

# Glossary: Mathematical Terms, Tables, and Illustrations

This Glossary contains terms found in the 2017 *Massachusetts Curriculum Framework for Mathematics*, as well as selected additional terms.

## Glossary Sources

(H) [Harcourt School Publishers Math Glossary](#)

(M) [Merriam-Webster Dictionary](#)

(MW) [MathWords.com](#)

(NCTM) [National Council of Teachers of Mathematics](#)

(OK) [Oklahoma State Department of Education](#)

## A

**AA similarity.** Angle-angle similarity. When two triangles have corresponding angles that are congruent, the triangles are similar. (MW)

**ASA congruence.** Angle-side-angle congruence. When two triangles have corresponding angles and sides that are congruent, the triangles themselves are congruent. (MW)

**Absolute value.** The absolute value of a real number is its (non-negative) distance from 0 on a number line.

**Addition and subtraction within 5, 10, 20, 100, or 1,000.** Addition or subtraction of two whole numbers with whole number answers, and with sum or minuend in the range 0-5, 0-10, 0-20, or 0-100, respectively. *Example:  $8 + 2 = 10$  is an addition within 10,  $14 - 5 = 9$  is a subtraction within 20, and  $55 - 18 = 37$  is a subtraction within 100.*

**Additive inverses.** Two numbers whose sum is 0 are additive inverses of one another.

*Example:  $3/4$  and  $-3/4$  are additive inverses of one another because  $3/4 + (-3/4) = (-3/4) + 3/4 = 0$ .*

## Algorithm/Standard Algorithm:

**Algorithm.** A finite set of steps for completing a procedure, e.g., multi-digit operations (addition, subtraction, multiplication, division). (*See standard 3.NBT.A.2.*)

**Standard algorithm.** One of the conventional algorithms used in the United States based on place value and properties of operations for addition, subtraction, multiplication, and division. (*See standards 4.NBT.B.4, 5.NBT.B.5, and 6.NS.B.2.*) [See Table 5 in the Glossary.](#)

**Analog.** Having to do with data represented by continuous variables, e.g., a clock with hour, minute, and second hands. (M)

**Analytic geometry.** The branch of mathematics that uses functions and relations to study geometric phenomena, e.g., the description of ellipses and other conic sections in the coordinate plane by quadratic equations.

**Argument of a complex number.** The angle describing the direction of a complex number on the complex plane. The argument is measured in radians as an angle in standard position. For a complex number in polar form  $r(\cos \theta + i \sin \theta)$ , the argument is  $\theta$ . (MW)

**Associative property of addition.** [See Table 3 in the Glossary.](#)

**Associative property of multiplication.** [See Table 3 in the Glossary.](#)

**Assumption.** A fact or statement (as a proposition, axiom, postulate, or notion) taken for granted. (M)

**Attribute.** A common feature of a set of figures.

## B

**Benchmark fraction.** A common fraction against which other fractions can be measured, such as  $\frac{1}{2}$ .

**Binomial Theorem.** A theorem that gives the polynomial expansion for any whole-number power of a binomial. For powers greater than or equal to zero. (OK)

**Bivariate data.** Pairs of linked numerical observations. *Example: a list of heights and weights for each player on a football team.*

**Box plot.** A graphic method that shows the distribution of data values by using the median, quartiles, and extremes of the data set. A box shows the middle 50% of the data. (DPI)

## C

**Calculus.** The mathematics of change and motion. The main concepts of calculus are limits, instantaneous rates of change, and areas enclosed by curves.

**Capacity.** The maximum amount or number that can be contained or accommodated, e.g., a jug with a one-gallon *capacity*; the auditorium was filled to *capacity*.

**Cardinal number.** A number (such as 1, 5, 15) that is used in simple counting and that indicates how many elements there are in a set.

