



Virginia Standards Alignment
*2011 College and Career Ready Performance Expectations, produced by the State Department of
Education*
Grades: 9-12



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Virginia Standards Alignment

Standards List with Aligned Product Skills

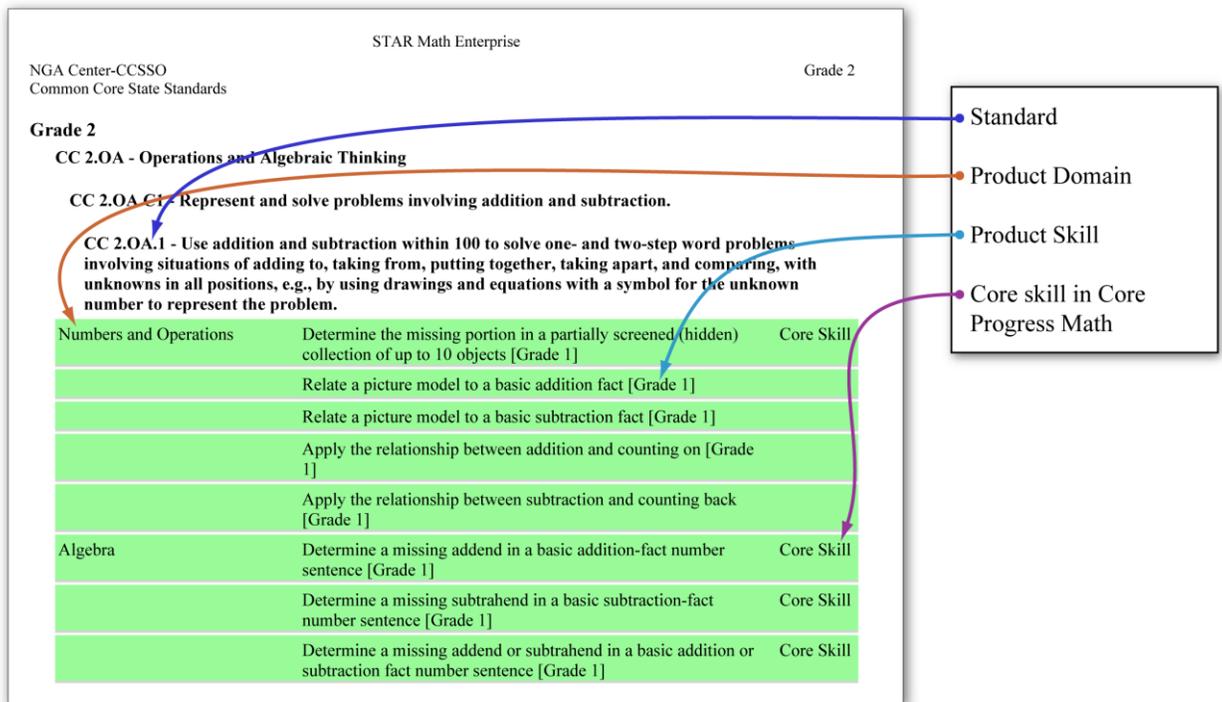
The Standards List with Aligned Product Skills Report is a standards-oriented document showing the entire list of standards for the subject and grade and the product skills aligned to those standards. This alignment report shows the breadth of standards coverage for the purpose and focus of this product.

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Note to Educator:

Thank you for your interest in Renaissance Learning technology. At Renaissance Learning, we recognize the impact that standards and assessment reform have on schools. We share the concerns of educators and administrators that students perform well and that teachers have the resources they need to support their efforts to address standards and assessments.

Renaissance Learning provides alignment reports to customers to show how the skills within each product align to the skills within academic standards. The alignment report presents all of the academic math standards for a specific state/agency with the aligned Renaissance Learning product skills indented below each standard.



Academic standards encompass the entire set of learning and expectations that teachers are responsible for. Renaissance Learning recognizes that teachers are the key to using products to address the entire set of standards. Renaissance Learning products are ideally suited to support teachers and academic standards. The Renaissance Learning alignment report supports teachers in this role by clearly identifying specific product skills that are aligned to the multiple skills within the standards.

