

MATHEMATICS GLOSSARY

ACCEPTABLE LEVELS OF ACCURACY - the precision determined by the situation or the given numbers, students should help develop what is acceptable according to the situation.

ADDITIVE IDENTITY PROPERTY - the sum of any number and zero is the original number; zero is the identity element of addition.

ANALYZE - to break down into parts and explain or demonstrate the logic of a situation or a process.

ANGLE RULER - a hinged ruler with a protractor attached for reading the measure of an angle in degrees.

ASSOCIATIVE PROPERTY - property about grouping of numbers; of addition, the formula $(a + b) + c = a + (b + c)$.

ASYMPTOTE - a straight line always approaching but never intersecting a curve.

BOX PLOT - a representation of data above a numbered scale where the "box" encloses all data between the median of the lower half (quartile 1) and the median of the upper half (quartile 3), with a vertical line inside the box to indicate the median of the data; a dot represents each of the high and low values of the data, and a horizontal line called a whisker connects each dot to the box.

CALCULATOR NOTATION - the symbols used by a calculator for scientific notation.

CAPACITY - the amount of liquid that can fill an object.

CARTESIAN PLANE - a rectangular coordinate system consisting of a horizontal number line (x-axis) and a vertical number line (y-axis), intersecting at the origin (zero on each number line).

CHORD - a straight line joining any two points on an arc, curve or circle.

CLASS OF FUNCTIONS - family of functions such as linear, quadratic, power (polynomial), exponential, or logarithmic.

CLASSES OF NUMBERS - family of numbers or number systems such as natural, integer, rational, irrational, real, or complex.

COMMUTATIVE PROPERTIES - properties about order - of addition, $a + b = b + a$; of multiplication, $a \times b = b \times a$.

COMPATIBLE NUMBERS - numbers that can be easily manipulated and operated on mentally.

COMPLEX NUMBERS - numbers of the form $a + bi$, where a and b are real numbers and $i = \sqrt{-1}$.

COMPOSE NUMBERS - put a set of numbers together to form a new number using addition or multiplication.

COMPOSITION - see "compose numbers".

COMPOUND EVENTS - two or more events in a probability situation such as flipping a coin and spinning a spinner.

CONCRETE MATERIALS - objects to be manipulated (e.g., pattern blocks, snap cubes, geoboards, tangrams, color tiles, base ten blocks).

CONIC SECTION - figures represented by cross-sections of a cone or two cones placed apex to apex - parabola, circle, ellipse, hyperbola.

CONSTANT RATE OF CHANGE - set of data or table of values in which the amount of the dependent variable changes by a constant (fixed) value as the value of the independent variable changes by a constant value.

CONSTANT RATIO - see constant rate of change.

CONSTRUCT - create a figure using only a straight edge and compass.

CONTRACTION - the opposite of dilation, a figure resulting from multiplying all dimensions of a given figure by a number between zero and one.

CONVERSION FACTOR - relationship between two units from different systems of measurement used to convert from one system to the other (e.g., 2.54 centimeters corresponds to 1 inch).

COORDINATE SYSTEM - set of ordered pairs used to locate an object or point on the two-dimensional plane.

COUNTING TECHNIQUES - a variety of methods used to determine the total possible outcomes, typically in a probability situation, including the multiplication principle, trees and lists.

DECOMPOSE NUMBERS - break up numbers into addends or factors.

DEPENDENT VARIABLE - a variable whose value depends on the value of another variable in combination with or without other numbers.

DERIVED MEASUREMENT - a measurement that is a combination of two other measurements such as speed in miles per hour.

DESCRIBE - to explain orally or in writing.

DEVELOP – to be involved in reasoning, exploration, conjecturing, using manipulatives or sketches to gain understanding of concepts or relationships.

DEVELOP FLUENCY - to become skillful in working with numbers, both in accuracy and speed.

DILATIONS - a figure resulting from multiplying all dimensions of a given figure by a number greater than one.

DIRECT VARIATION - a variation of the type $y = kx$; the graph is a straight line through the origin.

DISTRIBUTIVE PROPERTY - the property which relates multiplication and addition; the formula, $a(b + c) = a \times b + a \times c$.

DOUBLE LINE GRAPHS - graphs in which two sets of data are graphed at the same time, connecting each set with line segments.

DRAW - to create a figure using numbered scales on tools such as rulers and protractors.

ERROR TOLERANCE - the value allowable above and below a number or its approximation.

EXACT NUMBER - a numerical result that has not been rounded or estimated.

EXPLICIT FORM - a formula for any term of a sequence given the number of the term.

EXPONENTIAL FUNCTION - a function of the form $y = a(b^x)$.

EXPRESSION - combination of numerals or numerals and variables that indicate a finite number of operations, not an equation.

EXTRAPOLATE - to use given information to predict values beyond the set of given values using either a formula or a reasonable estimate.