**Cartesian plane.** A coordinate plane with perpendicular coordinate axes.

**Cavalieri's Principle.** A method, with formula given below, of finding the volume of any solid for which cross-sections by parallel planes have equal areas. This includes, but is not limited to, cylinders and prisms. Formula: Volume =  $Bh$ , where  $B$  is the area of a cross-section and  $h$  is the height of the solid. (MW)

**Coefficient.** Any of the factors of a product considered in relation to a specific factor. (W)

**Commutative property.** [See Table 3 in the Glossary.](#)

**Compare two treatments.** Compare different levels of a variable, imposed as treatments in an experiment, to each other and/or to a control group.

**Complex fraction.** A fraction  $A/B$  where  $A$  and/or  $B$  are fractions ( $B$  nonzero).

**Complex number.** A number that can be written as the sum or difference of a real number and an imaginary number. [See Illustration I in the Glossary.](#) (MW)

**Complex plane.** The coordinate plane used to graph complex numbers. (MW)

**Compose numbers.** a) Given pairs, triples, etc. of numbers, identify sums or products that can be computed; b) Each place in the base-ten place value is composed of ten units of the place to the left, i.e., one hundred is composed of ten bundles of ten, one ten is composed of ten ones, etc.

**Compose shapes.** Join geometric shapes without overlaps to form new shapes.

**Composite number.** A whole number that has more than two factors. (H)

**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. *See also: algorithm; computation strategy.*

**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. *See also: computation algorithm.*

**Congruent.** Two plane or solid figures are congruent if one can be obtained from the other by rigid motion (a sequence of rotations, reflections, and translations).

**Conjugate.** The result of writing the sum of two terms as a difference, or vice versa. *For example, the conjugate of  $x - 2$  is  $x + 2$ .* (MW)

**Coordinate plane.** A plane in which a point is represented using two coordinates that determine the precise location of the point. In the Cartesian plane, two perpendicular number lines are used to determine the locations of points. In the polar coordinate plane, points are determined by their distance along a ray through that point and the origin, and the angle that ray makes with a pre-determined horizontal axis. (OK)

**Cosine.** A trigonometric function that for an acute angle is the ratio between a leg adjacent to the angle when the angle is considered part of a right triangle and the hypotenuse. (M)

**Counting number.** A number used in counting objects, i.e., a number from the set 1, 2, 3, 4, 5,.... [See Illustration I in the Glossary.](#)

**Counting on.** A strategy for finding the number of objects in a group without having to count every member of the group. *For example, if a stack of books is known to have eight books and three more books are added to the top, it is not necessary to count the stack all over again; one can find the total by counting on—pointing to the top book and saying “eight,” following this with “nine, ten, eleven. There are eleven books now.”*

## D

**Decimal expansion.** Writing a rational number as a decimal.

**Decimal fraction.** A fraction (as  $0.25 = \frac{25}{100}$  or  $0.025 = \frac{25}{1000}$ ) or mixed number (as  $3.025 = 3\frac{25}{1000}$ ) in which the denominator is a power of ten, usually expressed by the use of the decimal point. (M)

**Decimal number.** Any real number expressed in base ten notation, such as 2.673.

**Decompose numbers.** Given a number, identify pairs, triples, etc. of numbers that combine to form the given number using subtraction and division.

**Decompose shapes.** Given a geometric shape, identify geometric shapes that meet without overlap to form the given shape.

**Differences between parameters.** A difference of numerical characteristics of a population, including measures of center and/or spread.

**Digit.** a) Any of the Arabic numerals 1 to 9 and usually the symbol 0; b) One of the elements that combine to form numbers in a system other than the decimal system.

**Digital.** Having to do with data that is represented in the form of numerical digits; providing a read out in numerical digits, e.g., a digital watch.

**Dilation.** A transformation that moves each point along the ray through the point emanating from a fixed center, and multiplies distances from the center by a common scale factor.

**Directrix.** A parabola is the collection of all points in the plane that are the same distance from a fixed point, called the focus (F), as they are from a fixed line, called the directrix (D). (Lone Star College lonetsar.edu)

**Discrete mathematics.** The branch of mathematics that includes combinatorics, recursion, Boolean algebra, set theory, and graph theory.