On the alignment report you will see the word “Core” next to some of the skills. Core skills are the most critical mathematics skills for a student to learn at a grade level. They are key building blocks in a student’s mathematics education. Students need to have proficiency with core skills to be successful in math at their grade levels and to progress in the grades that follow. Core skills are indicated on Renaissance Learning’s research-based and empirically validated Core Progress math learning progression. Core Progress Math identifies the continuum of concepts and skills needed for success in math. The continuum begins with early numeracy and progresses to the level of mathematics required for college and careers. All of the skills in the Core Progress Math contribute to STAR Math Enterprise Assessment. Alignments for STAR Math Enterprise include alignments to the Common Core State Standards (CCSS) Mathematics Standards.

In the alignment report, you will notice that most skills have a grade-level indicator at the end of the text. In addition to these grade-level skills, the report includes skills that are not grade specific and do not have a grade-level indicator. These skills are designated Overall Product Skills. They are skills that all students gain through use of the product.

We hope this report answers your questions regarding the alignment of Renaissance Learning technology and materials to standards. The complete alignment strategy document is available. The Math document is number R39616. If you have any questions about the alignment report, please feel free to call us at (800) 338-4204.

Sincerely,

Renaissance Learning

Grades: 9-12

Students will apply algebraic, geometric, and statistical concepts and the relationships among them to solve problems, model relations, and make decisions using data and situations within and outside of mathematics. In accomplishing this goal, students will develop and enhance a repertoire of skills and strategies for solving a variety of problem types.

VA 1 - Solve practical problems involving rational numbers (including numbers in scientific notation), percents, ratios, and proportions.

Numbers and Operations	WP: Determine a given percent of a number [Grade 8]	Core Skill
	WP: Determine the percent one number is of another number [Grade 8]	Core Skill
	WP: Determine a number given a part and a decimal percentage or a percentage more than 100% [Grade 8]	Core Skill
	Solve a problem involving simple interest [Grade 8]	
	Solve a problem involving annually compounded interest [Grade 8]	
	WP: Find the result of two consecutive percentage changes applied to a given number [Grade 8]	
	WP: Estimate a given percent of a number [Grade 8]	Core Skill
Algebra	Solve a 1-step equation involving rational numbers [Grade 8]	Core Skill
	Solve a 2-step equation involving rational numbers [Grade 8]	Core Skill
	WP: Use a 1-variable equation with rational coefficients to represent a situation involving two operations [Grade 8]	Core Skill
	WP: Use a 2-variable equation with rational coefficients to represent a situation [Grade 8]	Core Skill
	WP: Solve a problem involving a 1-variable, 2-step equation [Grade 8]	Core Skill
	WP: Determine a linear equation that can be used to solve a percent problem [Algebra 1]	
Geometry and Measurement	Determine a measure of length, weight or mass, or capacity or volume using proportional relationships [Grade 8]	Core Skill

VA 2 - Collect and analyze data, determine the equation of the curve of best fit, make predictions, and solve real-world problems using mathematical models. Mathematical models will include polynomial, exponential, and logarithmic functions.

Data Analysis, Statistics, and Probability	Use a scatter plot to organize data [Grade 8]	
	Determine if a scatter plot shows a positive relationship, a negative relationship, or no relationship between the variables [Grade 8]	
	Approximate a trend line for a scatter plot [Grade 8]	
	Answer a question using information from a scatter plot [Grade 8]	

VA 3 - Use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include

VA 3.a - Use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include investigating and using formulas for finding distance, midpoint, and slope;

Algebra	Determine the slope of a line given two points on the line [Algebra 1]	Core Skill
Geometry and Measurement	Determine the distance between two points [Geometry]	
	Solve a problem involving the distance formula [Geometry]	Core Skill
	Determine the midpoint of a line segment given the coordinates of the endpoints [Geometry]	Core Skill
	Solve a problem involving the midpoint formula [Geometry]	