FAMILIAR FRACTIONS - commonly used fractions such as halves, thirds, fourths, fifths, sixths, eighths and tenths.

FIELD PROPERTIES - closure for addition and multiplication, commutative for addition and multiplication, associative for addition and multiplication, identity for addition and multiplication, inverse for addition and multiplication, distributive for multiplication over addition.

FLEXIBLY - usually applied to computation, where students should be able to mentally manipulate numbers and components of numbers to create a solution to a problem.

FUNCTION RULE - the set of operations that describes the process that takes the independent variable and transforms it into the dependent variable in a consistent way.

GREATEST COMMON FACTOR - the greatest number that is a factor of each of the given numbers.

GROWING PATTERN – a pattern where the number of objects in the pattern increases from term to term.

GROWTH FORMULA – either a linear or exponential equation that describes the growth over time.

GROWTH PATTERN – a set of values usually visualized by plotting points on a grid and fitting either a linear or an exponential equation to the scatter plot.

IDENTIFY - to choose from a set or to name cases in which the desired result is present or true.

INDEPENDENT VARIABLE - in the equation, $y = 3x + 2$, x is the independent variable and y is the dependent variable. Substituting any value for x leads to a value for y .

INDIRECT MEASUREMENT - a measurement that is impossible or impractical to be measured directly or physically, usually calculated using a formula or a known relationship.

INDIRECT TECHNIQUE - the method used to determine an indirect measurement.

INTEGER - any whole number or its opposite.

INTEGRAL COEFFICIENT - in the expression, $3x$, 3 is the coefficient. Integral coefficients are coefficients that are integers.

INTERPOLATE - determine a value within a set of given values using a formula, rule, or reasonable estimation.

INVERSE OPERATION - examples of inverse operations are addition and subtraction, multiplication and division, extracting a root and raising to a power.

INVERSE VARIATION - a variation of the type $xy = k$; the graph is a hyperbola with axes as asymptotes.

IRREGULAR SHAPES - shapes that are not one of the named geometric shapes or combinations of shapes; shapes that may contain curved portions rather than straight-line segments.

JOINT VARIATION - variation in which the values of one variable depend on two or more direct variations, $z = kxy$.

JUSTIFY - give a logical explanation or informal proof of a mathematical situation, computation or property.

LAW OF COSINES - for any triangle with sides a , b , c , and angles A , B , and C , $a^2 = b^2 + c^2 - 2bc \cos A$.

LAW OF SINES - for any triangle with sides a , b , c and angles A , B , and C , $\sin A/a = \sin B/b = \sin C/c$.

LINE SYMMETRY - a figure has line symmetry if there is at least one line that divides the figure into two parts that are mirror images of each other.

LINEAR EQUATION - an equation which has a straight line graph.

LOCAL BEHAVIOR - a description of the values of a function or relation within a small interval of the independent variable.

LOGARITHM - a logarithm of a number is the exponent to which a given base must be raised to produce the given number.

LOGARITHMIC GROWTH - a set of values which are approximated by an equation of the form $y = \log_b x$.

LOGARITHMIC NOTATION - use of the symbols "log" or "ln" in context.

LOWER BOUND - any number below which a function value may approach but not pass.

MANIPULATIVES - objects that can be arranged, built, and moved around by hand, (see concrete materials.)

MATHEMATICAL NOTATION - correct use of labels, symbols, and abbreviations in a mathematics context.

MIRA - a plastic device which is used to determine and complete symmetries by reflecting images and allowing the user to also see through the reflecting surface.

MIXED VARIATION - variation that contains both direct and inverse variation.

MODE - the most frequently occurring value or values in a set of values.

MODEL - to create, using concrete materials, drawings or symbols; a representation of a mathematical relationship or situation.

NATURAL NUMBER - the counting numbers, starting with one.

NAVIGATIONAL SYSTEM - compass directions or bearings in a variety of formats.

NET - a two-dimensional pattern that will fold into a three-dimensional figure.

NON-CONSTANT RATE OF CHANGE - set of data or table of values in which the amount of the dependent variable does not change by a constant value as the value of the independent variable changes by a constant value.

NON-DEGENERATE CONIC SECTIONS - see conic sections.

NON-REGULAR SHAPE - a shape that does not have all sides congruent and all angles congruent.

ORDER - to place numbers in order from smallest to largest or largest to smallest.

ORDER OF OPERATIONS - the rule for using operations on numbers; first parentheses, then exponents, then multiplication and division, then addition and subtraction.

PARAMETRIC EQUATIONS - two equations which express the coordinates of x and y as separate functions of a common variable, called the parameter that is usually time.

PERPENDICULAR BISECTOR - a line segment or ray that intersects a segment at its midpoint at a 90° angle.

