

Making Connections to Content

Essential Vocabulary



VIRGINIA MATH SOL

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Making Connections to Content

New Essential Vocabulary

Teaching specific terms in a specific way is probably the strongest action a teacher can take to ensure that students have the academic background knowledge they need to understand the content they will encounter in school. When teachers in a school focus on the same academic vocabulary and teach it using a systematic approach the school powerfully influences students understanding of content. When all teachers in a school division embrace and use the approach, it becomes even more powerful. In Robert Marzano and Debra Pickering's book *Building Academic Vocabulary* (ASCD, 2005) their research explains that students who have direct vocabulary instruction on specific terms increase their understanding from the 50th percentile to the 83rd percentile.

Many students acquire academic background knowledge outside of school and come to subject-area classes already knowing and using terms essential for understanding content. For example they may have traveled or been exposed to different individuals, experiences or cultures. By contrast, students from families with fewer resources may have lacked such opportunities, and thus, have not acquired important background knowledge. When these two different students enroll in school they enter with discrepancies in their academic knowledge. Unfortunately, as time progresses, the gap in academic knowledge increases. Given the fact that knowledge of vocabulary has a profound effect on student comprehension of academic content a systematic approach to vocabulary instruction is essential. This document attempts to assist Virginia educators in designing instruction for all students that will ensure their mastery of all content regardless of their knowledge when they enter school.

For your benefit, the document has been organized into two sections. The first section provides non-negotiable vocabulary by grade level with each content area separated. The second section lists essential vocabulary by content area and then sub-divided by grade level.

Making Connections to Content

New Essential Vocabulary

FOR

MATHEMATICS

SECTION ONE

by

Grade Level or course

Making Connections to Content

New Essential Vocabulary

Kindergarten

MATHEMATICS

Number and Number Sense: set; more; fewer; same; equal; one-to-one correspondence; zero (0); 0 through 15; 0 elements; first through tenth; left-to-right; right-to-left; top-to-bottom; bottom-to-top; +0 to 100; 10 to +0; one more than; one less than; fives; tens; fraction; whole; part; half; a fourth of.

Computation and Estimation: whole numbers; addition; subtraction; take away (taking away); separate (separating); difference; counting; sum.

Measurement: money; penny; nickel; dime; quarter; 10 cents; ruler; length; weight (scale); time (clock); analog and digital; hour; calendar (day, month, and seasons); temperature (thermometer); hot (hotter); cold (colder); length (shorter and longer); height (taller and shorter); weight (heavier and lighter); hotness; coldness.

Geometry: circle; triangle; square; rectangle; size (larger and smaller); plane geometric figures (circle, triangle, square, and rectangle); figure (figures); closed; side (sides); corner (corners); angle (angles); round; curved; polygon; line segment; closed; a triangle is; quadrilateral; equal length; the center; above; below; next to;

Probability and Statistics: data; greatest; least; the same; more likely; less likely; counting; tallying; tables; picture graphs; object graphs;

Patterns, Functions, and Algebra: classify; pattern; attributes; sort; categories; core; repeating pattern

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Based on the 2009 Mathematics Revised Curriculum Framework

Grade 1

MATHEMATICS

Number and Number Sense: 0 to 100; count; by one (ones); two (twos); five (fives); ten (tens); fraction; part of a whole; whole region; one-half; two halves; one third; two thirds; three thirds; one fourth; two fourths; three fourths; four fourths.

Computation and Estimation: magnitude; estimate; add; addition; adding; sum; subtraction; subtracting; minus, difference; counting back; one-more-than; two-more-than; one-less-than; two-less-than; +; -; =;

Measurement: money; cent (cents); nickel; dime; quarter; penny (pennies); ones; fives; tens; analog clock; digital clock; time; half hour; minute and hour hand; a.m.; p.m.; sixty minutes; hour; length; weight; mass; volume; nonstandard units; more; less; equivalent; balance scale; lighter; heavier; the same; calendar; units of time; days; weeks; months; today; yesterday; next week; last week; seven days in a week; months of the year;.