VA 3.b - Use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include applying slope to verify and determine whether lines are parallel or perpendicular;

Algebra	Determine if two lines are perpendicular or parallel given the equations of the lines [Algebra 1]	
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VA 3.c - Use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include investigating symmetry and determining whether a figure is symmetric with respect to a line or a point; and

Geometry and Measurement	Determine lines of symmetry [Grade 4]	Core Skill
	Identify a figure that has reflectional or rotational symmetry [Grade 5]	
	Determine the angle of rotational symmetry of a figure [Geometry]	

VA 3.d - Use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include determining whether a figure has been translated, reflected, rotated, or dilated, using coordinate methods.

Geometry and Measurement	Determine the transformation that generates the image of a figure in the Cartesian plane [Grade 6]	
	Relate the coordinates of a preimage or an image to a translation described using mapping notation [Geometry]	
	Determine the coordinates of a preimage or an image given a reflection across a horizontal line, a vertical line, the line $y = x$, or the line $y = -x$ [Geometry]	
	Relate the coordinates of a preimage or an image to a dilation centered at the origin [Geometry]	
	Determine the angle of rotational symmetry of a figure [Geometry]	
	Determine the coordinates of the image of a figure after two transformations of the same type [Geometry]	
	Determine the coordinates of the image of a figure after two transformations of different types [Geometry]	

VA 4 - Verify characteristics of quadrilaterals and use properties of quadrilaterals to solve real-world problems.

Geometry and Measurement	Determine a length or an angle measure using general properties of parallelograms [Geometry]	
	Determine a length or an angle measure using properties of squares, rectangles, or rhombi [Geometry]	
	Determine a length or an angle measure using properties of kites [Geometry]	
	Determine a length or an angle measure using properties of trapezoids [Geometry]	
	Determine the area of a quadrilateral [Geometry]	Core Skill
	Determine a length given the area of a quadrilateral [Geometry]	Core Skill
	WP: Solve a problem involving the area of a quadrilateral [Geometry]	

VA 5 - Solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry.

Geometry and Measurement	Determine the length of the hypotenuse of a right triangle using the Pythagorean theorem [Grade 8]	Core Skill
	Determine the length of a leg of a right triangle using the Pythagorean theorem [Grade 8]	Core Skill
	WP: Use the Pythagorean theorem to find a length or a distance [Grade 8]	Core Skill
	Determine if a triangle is a right triangle by using the Pythagorean theorem [Grade 8]	
	Solve for the length of a side of a triangle using the Pythagorean theorem [Geometry]	
	Determine a length in a complex figure using the Pythagorean theorem [Geometry]	Core Skill
	Determine a length using the properties of a 45-45-90 degree triangle or a 30-60-90 degree triangle [Geometry]	Core Skill
	WP: Determine a length using the properties of a 45-45-90 degree triangle or a 30-60-90 degree triangle [Geometry]	
	WP: Solve a problem involving a complex figure using the Pythagorean theorem [Geometry]	
	Determine a length using a sine, cosine, or tangent ratio in a right triangle [Geometry]	
	Determine the measure of an angle using a sine, cosine, or tangent ratio in a right triangle [Geometry]	
	WP: Determine a length in a right triangle using a sine, cosine, or tangent ratio [Geometry]	
	WP: Determine the measure of an angle in a right triangle using a sine, cosine, or tangent ratio [Geometry]	

VA 6 - Use formulas for surface area and volume of three-dimensional objects to solve real-world problems.

