13 is read/written as thirteen hundredths; 0.483 is read/written as four hundred eighty-three thousandths. Note: when using a whole number and a decimal, the "and" is important when reading/writing numbers with decimals because the "and" denotes that a decimal is present. Also, using the "and" and place value designation is important for mathematics AGLIs. **How to read/write decimals (money context):** 6.11 as money is $6.11 and is read/written as six dollars and eleven cents; 3.8 as money is $3.80 and is read/written as three dollars and eighty cents; 0.45 as money is $0.45 and is read/written as forty-five cents. **Compare decimals:** start with the tenths place, then the hundredths place, etc. If one decimal has a higher number in the tenths place then it is larger than a decimal with fewer tenths. If the tenths are equal compare the hundredths, then the thousandths etc. until one decimal is larger or there are no more places to compare. For example, comparing .5 (5/10) and .05 (5/100) could be thought of in factional terms as .5 being 50/100 and .05 being (5/100) then it is clear .5 is greater than .05. The same applies to the context of money compared to the hundredths place. For example, comparing $0.20 (20/100) and $0.02 (2/100) would be $0.20 > $0.02; comparing $0.55 (55/100) and $0.60 (60/100) would be $0.55 < $0.60; comparing $0.75 (75/100) and $0.77 (77/100) would be $0.75 < $0.77; etc. **Order decimals:** arranging decimals in an ascending or descending order. For example (ascending order), starting with 3.15 and 5.2, the number 5.184 would come between them, the number 3.1 would come before them, and the number 5.28 would come after them. The same applies to the context of money when ordering decimals to the hundredths place. For example (ascending order), starting with $0.75 and $1.00, the money amount $0.80 would come between them, the money amount $0.50 would come before them, and the money amount $1.01 would come after them; etc. **AGLIs Note:** when working on decimals to the hundredths place in the context of money, item amounts need to include cents and should not just be whole number costs. Whole numbers could be used for items, but need to show/include .00 for the cents decimal representation.
Denomination	As related to money, the value of currency amounts. The most common denominations are $1, $5 and $10 bills. Today, our government also prints $20, $50 and $100 bills. If you have a $5 and a $1, the two bills are different denominations.
Digital clock	A clock that gives the time using numbers. Example: 3:30

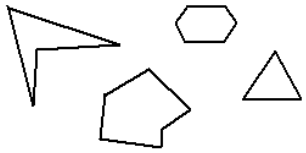
Term	Definition
Dilation	A transformation in which all distances are lengthened or shortened by a common factor. Example: 
Equilateral triangle	A triangle whose three sides are all congruent (equal in length).
Evaluate/Solve in expression (numeric/algebraic) and equation (numeric/algebraic) **(also referred to as "find the value")**	To evaluate/solve an expression/equation means to find a numerical value for it, to 'work it out.' **Note regarding presentation of expression/equation:** expression/equation must present horizontally, but student may rewrite it/represent it vertically (in a working format) in order to then solve it.
Factor	One of two or more numbers that are multiplied together to get another number. Example: 3 and 4 are factors of 12 because $3 \times 4 = 12$
First quadrant	The quadrant located in the upper right portion of the coordinate plane. In this quadrant, both the x- and y- coordinates are positive numbers.
Fraction	A number in the form $\frac{a}{b}$ or a/b where *a* is called the numerator and *b* is called the denominator. A fraction names a part of a whole or a part of a collection. Example: The shaded portion represents $\frac{2}{3}$ of the circle.  2 is the numerator and 3 is the denominator