Geometry: triangle (triangles); square (squares); rectangle (rectangles); circle; rhombi; trapezoids; sides; vertices; angles; right angles; plane geometric figure; curved; vertex; equilateral; obtuse; acute; quadrilateral (quadrilaterals); translations; reflections; rotations.

Probability and Statistics: tables; picture graphs; object graphs; data; surveys, tallying; more; less; fewer; greater than; less than; equal to.

Patterns, Functions, and Algebra: attributes; color; patterns; repeating patterns; growing patterns; repeating numeric pattern; core (the part of the sequence that repeats); geometric patterns; rotation; reflection; equality; equal sign; equations; equality (=) symbol; equivalent values.

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Grade 2

MATHEMATICS

Number and Number Sense: greater than; less than; equal to; $>$, $<$, or $=$; inequality symbols; rounding; nearest; number lines (number lines); one (ones); ten (tens); hundred (hundreds); place value; first through twentieth; ordered position; ordinal position; ordinality; cardinality; left to right; right to left; top to bottom; bottom to top; whole; fraction; part; denominator; numerator; unit fraction; halves; thirds; fourths; sixths; eighths; tenths; count forward; twos; fives; tens; count backward; skip counting; odd numbers; even numbers.

Computation and Estimation: add; addition; adding; sum; joining; combining; minus; subtraction; subtracting; difference; taking away; separating; estimate; rounding; estimation is; partial sums; regroup; minuend; subtrahend; inverse operations; addition fact; subtraction fact.

Measurement: money; penny (pennies); nickel (nickels); dime (dimes); quarter (quarters); cent (cents); cent symbol (c); dollar; dollar symbol (\$); decimal point; decimal point symbol (.); length; centimeter; inch; weight/mass; pounds/ounces; kilograms/grams; scale; liquid volume; cups; pints; quarts; gallons; liters; time; analog clock; digital clock; hour; minutes; quarter hours; calendar; days; weeks; months; temperature; Celsius; degrees; Celsius (C); Fahrenheit (F); thermometers.

Geometry: figure (figures); symmetric; line of symmetry; reflected; figures; transformation; translation; sliding; rotation; vertex; reflection; flipping; horizontal; vertical; diagonal; solid geometric figures; circle/sphere; square/cube; rectangle/rectangular prism; plane and solid; faces; edges; vertices; sides; bases; angles.

Probability and Statistics: picture graphs, pictographs; bar graphs; data; categories; parallel; horizontal; vertical; axis; experiments; predict outcomes; probability; event; favorable outcomes; possible outcomes; impossible; unlikely; as likely as; unlikely; equally likely; likely; certain.

Patterns, Functions, and Algebra: patterns; repeating patterns; growing patterns; numeric patterns; common difference; growing numeric pattern; repeating numeric pattern; transformations; rotation; reflection; vertex; flipping; addend; subtrahend; story problem; numerical sentence; = symbol; balanced; = symbol; not balanced.

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Grade 3

MATHEMATICS

Number and Number Sense: Base-10 number system; place value; whole numbers; standard; written; expanded; period (periods); rounding; estimate; symbols $>$, $<$, or $=$; greater than; less than; equal to; digits; addition; subtraction; inverse operations; multiplication; division; mixed numbers; fraction; parts; set; whole; denominator; like and unlike denominators; numerator; half (halves); third (thirds); fourth (fourths); eighth (eighths); tenth (tenths).

Computation and Estimation: addition; addend; sum; subtraction; minuend; subtrahend; difference; multiplication facts; division facts; factor; product; number line; proper fraction; numerator; denominator; improper fraction.

Measurement: coin (coins); bill (bills); length: centimeter; meter; inch; foot; yard; liquid volume; cups; pints; quarts; gallons; liters; weight/mass; ounces; pounds; grams; kilograms; area; perimeter; U.S. Customary; metric units; square units; polygon; closed plane figure; line segments; curved; surface; analog; digital clock; clocks; elapsed time; periods of time; minutes; hours; calendar; days; months; week; years; temperatures; thermometers; Celsius; Fahrenheit.