**Dot plot.** *See: line plot.*

## E

**Expanded Form.** A multi-digit number is expressed in expanded form when it is written as a sum of single-digit multiples of powers of ten. *For example,  $643 = 600 + 40 + 3$ .*

**Expected value.** For a random variable, the weighted average of its possible values, with weights given by their respective probabilities.

**Exponent.** The number that indicates how many times the base is used as a factor, e.g., in  $4^3 = 4 \times 4 \times 4 = 64$ , the exponent is 3, indicating that 4 is repeated as a factor three times.

**Exponential function.** A function of the form  $y = a \cdot b^x$  where  $a > 0$  and either  $0 < b < 1$  or  $b > 1$ . The variables do not have to be  $x$  and  $y$ . *For example,  $A = 3.2 \cdot (1.02)^t$  is an exponential function.*

**Expression.** A mathematical phrase that combines operations, numbers, and/or variables (e.g.,  $3^2 \div a$ ). (H)

## F

**Fibonacci sequence.** The sequence of numbers beginning with 1, 1, in which each number that follows is the sum of the previous two numbers, i.e., 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144....

**First quartile.** For a data set with median  $M$ , the first quartile is the median of the data values less than  $M$ . *Example: For the data set  $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$ , the first quartile is 6.<sup>6</sup> See also: *median, third quartile, interquartile range*.*

**Fluency.** Fluency in the grades 1-6 standards is the ability *to carry out calculations* and apply *numerical algorithms* quickly and accurately. Fluency in each grade involves a mixture of knowing some answers from memory (instant recall), knowing some answers from patterns (e.g., “adding 0 yields the same number”), and knowing some answers from the use of other strategies. The development of fluency follows a specific progression in these grades that begins with conceptual understanding and eventually requires students to “know from memory their math facts,” use various strategies to arrive at answers, and develop proficiency using the standard algorithm for each operation. *(See standards 1.OA.B.3, 2.OA.B.2, 3.OA.B.5, 3.OA.C.7 and 3.NBT.A.2, 4.NBT.B.4, 5.NBT.B.5, 6.NS.B.2 and 6.NS.B.3.)*

**Fraction.** A number expressible in the form  $a/b$  where  $a$  is a whole number and  $b$  is a positive whole number. (The word *fraction* in these standards always refers to a nonnegative number.) *See also: rational number.*

**Function.** A mathematical relation for which each element of the domain corresponds to exactly one element of the range. (MW)

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<sup>6</sup> Many different methods for computing quartiles are in use. The method defined here is sometimes called the Moore and McCabe method. See Langford, E., “Quartiles in Elementary Statistics,” *Journal of Statistics Education* Volume 14, Number 3 (2006).

**Function notation.** A notation that describes a function. For a function  $f$ , when  $x$  is a member of the domain, the symbol  $f(x)$  denotes the corresponding member of the range (e.g.,  $f(x) = x + 3$ ).

**Fundamental Theorem of Algebra.** The theorem that establishes that, using complex numbers, all polynomials can be factored into a product of linear terms. A generalization of the theorem asserts that any polynomial of degree  $n$  has exactly  $n$  zeros, counting multiplicity. (MW)

## G

**Geometric sequence (progression).** An ordered list of numbers that has a common ratio between consecutive terms, e.g., 2, 6, 18, 54.... (H)

## H

**Histogram.** A type of bar graph used to display the distribution of measurement data across a continuous range.

## I

**Identity property of 0.** [See Table 3 in the Glossary.](#)

**Imaginary number.** Complex numbers with no real terms, such as  $5i$ . [See Illustration I in the Glossary.](#) (M)

**Independently combined probability models.** Two probability models are said to be combined independently if the probability of each ordered pair in the combined model equals the product of the original probabilities of the two individual outcomes in the ordered pair.