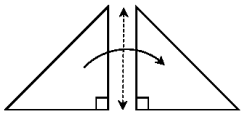
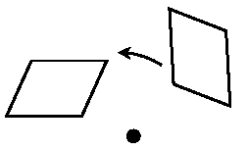
Term	Definition
Frequency chart	A table that lists the categories of data and shows the number of times each category occurs. Some ways a frequency chart can be presented are with tally or tick marks (see example below), numbers, bars, 'X's, etc. Example: 
Geometric shape (figure)	Geometric figures can be two dimensional or three dimensional. Figures typically include triangles, quadrilaterals, any other polygon, circles, ovals, spheres, prisms, pyramids, cones, cylinders, and ploy hedra. It also includes any point, line, segment, ray, angle, curve, region, plane, surface, solid, etc. (e.g., a heart is a simple closed curve) Formally, a geometric figure is any set of points on a plane or in space. Note: geometric shapes can be represented by real-world examples,e.g. a DVD-rom can represent a circle, a window can represent a rectangle, etc.
Graph	A diagram or drawing used to record information. Some examples are *bar graph*, *pictograph*, *pie graph*, *scatter plot*, etc.
Hundreds chart	A 10 x 10 grid filled in with the numbers from 1 to 100. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20… 91 92 93 94 95 96 97 98 99 100
Image of a transformation	The figure that results after one or more transformations.
Improper fraction	A fraction where the numerator is greater than the denominator. Example: $\frac{3}{2}$ is an improper fraction
Integer	The set of numbers containing zero, all natural numbers, and the negatives of all natural numbers. Example: …, -4, -3, -2, -1, 0, 1, 2, 3, 4, … are integers
Irrational number	Written as decimals, irrational numbers neither repeat nor terminate. Examples: π; $\sqrt{3}$; 0.15115111511115111115…
Isosceles triangle	A triangle with at least two sides that are congruent (equal in length). Note: An equilateral triangle is also an isosceles triangle.
Length	Distance from one end to the other; how long something is. Height can be considered for length.

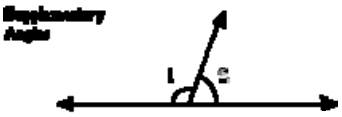
Term	Definition
Line segment	All points between two given points (including the given points themselves). Example: line segment $\overline{AB}$ 
Line symmetry	Figures that match exactly when folded in half have line symmetry. Example:  The dotted line denotes the line symmetry of this triangle.
List	A series of names or other items written or printed together in a meaningful grouping or sequence so as to constitute a record.
Mass	The quantity of matter in an object, often confused with weight. An object's mass does not depend on gravity (for example, an object having a mass of 3 kg on Earth, would still have a mass of 3 kg in space). An object's weight combines the object's mass and the gravitational force acting upon the object (for example, an object weighing 100 lbs on Earth would be 0 lbs in space).
Metric units of length	Kilometers, meters, centimeters, and millimeters
Metric units of liquid	Kiloliters, liters, centiliters, and milliliters
Metric units of mass	Kilograms and grams
Mixed number	A whole number together with a proper fraction. Example: $3\frac{1}{2}$ is a mixed number.
Multiplicand	A number which is to be multiplied in a multiplication problem. Example: In 5 x 2 = 10, 5 is the multiplicand.
Multiplier	The number of times a multiplicand is added to itself in a multiplication problem. Example: In 6 x 8 = 48, 8 is the multiplier.
Non-standard units of measure	Such measures include paperclips, foot steps, lengths of string, etc.

Term	Definition
Number line	A line representing the set of all real numbers. The number line is typically marked showing integer values. 
Numeral	A symbol for a number. Example: 3 is the numeral for three.
Numeric equation (sentence)	See *Algebraic (or Numeric) equations or inequalities.*
Numeric expression (phrase)	See *Algebraic (or Numeric) expression.*
Operation	Addition, subtraction, multiplication, and division
Order numbers	Given a list of three or more numbers, put the numbers in order from least to greatest or from greatest to least.
Order of operations	The standard order of operations is as follows: Carry out all exponents and roots, from left to right Carry out all multiplication and division, from left to right Carry out all addition and subtraction, from left to right Parentheses are used to indicate that operations are to be done in a different order than the one given above. When parentheses appear, carry out the operation(s) within each pair of parentheses (from the inside out, if multiple levels of parentheses are used) and then follow the order of operations given above. Examples: $4 + 6 \div 2 - 1 + 7 \times 2 \rightarrow 4 + 3 - 1 + 14 \rightarrow 40$ $(4 + 6) \div 2 - [(1 + 7) \times 2] \rightarrow 10 \div 2 - [8 \times 2] \rightarrow 5 - 16 \rightarrow -11$
Ordinal numbers	Numbers that show place or position (first, second, third…to tenth) Example: The first person in line
Parallel lines	Two lines are parallel if they are in the same plane and never intersect.
Pattern (Duplicate)	To copy a specified pattern exactly as given.
Pattern (Extend)	To continue and lengthen a pattern.
Pattern (Fill in missing element)	A pattern with a missing element somewhere in/near the middle of the pattern. A missing element to be filled in needs to occur in/near the middle and not at the very end or very beginning of the pattern.