Geometry: circle; square; rectangle; triangle; solid geometric figure; cube; rectangular prism; square pyramid; sphere; cone; cylinder; plane geometric figures; faces; vertices; edges; point; space; length; width; line; endpoints; line segment; angle; vertex; ray; angle rulers; congruent; noncongruent.

Probability and Statistics: line plot; picture graph; bar graph; sample space; data; categories; axis; outcomes; favorable outcomes; possible outcomes; impossible; unlikely; equally likely; likely; certain.

Patterns, Functions, and Algebra: pattern (patterns); growing patterns; numeric patterns; geometric patterns; transformations; rotation; vertex; reflection; flipping; commutative properties for addition and multiplication; identity and commutative properties for addition and multiplication; commutative property for addition; commutative property for multiplication; factors; identity property for addition; identity property of multiplication; number sentence.

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Grade 4

MATHEMATICS

Number and Number Sense: period (periods); whole number (whole numbers); greater than; less than; equal to; million (millions); place value; period (periods); round; symbols ($>$, $<$, or $=$); thousand; ten thousand; hundred thousand; number line; denominator; numerator; common denominators; denominators of 12 or less; like numerators; unlike denominators; mixed number; equivalent fractions; decimals; decimal point; decimal number; forms: standard, written.

Computation and Estimation: sum is; sums; difference (differences); estimate; solution; inverse operations; dividend; divisor; quotient; multistep problems; closer to; between; a little more than; product (products); quotients of; remainders; front-end; leading-digit estimation; factor; product; multiple; common factor; least common multiple; greatest common factor; common multiples.

Measurement : metric unit (metric units); metric; gram; kilogram; milliliter; liter; millimeter (millimeters); centimeter (centimeters); meter (meters); kilometer (kilometers); U.S. Customary units; length; inch (inches); feet; yard (yards); miles; mass; weight; ounce; pound; ton; liquid volume; cups; pints; quarts; gallons; elapsed time; a.m.; p.m.

Geometry: points; lines; line segments; rays; angles; endpoints; vertices; intersection; parallelism; perpendicularity; intersecting lines; perpendicular lines; right angles; parallel lines; plane figures; geometric transformations; reflection; translations; rotation; congruence; congruent figures; noncongruent; line of reflection; transformation; square; sides; polygon; closed; triangle; quadrilateral; rectangle; trapezoid; rhombus; parallelogram; pentagon; hexagon; heptagon; octagon; nonagon; decagon.

Probability and Statistics: outcome; simple event; probability; favorable outcomes; possible outcomes; impossible; certain; unlikely; as likely; as unlikely; equally likely, likely; event; data analysis; line graphs; continuous; not continuous; horizontal axis; vertical axis; scale ; frequency; increments; chart; bar graphs; title; categories.

Patterns, Functions, and Algebra: geometric pattern, numerical pattern, equality, equation, associative property for addition, associative property for multiplication, equal sign ($=$),

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Grade 5

MATHEMATICS

Number and Number Sense: decimal; decimal number; decimal point; whole number; greater than; less than; equal to; number line; tenth; hundredth; thousandth; equivalent; half (halves); fourth (fourths); fifth (fifths); eighth (eighths); tenth (tenths); prime number; factors; composite number; natural number; prime factorization; product; even; odd.

Computation and Estimation: estimation; reasonableness; sum (sums); difference (differences); product (products); division; decimal point; quotient; dividend; divisor; multistep problem; fraction; simplest form; equivalent fraction; numerator; denominator; greatest common factor; equivalent fractions; mixed numbers; least common denominator (LCD); least common multiple (LCM); expression; order of operations.