**Integer.** All positive and negative whole numbers, including zero. (MW)

**Interquartile range.** A measure of variation in a set of numerical data, the interquartile range is the distance between the first and third quartiles of the data set. Example: For the data set  $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$ , the interquartile range is  $15 - 6 = 9$ . *See also: first quartile, third quartile.*

**Inverse function.** A function obtained by expressing the dependent variable of one function as the independent variable of another; that is the inverse of  $y = f(x)$  is  $x = f^{-1}(y)$ . (NCTM)

**Irrational number.** A number that cannot be expressed as a quotient of two integers, e.g.,  $\sqrt{2}$ . It can be shown that a number is irrational if and only if it cannot be written as a repeating or terminating decimal.

## K

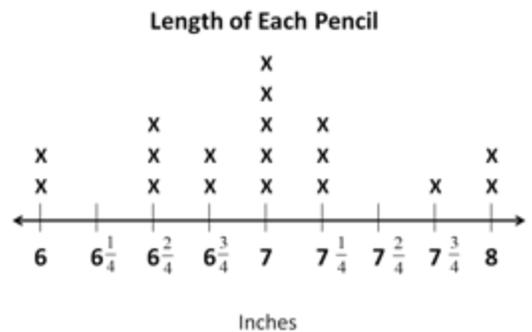
**Know from Memory.** To instantly recall single-digit math facts to use when needed. *Note: In the early grades, students develop number sense and fluency in operations. Students are expected to commit single digit math facts to memory by the end of: a) grade 2 for addition and related subtraction facts (see standard 2.OA.B.2); and b) grade 3 for multiplication and related division facts (see standard 3.OA.C.7).*

## L

**Law of Cosines.** An equation relating the cosine of an interior angle and the lengths of the sides of a triangle. (MW)

**Law of Sines.** Equations relating the sines of the interior angles of a triangle and the corresponding opposite sides. (MW)

**Line plot.** A method of visually displaying a distribution of data values where each data value is shown as a dot or mark above a number line. (Also known as a *dot plot*.) (DPI)



**Linear association.** Two variables have a linear association if a scatter plot of the data can be well approximated by a line.

**Linear equation.** Any equation that can be written in the form  $Ax + By + C = 0$  where  $A$  and  $B$  cannot both be 0. The graph of such an equation is a line.

**Linear function.** A function with an equation of the form  $y = mx + b$ , where  $m$  and  $b$  are constants

**Logarithm.** The exponent that indicates the power to which a base number is raised to produce a given number. *For example, the logarithm of 100 to the base 10 is 2.* (M)

**Logarithmic function.** Any function in which an independent variable appears in the form of a logarithm; they are the inverse functions of exponential functions.

## M

**Matrix (pl. matrices).** A rectangular array of numbers or variables.

**Mean.** A measure of center in a set of numerical data, computed by adding the values in a list and then dividing by the number of values in the list.<sup>7</sup> *Example: For the data set  $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$ , the mean is 21.*

<sup>7</sup> To be more precise, this defines the *arithmetic mean*.

**Mean absolute deviation.** A measure of variation in a set of numerical data, computed by adding the distances between each data value and the mean, then dividing by the number of data values. *Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the mean absolute deviation is 20.*

**Measure of variability.** A determination of how much the performance of a group deviates from the mean or median, most frequently used measure is standard deviation.

**Median.** A measure of center in a set of numerical data. The median of a list of values is the value appearing at the center of a sorted version of the list; or the mean of the two central values, if the list contains an even number of values. *Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 90}, the median is 11.*

**Midline.** In the graph of a trigonometric function, the horizontal line halfway between its maximum and minimum values.

**Model.** A mathematical representation (e.g., number, graph, matrix, equation(s), geometric figure) for real-world or mathematical objects, properties, actions, or relationships. (DPI)

**Modulus of a complex number.** The distance between a complex number and the origin on the complex plane. The absolute value of  $a + bi$  is written  $|a + bi|$ , and the formula for  $|a + bi|$  is  $\sqrt{a^2 + b^2}$ . For a complex number in polar form,  $r(\cos \theta + i \sin \theta)$ , the modulus is  $r$ . (MW)

**Multiplication and division within 100.** Multiplication or division of two whole numbers with whole number answers, and with product or dividend in the range 0-100. *Example:  $72 \div 8 = 9$ .*

**Multiplicative inverses.** Two numbers whose product is 1 are multiplicative inverses of one another. *Example:  $\frac{3}{4}$  and  $\frac{4}{3}$  are multiplicative inverses of one another because  $\frac{3}{4} \times \frac{4}{3} = \frac{4}{3} \times \frac{3}{4} = 1$ .*

## N

**Network.** a) A figure consisting of vertices and edges that shows how objects are connected; b) A collection of points (vertices), with certain connections (edges) between them.