Term	Definition
Pattern (Growing)	Patterns that involve a progression from step to step. Can grow larger or smaller. Example: ● ●● ●●● ●●●● Step 1 Step 2 Step 3 Step 4 This pattern is growing by one in each step.
Pattern (Number)	A pattern of numbers arranged according to a rule.
Pattern (Repeating)	A pattern with a cyclic structure [e.g., (A, B) pattern (blue-red, blue-red) or (A, B, C) pattern (blue-red-green, blue-red-green)].The pattern should be shown or demonstrated at least twice to be considered a pattern.
Pattern (Shape)	A pattern of geometric shapes arranged according to a rule. (Note: geometric shapes can be represented by real-world examples: e.g., a DVD disc can represent a circle, a window can represent a rectangle). The pattern should be shown or demonstrated at least twice to be considered a pattern. Example: ▲●●▲●●
Place value of whole numbers	Each digit is a specific place value – for 3,819,274 where 3 is millions, 8 is hundred thousands, 1 is ten thousands, 9 is thousands, 2 is hundreds, 7 is tens, and 4 is ones.
Percent	An amount that represents part of 100. Example: 25% means $\frac{25}{100}$
Perimeter	The sum of the lengths of the sides of a polygon. The distance around an object.
Pictograph	A record of data collected which consists of categories of data and uses pictures or symbols to represent the frequency that each category occurred. Example: STUDENT / NUMBER OF APPLES EATEN Sally  Tom  Maria 
Pie graph (pie chart/sector graph)	A graph using a divided circle where each section includes part of the total.

Term	Definition
Polygon	A closed figure on a flat surface that is made up of three or more line segments joined end to end. The line segments of a polygon may not cross. The name of a polygon describes the number of sides: triangle (3), quadrilateral (4), pentagon (5), hexagon (6), heptagon (7), octagon (8), nonagon (9), decagon (10), undecagon (11), dodecagon (12). Examples: 
Prime factorization	To write a number as the product of its prime factors. Example: $24 = 2 \times 2 \times 2 \times 3$
Prime numbers	Numbers which have only two factors, 1 and the number itself. Example, 13 is a prime number since its only factors are 1 and 13, but 9 is not a prime number, since it has three factors, 1, 3, and 9.
Probability	The likelihood or chance that an event will occur. Probabilities can be described as: Likely, if the event will most probably happen; Certain, if the event will definitely happen; Impossible, if the event cannot happen; Unlikely, if there is little chance that the event will happen. A probability can also be expressed as a fraction. Example: A spinner has three equal sized sections labeled A, B, and C. The probability that the spinner will land on C is $\frac{1}{3}$. Here, the numerator is 1 because only one of the sections is labeled C. The denominator is 3 because there are only three sections on the spinner.
Proper fraction	A fraction with a smaller numerator than denominator. Example: $\frac{3}{4}$ is a proper fraction
Proportion	An equation that states that two ratios are equal. Example: 6/8 = 9/12
Quadrant	See *Coordinates*.
Quadrilateral	A four-sided polygon. Quadrilaterals include rectangles, squares, parallelograms, rhombi, trapezoids, and diamonds (kites).
Qualitative data	Data that are divided into categories rather than quantities. Examples: favorite colors; kinds of fruit; leisure activities; etc.