Measurement: perimeter; area; volume; U.S. customary unit; metric; length; width; side; base; height; estimate; inch; foot; yard; mass; weight; ounces; pounds; tons; grams; kilograms; length; feet; yards; millimeters; centimeters; meters; kilometers; liquid volume: cup (cups); pint (pints); quart (quarts); gallon (gallons); milliliter (milliliters); liter (liters); area: square units; temperature: Celsius; Fahrenheit; freezes; boils; diameter; radius; chord; circumference; circle; center; elapsed time; angles; degree; right angle; acute angle; obtuse angle; straight angle.

Geometry: right triangle; obtuse triangle; acute triangle; scalene triangle; congruent; isosceles triangle; equilateral; quadrilateral; polygon; parallelogram; diagonal; rectangle; square; rhombus; plane figures; trapezoid; bases; legs.

Probability and Statistics: probability; outcomes; event; number of favorable outcomes; number of possible outcomes; ratio; impossible; unlikely; as likely as unlikely; equally likely; likely; certain; sample space; tree diagram; Fundamental Counting Principle; stem-and-leaf plot; line graphs; vertical axis; horizontal axis; title; frequency; data; stems; key; mean; median; mode; measures of center; fair share; range; measure of variation; statistics.

Patterns, Functions, and Algebra: numerical pattern, geometric pattern, infinite, repeating pattern, growing pattern, expression, T-table, verbal quantitative expression, algebraic expression, variable, unknown, open sentence, story problem, distributive property

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Grade 6

MATHEMATICS

Number and Number Sense: ratio; percent (percents); decimal (decimals); fraction (fractions); integers; whole numbers; positive integers; negative integers; zero; absolute value; exponents; perfect squares; exponential notation; base; power of a number; zero power; undefined; powers of ten.

Computation and Estimation: mixed numbers; inverse operations; simplest form; reasonableness; order of operations.

Measurement: U.S. Customary System; inch, foot (feet), yard, mile; ounce; pounds; quart; metric system; centimeters, meter, kilometers; weight; mass; ounce, pounds, grams, kilogram; freezes; boils; linear units; square units; cubic units; pi; circumference; circle; diameter; area; radius; perimeter; volume; surface area; rectangular prism; polygon; closed curve; square; rectangle; faces; base; height.

Geometry: coordinate plane; coordinates; ordered pair; axes; quadrants; congruent figures; noncongruent figures; quadrilaterals; quadrilateral; closed planar (two-dimensional) figure; parallelogram; rectangle is; perpendicular bisectors; square; rhombus; trapezoid; kite; parallel sides; Venn Diagram.

Probability and Statistics: circle graphs; bar graphs; categorical (discrete) data; line graphs; continuous data; title; data categories; labels; scale; key; mean; balance point; measure of center; median; mode; probability; event; simple event; dependent events; independent events.

Patterns, Functions, and Algebra: numerical patterns; arithmetic sequence; common difference; geometric sequence; common ratio; linear equation; term; variable; coefficient; equation; additive identity property; multiplicative identity property; multiplicative inverse property; multiplicative property of zero; undefined; inequalities.

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Grade 7

MATHEMATICS

Number and Number Sense: negative exponents; powers of ten; scientific notation; fractions; decimals; percents; square roots; absolute value; square of a number; arithmetic sequence; common difference; geometric sequences; common ratio; variable expression.

Computation and Estimation: integers; whole numbers; proportion is; means; extremes; scale factors; rate; ratio; percent.

Measurement: volume; surface area; cylinders; rectangular prisms; net; base; height; plane figures; quadrilaterals; triangles; similar figures; polygons; congruent polygons; corresponding sides; corresponding angles.

Geometry: quadrilaterals; parallelogram; rectangle; square; rhombus; trapezoid; closed plane (two-dimensional); figure; line segments; diagonals; perpendicular; right angles; bisect; intersect; parallel; nonparallel; isosceles trapezoid; transformations; reflections; dilations; rotations; translations; coordinate plane; turn; fixed point; center of rotation; slide; multiplicative factor; image; preimage; coordinates.

Probability and Statistics: theoretical probability; event; favorable outcomes; possible outcomes; experimental probability; trials; Fundamental (Basic) Counting Principle; tree diagrams; compound event; histogram; bar graph; frequency; frequency distribution; line plots; circle graphs; stem-and-leaf plots.