PIECEWISE FUNCTION - a function consisting of two or more equations, defined for specified intervals of the independent variable.

POLYHEDRON - a solid figure bounded by faces that are polygons; two faces meet at an edge, two or more edges meet at a vertex.

PRIME FACTORIZATION - the unique set of factors of a number, all of which are prime numbers.

PROBABILITY - a ratio of the number of desired outcomes and the number of possible outcomes.

PROBABILITY EVENTS - the set of all possible outcomes of an experiment is the sample space; any subset of the sample space is an event.

PROPERTIES OF EQUALITY - reflexive property ($a = a$), symmetric property (if $a = b$, then $b = a$), and transitive property (if $a = b$ and $b = c$, then $a = c$).

PROPORTIONALITY - a relationship described by a constant ratio.

PROVE - use logical arguments, definitions, theorems, and properties to show that a relationship is true for all numbers or specific set of figures.

PYTHAGOREAN THEOREM - In a right triangle with sides a and b , and hypotenuse c , the theorem states that $c^2 = a^2 + b^2$.

PYTHAGOREAN TRIPLES - sets of three numbers that satisfy the Pythagorean theorem.

QUADRATIC EQUATION - any equation of the form $y = ax^2 + bx + c$.

RADIAN - an angle measure based on the premise that there are 2π radians in a complete circle.

RATIO - a comparison of one quantity to another.

RATIO OF SIMILITUDE - the simplest form ratio of the measures of corresponding parts of similar figures.

REAL NUMBERS - rational and irrational numbers.

RECOMPOSE - put addends or factors of a given number back together in a way different from the original arrangement or decomposition.

RECURSIVE FORM - a formula for the next term of a sequence given the term before it.

REFLECTION - a rigid motion of an object on the plane, also known as a "flip", where the object is replicated as if it were folded across a line and imprinted in its new location.

REGULAR POLYGON - a polygon with equal sides and equal angles.

REGULAR SHAPE - see regular polygon.

RIGID MOTION – a motion that preserves shape and size.

ROTATIONAL SYMMETRY - a figure has rotational symmetry if it can be rotated (turned) less than 360 degrees about a point so that it appears the same as the original figure.

ROTATION - a rigid motion in the plane in which a figure is rotated (turned) about a point in the plane.

SCIENTIFIC NOTATION - a notation for expressing very large and very small numbers as a product of a decimal number greater than or equal to one and less than ten and a power of ten.

SET OF DATA POINTS - data collected and placed into ordered pairs for the purpose of graphing.

SIMPLE POLYGONS - convex, closed shapes bounded by line segments joined end to end.

SIMPLE EVENTS - a single activity in a probability experiment such as flipping a coin.

SIMULATION - an experiment that has the same number of outcomes as a given situation but is easier or more practical to carry out than the given situation.

SLOPE - the ratio of the increase in the y-values to the increase in the x-values between any two ordered pairs.

SLOPE-INTERCEPT FORM - the form of a linear equation $y = mx + b$ where m represents the slope and b represents the y-intercept.

STANDARD FORM - the form of a number expressed as a sum of products involving powers of ten.

STEM AND LEAF PLOTS - a method of displaying data where the leading digit(s) are the stem and the ending single digits are arranged in ascending order to the side representing the leaves.

SUCCESSIVE APPROXIMATION - a sequence of approximations, each one closer to the desired value.

SURFACE AREA - the total area required to cover the surface of a three-dimensional object.

SYSTEM OF EQUATIONS - a set of two or more equations.

TABLE OF VALUES - a table of two columns, the first representing values of the independent variable, the second representing the values of the dependent variable.

TESSELLATION - a tiling of a plane with no gaps and no overlaps.

TRANSFORMATIONS - motions in the plane; translations, rotations, reflections, dilations and contractions.

TRANSLATION - a rigid motion of an object in the plane also known as a "slide" where the object moves from one location to another.

TREE DIAGRAM - a counting technique where outcome options are shown as "branches" and the total number of branches at the end of the tree represent the total number of possible outcomes.

TRIANGLE INEQUALITY - the property that states that the length of any side of a triangle is less than the sum of the lengths of the other two sides.

UNIT ANALYSIS - the process of using conversion factors to change from one measure or rate to another.

UNIT OF ATTRIBUTE - the unit chosen depends upon the attribute being measured (e.g., for the attribute "length", a unit might be "meters").

UNIT FRACTION – fraction with one as a numerator and a natural number as a denominator.

UPPER BOUND - any number above which a function value may approach but not pass.

VECTOR - a line segment with both direction and length.

VERTICAL ANGLES - non-adjacent angles formed by the intersection of two lines.

VERTICES - plural form of vertex; the point of intersection of the rays of an angle, "corner" point of any geometric figure bounded by lines, planes, or lines and planes.

VOLUME - the amount of space occupied in three dimensions.