Term	Definition
Quantitative data	Data that can be either counted (discrete data) or measured (continuous data). Examples of discrete data: students in a class, courses taken, jellybeans in a jar, etc. Examples of continuous data: height, amount of rainfall, temperature, etc. Note that some data that appear in the form of numbers may not be quantitative. Examples: zip code, social security number, shoe size, etc.
Ratio	A comparison of two amounts. Ratios can be written many ways, including, 3 : 4, 3 to 4, or $\frac{3}{4}$.
Ray	A ray is part of a line. It consists of one endpoint and all the points to one side of that endpoint.
Rectangle	A four-sided polygon with all right angles. A parallelogram with four right angles.
Reflection (flip)	A transformation in which a figure is flipped over a line. Example: 
Right triangle	A right triangle is a triangle with one right [90 degrees] angle.
Rotation (turn)	A transformation in which a figure is turned around a fixed point. Example: 
Rule for a pattern	A sentence or equation that describes how to extend a pattern or how to find a certain term of a pattern.
Sample	A section or subset of a whole group; to get data from part of a group and use that data to obtain information about the whole group.
Scale	The size of each interval on the axes of a graph. The sizes of the intervals on any axis must be equal. Each interval is given a number. The numbers can be consecutive or the result of skipping.

Term	Definition
Scatter plot	A graph of paired data in which the data values are plotted as (x, y) points. Example: 
Similar shapes	Two figures are similar if they have the same shape; their angles are equal in size and the corresponding sides are in proportion. Example:  These two shapes are similar.
Simplify in expression (numeric/algebraic) and equation (numeric/algebraic)	Reduce it to a point using order of operations in order to then be able to evaluate/solve the expression/equation for its value. **Note regarding presentation of expression/equation:** expression/equation must present horizontally, but student may rewrite it/represent it vertically (in a working format) in order to simplify the expression/equation and does not need to solve it. For evaluate/solve, see *Evaluate/Solve in expression (numeric/algebraic) and equation (numeric/algebraic)*.
Skip count	Count by 2's, 3's, 5's, etc., skipping the numbers in between.
Square	A rectangle with all sides congruent.
Standard units of measure	All customary and metric units of measure.
Strategies **(computational strategies related to addition, subtraction, multiplication, and/or division)**	Any method used to carry out a computation, whether a formal, traditional pencil-and-paper algorithm (method), an informal written or mental strategy, use of objects, or some combination of these methods; including but not limited to calculators, multiplication tables, number lines, Touch Math, manipulatives, memory strategies (double, backwards 1, number+1, etc.), base ten blocks, geometrically (visually using a grid or an array), tally marks, fact tables, etc. and can include instructional methods such as activities involving number puzzles, number related games, multiple solution strategies, etc.
Supplementary angles	A pair of angles whose measures have a sum of 180°. Example:  In this diagram angles 1 and 2 are supplementary angles, since, the measure of angle 1 + the measure of angle 2 = 180°.

Term	Definition
Table	An orderly arrangement of data, especially one in which the data are arranged in columns and rows in an essentially rectangular form.
Translation (slide)	A transformation in which a figure is slid in any direction. Example: 
Triangle	A three-sided polygon. Triangles include equilateral triangle, isosceles triangle, scalene triangle, acute triangle, obtuse triangle, and right triangle.
Unit fraction	A fraction with a 1 as the numerator. Examples: $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ are unit fractions
Variable	A quantity that can change or that may take on different values. Variable also refers to a letter or symbol representing such a quantity.
Vertical angles	A pair of opposite angles formed by the intersection of two straight lines. Example:  In this diagram, angles 1 and 4 are one pair of vertical angles and angles 2 and 3 are another pair of vertical angles. Vertical angles are congruent; therefore, angle 1 is congruent to angle 4 and angle 2 is congruent to angle 3.
Volume	The amount of cubic units it takes to fill a three-dimensional object. Example: if the dimensions of a rectangular solid are measured in inches, the volume of the box is given in cubic inches.
Weight	The weight of an object changes according to gravity. W = mass x gravity For example, a person weighing 180 pounds on Earth would weigh 0 pounds in space due to no gravity, even though the amount of mass did not change.
Whole number	The numbers 0, 1, 2, 3, 4, ….

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