**Non-linear association.** The relationship between two variables is nonlinear if the change in the second is not simply proportional to the change in the first, independent of the value of the first variable.

**Number line diagram.** A diagram of the number line used to represent numbers and support reasoning about them. In a number line diagram for measurement quantities, the interval from 0 to 1 on the diagram represents the unit of measure for the quantity.

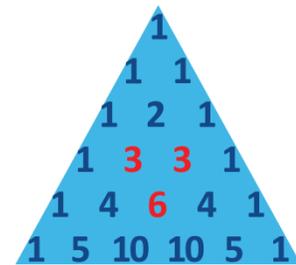
**Numeral.** A symbol or mark used to represent a number.

## O

**Observational study.** A type of study in which an action or behavior is observed in such a manner that no interference with, or influence upon, the behavior occurs.

**Order of Operations.** Convention adopted to perform mathematical operations in a consistent order. 1. Perform all operations inside parentheses, brackets, and/or above and below a fraction bar in the order specified in steps 3 and 4; 2. Find the value of any powers or roots; 3. Multiply and divide from left to right; 4. Add and subtract from left to right. (NCTM)

**Ordinal number.** A number designating the place (as first, second, or third) occupied by an item in an ordered sequence. (M)



## P

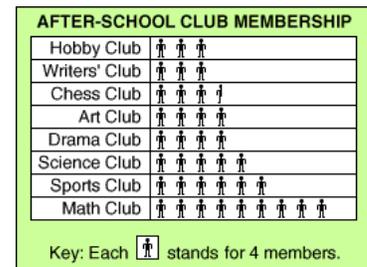
**Partition.** A process of dividing an object into parts.

**Pascal's triangle.** A triangular arrangement of numbers in which each row starts and ends with 1, and each other number is the sum of the two numbers above it. (H)

**Percent rate of change.** A rate of change expressed as a percent. *Example: if a population grows from 50 to 55 in a year, it grows by  $5/50 = 10\%$  per year.*

**Periodic phenomena.** Naturally recurring events, for example, ocean tides, machine cycles.

**Picture graph.** A graph that uses pictures to show and compare information.



**Plane.** A flat surface that extends infinitely in all directions.

**Polar form.** The polar coordinates of a complex number on the complex plane. The polar form of a complex number is written in any of the following forms:  $r \cos \theta + r i \sin \theta$ ,  $r(\cos \theta + i \sin \theta)$ , or  $r \text{cis } \theta$ . In any of these forms,  $r$  is called the modulus or absolute value.  $\theta$  is called the argument. (MW)

**Polynomial.** The sum or difference of terms which have variables raised to positive integer powers and which have coefficients that may be real or complex. The following are all polynomials:  $5x^3 - 2x^2 + x - 13$ ,  $x^2y^3 + xy$ , and  $(1 + i)a^2 + ib^2$ . (MW)

**Polynomial function.** Any function whose value is the solution of a polynomial.

**Postulate.** A statement accepted as true without proof.

**Prime factorization.** A number written as the product of all its prime factors. (H)

**Prime number.** A whole number greater than 1 whose only factors are 1 and itself.

**Probability distribution.** The set of possible values of a random variable with a probability assigned to each.

**Properties of equality.** [See Table 4 in the Glossary.](#)

**Properties of inequality.** [See Table 6 in the Glossary.](#)

**Properties of operations.** [See Table 3 in the Glossary.](#)

**Probability.** A number between 0 and 1 used to quantify likelihood for processes that have uncertain outcomes (such as tossing a coin, selecting a person at random from a group of people, tossing a ball at a target, testing for a medical condition).