Patterns, Functions, and Algebra: tables, rules, elements, sets, equations, relation, function, ordered pair, independent variable, dependent variable, curve, vertical line test, expression, variable, numerical expression, verbal expression, verbal sentence, algebraic expression, replacement set, order of operations, one-step equation, inverse operation, two-step equation, inequality, solution, number line commutative property for addition, commutative property for multiplication, associative property of addition, associative property of multiplication, distributive property, additive identity, real numbers, multiplicative identity, additive inverse, multiplicative inverse, multiplicative property of zero, undefined

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Grade 8

MATHEMATICS

Number and Number Sense: numerical expression; positive exponents; rational numbers; order of operations; decimals; fractions; percents; scientific notations; expression; rational number; inverse; power of a number; base; exponent; factor; zero power; natural or counting numbers; whole numbers; integers; rational; irrational; real number system.

Computation and Estimation: percent; ratios; proportions; discount; original price; discount price; simple interest; rate of interest; loan; investment; total value; total cost; percent increase; percent decrease; percent of change; markup; sales tax; simple interest formula; algebraic expressions; variables; grouping symbols; square root; perfect square; positive and negative roots; irrational number.

Measurement: vertical angles; complementary angles; supplementary angles; adjacent angles; reflex angles; intersecting lines; vertex; volume; surface area; prisms; cylinders; cones; pyramids; polyhedron; polygons; common vertex; area; circular cone; right circular cone; three-dimensional figure; nets; rectangular prism; attribute; two-dimensional representations.

Geometry: transformations; plane figures; rotation; clockwise; counterclockwise; center of rotation; reflection; axis; translation; dilation; a scale factor; similar figure; image of a polygon; preimage; side; views; top view; bottom view; Pythagorean Theorem; right triangle; legs; hypotenuse; area; perimeter; composite; closed plane figure; composite figure; subdivisions; circumference.

Probability and Statistics: probability; outcome; independent events; dependent events; replacement; comparisons; predictions; inferences; scatter plots.

Patterns, Functions, and Algebra: relation, ordered pairs, first member, second member, set, function, variable, table, graph, discrete, continuous, discrete function, distinct points, continuous function, physical model, multistep equation, two-step inequality, equality, expressions, commutative property for addition, commutative property for multiplication, associative property of addition, associative property of multiplication, distributive property, identity elements, additive identity, multiplicative identity, additive inverse, multiplicative inverse, multiplicative property of zero, like terms, linear equation, constant rate, axes, coordinate plane, domain, input, range, output, independent variable, dependent variable,

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ALGEBRA I

Expressions and Operations: replacement set; algebraic expression; magnitude; quantitative situations; absolute value; square root; cube root; laws of exponents; polynomials; factoring; binomial; trinomial; inductive reasoning; monomial; factors; prime polynomials; polynomial expressions; x-intercepts; radicand (argument); cube root; perfect cube factors; perfect cube; non-perfect cube; principal square root; literal equations (formulas); field properties; axioms of equality; real numbers; subsets; quadratic equations; algebraically; graphically; verify; solution; member; linear and quadratic equations; intersection; no solution; parallel; infinite solutions; simplify expressions; solve equations; system of two linear equations; unique solution; roots; set builder notation; axioms of inequality; properties of order; linear equations; slope; x- and y- intercepts; dependent variable; independent variable; parent function; slope or y-intercept; transformations; slope of the line; equation of a line; graph of a line; half-plane; parallel lines; positive; negative; zero; undefined; vertical line; horizontal line.