Geometry and Measurement	Determine the volume of a pyramid or a cone [Grade 8]	
	WP: Determine the volume of a pyramid or a cone [Grade 8]	
	Determine the surface area of a pyramid or a cone [Grade 8]	
	WP: Determine the surface area of a pyramid or a cone [Grade 8]	
	Solve a problem involving the surface area or the volume of a pyramid or a cone [Grade 8]	
	Determine a length given the surface area of a right cylinder or a right prism that has a rectangle or a right triangle as a base [Geometry]	Core Skill
	Solve a problem involving the surface area of a cone or a pyramid that has a rectangle or right triangle as a base [Geometry]	
	Determine a length given the surface area of a right prism or a right pyramid that has a regular polygon as its base [Geometry]	
	Determine the volume of an oblique prism or an oblique cylinder [Geometry]	
	Determine the volume of a right pyramid or a right cone [Geometry]	
	Solve a problem involving the volume of a right pyramid or a right cone [Geometry]	Core Skill
	Determine the volume of an oblique pyramid or an oblique cone [Geometry]	
	Determine the surface area of a sphere [Geometry]	Core Skill
	Determine the radius, diameter, or circumference of a sphere given its surface area [Geometry]	
	WP: Solve a problem involving the surface area of a sphere [Geometry]	
	Determine the surface area of a complex solid figure [Geometry]	
	Solve a problem involving the surface area of a complex solid figure [Geometry]	
	Determine the volume of a sphere or hemisphere [Geometry]	Core Skill
	WP: Determine the volume of a sphere or hemisphere [Geometry]	
	Determine the volume of a complex solid figure [Geometry]	
	WP: Solve a problem involving the volume of a complex solid figure [Geometry]	
	WP: Solve a problem involving two solid figures that have the same surface area or volume [Geometry]	

VA 7 - Use similar geometric objects in two- or three-dimensions to

VA 7.a - Use similar geometric objects in two- or three-dimensions to compare ratios between side lengths, perimeters, areas, and volumes;

Geometry and Measurement	Determine the ratio of the perimeters or areas of similar shapes [Grade 8]
	Solve a problem involving the surface areas of similar solid figures [Geometry]
	Solve a problem involving the volumes of similar solid figures [Geometry]

VA 7.b - Use similar geometric objects in two- or three-dimensions to determine how changes in one or more dimensions of an object affect area and/or volume of the object;

Geometry and Measurement	Solve a problem involving the surface areas of similar solid figures [Geometry]
	Solve a problem involving the volumes of similar solid figures [Geometry]

VA 7.c - Use similar geometric objects in two- or three-dimensions to determine how changes in area and/or volume of an object affect one or more dimensions of the object; and

Geometry and Measurement	Solve a problem involving the surface areas of similar solid figures [Geometry]
	Solve a problem involving the volumes of similar solid figures [Geometry]

VA 7.d - Use similar geometric objects in two- or three-dimensions to solve real-world problems about similar geometric objects.

Geometry and Measurement	WP: Determine a length using similarity [Geometry]	Core Skill
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VA 8 - Compare distributions of two or more univariate data sets, analyzing center and spread (within group and between group variations), clusters and gaps, shapes, outliers, or other unusual features.

Data Analysis, Statistics, and Probability	Determine the quartiles of a data set [Grade 8]
	Read a box-and-whisker plot [Grade 8]
	Use a box-and-whisker plot to organize data [Grade 8]
	Answer a question using information from a box-and-whisker plot [Grade 8]
	Answer a question using information from two box-and-whisker plots [Grade 8]
	Analyze the effect that changing elements in a data set has on the mean, the median, or the range [Grade 8]
	Compare the medians, the modes, or the ranges of the data in a double stem-and-leaf plot [Grade 8]
	Determine the median of the data in a frequency table or a bar graph [Grade 8]
	Determine the mean of the data in a frequency table or a bar graph [Grade 8]

VA 9 - Design and conduct an experiment/survey. Key concepts include

VA 9.a - Design and conduct an experiment/survey. Key concepts include sample size;

Data Analysis, Statistics, and Probability	Determine if a sample is likely to be representative of the larger population [Grade 8]
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VA 9.b - Design and conduct an experiment/survey. Key concepts include sampling technique;

Data Analysis, Statistics, and Probability	Determine if a sample is likely to be representative of the larger population [Grade 8]
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VA 9.c - Design and conduct an experiment/survey. Key concepts include controlling sources of bias and experimental error;

Data Analysis, Statistics, and Probability	Determine if a question is likely to produce a biased survey result [Grade 8]
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VA 9.d - Design and conduct an experiment/survey. Key concepts include data collection; and

VA 9.e - Design and conduct an experiment/survey. Key concepts include data analysis and reporting.