**Probability model.** A probability model is used to assign probabilities to outcomes of a chance process by examining the nature of the process. The set of all outcomes is called the sample space, and their probabilities sum to 1. *See also: uniform probability model.*

**Proof.** A proof of a mathematical statement is a detailed explanation of how that statement follows logically from statements already accepted as true.

**Proportion.** An equation that states that two ratios are equivalent, e.g.,  $4/8 = 1/2$  or  $4 : 8 = 1 : 2$ .

**Pythagorean Theorem.** For any right triangle, the sum of the squares of the measures of the legs equals the square of the measure of the hypotenuse.

## Q

**Quadratic equation.** An equation that includes only second degree polynomials. Some examples are  $y = 3x^2 - 5x^2 + 1$ ,  $x^2 + 5xy + y^2 = 1$ , and  $1.6a^2 + 5.9a - 3.14 = 0$ . (MW)

**Quadratic expression.** An expression that contains the square of the variable, but no higher power of it.

**Quadratic function.** A function that can be represented by an equation of the form  $y = ax^2 + bx + c$ , where  $a$ ,  $b$ , and  $c$  are arbitrary, but fixed, numbers and  $a \neq 0$ . The graph of this function is a parabola. (DPI)

**Quadratic polynomial.** A polynomial where the highest degree of any of its terms is 2.

## R

**Radical.** The  $\sqrt{\quad}$  symbol, which is used to indicate square roots or  $n$ th roots. (MW)

**Random sampling.** A smaller group of people or objects chosen from a larger group or population by a process giving equal chance of selection to all possible people or objects. (H)

**Random variable.** An assignment of a numerical value to each outcome in a sample space. (M)

**Ratio.** A relationship between quantities such that for every  $a$  units of one quantity there are  $b$  units of the other. A ratio is often denoted by  $a:b$  and read " $a$  to  $b$ ".

**Rational expression.** A quotient of two polynomials with a non-zero denominator.

**Rational number.** A number expressible in the form  $\frac{a}{b}$  or  $-\frac{a}{b}$  for some fraction  $\frac{a}{b}$ . The rational numbers include the integers. [See Illustration I in the Glossary.](#)

**Real number.** A number from the set of numbers consisting of all rational and all irrational numbers. [See Illustration I in the Glossary.](#)

**Rectangular array.** An arrangement of mathematical elements into rows and columns.

**Rectilinear figure.** A polygon all angles of which are right angles.

**Recursive pattern or sequence.** A pattern or sequence wherein each successive term can be computed from some or all of the preceding terms by an algorithmic procedure.

**Reflection.** A type of transformation that flips points about a line, called the *line of reflection*. Taken together, the image and the pre-image have the line of reflection as a line of symmetry.

**Relative frequency.** The empirical counterpart of probability. If an event occurs  $N'$  times in  $N$  trials, its relative frequency is  $\frac{N'}{N}$ . (M)

**Relatively Prime.** Two positive integers that share no common divisors greater than 1; that is, the only common positive factor of the two numbers is 1.

**Remainder Theorem.** If  $f(x)$  is a polynomial in  $x$  then the remainder on dividing  $f(x)$  by  $x - a$  is  $f(a)$ . (M)

**Repeating decimal.** A decimal in which, after a certain point, a particular digit or sequence of digits repeats itself indefinitely; the decimal form of a rational number. (M) *See also: terminating decimal.*

**Rigid motion.** A transformation of points in space consisting of a sequence of one or more translations, reflections, and/or rotations. Rigid motions are here assumed to preserve distances and angle measures.

**Rotation.** A type of transformation that turns a figure about a fixed point, called the *center of rotation*.

## S

**SAS congruence (Side-angle-side congruence).** When two triangles have corresponding sides and the angles formed by those sides are congruent, the triangles are congruent. (MW)

**SSS congruence (Side-side-side congruence).** When two triangles have corresponding sides that are congruent, the triangles are congruent. (MW)

**Sample space.** In a probability model for a random process, a list of the individual outcomes that are to be considered.