Equations and Inequalities: solution, member (side of equation), linear equation, quadratic equation, equality, literal equation (formula), justify, system of linear equations, intersect, point of intersection, parallel, coincide, field properties, properties of equality, zeros, x-intercept, function, roots, inequality, real-world, solution set, algebraically, graphically, slope, y-intercept, reflections, translations, parent function, dependent variable, independent variable, line, constant rate of change, equation of a line, half-plane, equal slopes, undefined, perpendicular

Functions: function; relation; domain; range; element; zeros of a function; x- and y-intercepts; inductive reasoning; abscissa; ordinate; zero of a function; unique; dependent variable; independent variable; constant of proportionality; direct variation; origin; inverse variation.

Statistics: variance; z-scores; mean absolute deviation; standard deviation; descriptive statistics; measures of center and variation; curve of best fit; contextual validity; box-and-whisker plot; curve of best fit; sample size, randomness, bias.

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GEOMETRY

Reasoning, Lines, and Transformations: intersecting; union; premises; conclusion; converse; inverse; contrapositive; conditional statement; symbolic form; Venn diagrams; deductive reasoning; inductive reasoning, deductive reasoning; proof; definitions; postulates; theorems; observations; assumptions; hypotheses; logical arguments; Euclidean geometry; undefined terms; biconditional; transversal; intersected; parallel lines; parallel postulate; corresponding angles; alternate interior angles, alternate exterior angles; same-side (consecutive) interior angles; distance; midpoint; slope; parallel; perpendicular; symmetric; translated; reflected; rotated; dilated; transformations; distance formula; image; isomorphic; preimage; distance formula; a line segment congruent; perpendicular bisector; point; line; bisector of a given angle.

Triangles: similarity; congruent figures; proportions; algebraic methods; coordinate methods; Pythagorean Theorem; right triangle; ratios; scale factor; hypotenuse; 45-45-90 degree triangles; 30-60-90 triangles; sine; cosine; tangent.

Polygons and Circles: quadrilateral; parallelogram; rectangle; rhombi; square; isosceles trapezoids; trapezoids; distance formula; slope; midpoint formula; polygons; intersecting lines; regular polygon; nonregular polygon; exterior angle; corresponding interior angle; linear pair; convex; polygon; nonoverlapping triangles; angles arcs; chords; tangents; secants; inscribed angles; locus; equidistant; center; conic section; radius; endpoint; diameter.

Three-Dimensional Figures: three-dimensional object; surface area; volume; cylinders; prisms; pyramids; cones; spheres; lengths; perimeters; areas; volumes; dimension; constant ratio; proportional reasoning; ratios.

Coordinate Relations and Transformations: transformation; distance formula; Pythagorean Theorem; coordinate plane; reflection; rotation; translation; line segment; coordinates; endpoint; midpoint formula; slope of a line; point symmetry; line symmetry

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ALGEBRA II

Expressions and Operations: rational algebraic expressions; rational numbers; variables; rational exponents; radical expressions; radical notation; exponential notation; factor; difference of squares; sum and difference of cubes; perfect square trinomials; complex numbers; real numbers; i ; square root; radical expressions; rational numbers; pure imaginary; real; rational; irrational; integers; whole; natural.

Relations and Functions: arithmetic; geometric sequence; sequences; series; n th term; geometric series; infinite series.

Equations and Inequalities: quadratic formula; quadratic function; discriminant; roots; absolute value; quadratic equation; radical or rational equations; nonlinear system of equations; points of intersection; linear-quadratic system; quadratic-quadratic system.

Functions: transformations; translations; reflections; dilations; parent graph; domain; range; limited; discontinuous; zeros; x - and y -intercepts; intervals; asymptotes; end behavior; inverse; composition; zero of a function; limited and discontinuous domains; ranges; inverse of a function; exponential; logarithmic; functions; composition of functions; logarithmic; exponential forms; vertical and horizontal asymptotes; fundamental theorem of algebra; polynomial function; factored form; zeros of multiplicity; real solutions; nonreal solutions.

Statistics: curve of best fit; polynomial; exponential; logarithmic functions; scatter plots; inverse variation; joint variation; direct and inverse variations; normal distribution; standard normal curve; symmetrical curves; mean; standard deviation; continuous distributions; normal curve; standard normal density function; fundamental counting principle; permutations; combinations.