**Scatter plot.** A graph in the coordinate plane representing a set of bivariate data. *For example, the heights and weights of a group of people could be displayed on a scatter plot.* (DPI)

**Scientific notation.** A widely used floating-point system in which numbers are expressed as products consisting of a number between 1 and 10 multiplied by an appropriate power of 10, e.g.,  $562 = 5.62 \times 10^2$ . (MW)

**Sequence, progression.** A set of elements ordered so that they can be labeled with consecutive positive integers starting with 1, e.g., 1, 3, 9, 27, 81. In this sequence, 1 is the *first term*, 3 is the *second term*, 9 is the *third term*, and so on.

**Significant figures (digits).** A way of describing how precisely a number is written, particularly when the number is a measurement. (MW)

**Similarity transformation.** A rigid motion followed by a dilation.

**Simultaneous equations.** Two or more equations containing common variables. (MW)

**Sine (of an acute angle).** The trigonometric function that for an acute angle is the ratio between the leg opposite the angle when the angle is considered part of a right triangle and the hypotenuse. (M)

## T

**Tangent.** a) Meeting a curve or surface in a single point if a sufficiently small interval is considered. b) The trigonometric function that, for an acute angle, is the ratio between the leg opposite the angle and the leg adjacent to the angle when the angle is considered part of a right triangle. (MW)

**Tape diagram.** A drawing that looks like a segment of tape, used to illustrate number relationships. Also known as a strip diagram, bar model, fraction strip, or length model.

**Terminating decimal.** A decimal is called terminating if its repeating digit is 0. A terminating decimal is the decimal form of a rational number. *See also: repeating decimal.*

**Third quartile.** For a data set with median  $M$ , the third quartile is the median of the data values greater than  $M$ . *Example: For the data set {2, 3, 6, 7, 10, 12, 14, 15, 22, 120}, the third quartile is 15. See also: median, first quartile, interquartile range.*

**Transformation.** A prescription, or rule, that sets up a one-to-one correspondence between the points in a geometric object (the *pre-image*) and the points in another geometric object (the *image*). Reflections, rotations, translations, and dilations are particular examples of transformations.

**Transitivity principle for indirect measurement.** If the length of object A is greater than the length of object B, and the length of object B is greater than the length of object C, then the length of object A is greater than the length of object C. This principle applies to measurement of other quantities as well.

**Translation.** A type of transformation that moves every point in a graph or geometric figure by the same distance in the same direction without a change in orientation or size. (MW)

**Trapezoid.** A quadrilateral with at least one pair of parallel sides. (Note: There are two definitions for the term trapezoid. This is the inclusive definition. For more information see [commoncoretools.me/wpcontent/uploads/2014/12/ccss\\_progression\\_gk6\\_2014\\_12\\_27.pdf](https://commoncoretools.me/wpcontent/uploads/2014/12/ccss_progression_gk6_2014_12_27.pdf).)

**Trigonometric function.** A function (as the sine, cosine, tangent, cotangent, secant, or cosecant) of an arc or angle most simply expressed in terms of the ratios of pairs of sides of a right-angled triangle. (M)

**Trigonometry.** The study of triangles, with emphasis on calculations involving the lengths of sides and the measure of angles. (MW)

## U

**Uniform probability model.** A probability model which assigns equal probability to all outcomes. *See also: probability model.*

**Unit fraction.** A fraction with a numerator of 1, such as  $1/3$  or  $1/5$ .

## V

**Valid.** a) Well-grounded or justifiable, being at once relevant and meaningful, e.g., a *valid* theory; b) Logically correct. (MW)

**Variable.** A quantity that can change or that may take on different values. Refers to the letter or symbol representing such a quantity in an expression, equation, inequality, or matrix. (MW)

**Vector.** A quantity with magnitude and direction in the plane or in space, defined by an ordered pair or triple of real numbers.

Visual fraction model. A tape diagram, number line diagram, or area model.

## W

Whole numbers. The numbers 0, 1, 2, 3,.... [See Illustration I in the Glossary.](#)