VA 10 - Investigate and apply the properties of arithmetic and geometric sequences and series to solve real-world problems, including writing the first n terms, finding the nth term, and evaluating summation formulas. Notation will include summation symbol and a^n .

VA 11 - Use angles, arcs, chords, tangents, and secants to

VA 11.a - Use angles, arcs, chords, tangents, and secants to investigate, verify, and apply properties of circles;

Geometry and Measurement	Determine the length of a line segment, the measure of an angle, or the measure of an arc using a tangent to a circle [Geometry]	Core Skill
	Determine a length using a line segment tangent to a circle and the radius that intersects the tangent [Geometry]	Core Skill
	Determine a length using two intersecting tangents to a circle [Geometry]	
	Determine the measure of an arc or an angle formed by intersecting chords or a chord that intersects a tangent to a circle [Geometry]	
	Determine the measure of an arc or an angle formed by two tangents, two secants, or a tangent and a secant that intersect outside a circle [Geometry]	
	Determine a length using intersecting chords, two secants that intersect outside a circle, or a tangent and a secant that intersect outside a circle [Geometry]	
	Solve a problem involving intersecting chords, tangents, and/or secants of a circle [Geometry]	

VA 11.b - Use angles, arcs, chords, tangents, and secants to solve real-world problems involving properties of circles; and

Geometry and Measurement	WP: Determine a length or an area involving a sector of a circle [Geometry]	Core Skill
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VA 11.c - Use angles, arcs, chords, tangents, and secants to find arc lengths and areas of sectors in circles.

Geometry and Measurement	Determine the area of a sector of a circle [Geometry]	Core Skill
	Determine the area of a segment of a circle [Geometry]	
	Determine the length of the radius or the diameter of a circle given the area of a sector [Geometry]	Core Skill
	WP: Determine a length or an area involving a sector of a circle [Geometry]	Core Skill
	Determine the measure of an arc or an angle given the area of a sector of a circle [Geometry]	Core Skill

Students will be able to recognize, use, and interpret various functions and their representations, including verbal descriptions, tables, equations, and graphs to make predictions and analyze relationships in solving complex, real-world mathematical problems.

VA 12 - Transfer between and analyze multiple representations of functions, including algebraic formulas, graphs, tables, and words. Select and use appropriate representations for analysis, interpretation, and prediction.

Algebra	Determine the table of values that represents a linear equation with rational coefficients in two variables [Grade 8]	Core Skill
	Determine a linear equation in two variables that represents a table of values [Grade 8]	Core Skill
	Determine the graph of a 2-operation linear function [Grade 8]	Core Skill
	Determine the slope of a line given its graph or a graph of a line with a given slope [Grade 8]	Core Skill
	Determine the x- or y-intercept of a line given its graph [Grade 8]	Core Skill
	WP: Interpret the meaning of the slope of a graphed line [Grade 8]	Core Skill
	WP: Interpret the meaning of the y-intercept of a graphed line [Grade 8]	Core Skill

VA 13 - Investigate and describe the relationships among solutions of an equation, zeros of a function, x-intercepts of a graph, and factors of a polynomial expression.

Overall Product Skills	Develop understanding and ability to analyze mathematical relationships including those between and among arithmetic operations.	
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VA 14 - Recognize the general shape of function (absolute value, square root, cube root, rational, polynomial, exponential, and logarithmic) families and convert between graphic and symbolic forms of functions. Use a transformational approach to graphing. Use graphing calculators as a tool to investigate the shapes and behaviors of these functions.

	Determine the graph of a 2-variable absolute value equation [Algebra 1]	
	Determine the graph of a given quadratic function [Algebra 1]	Core Skill
	Determine the graph of an exponential function [Algebra 1]	
	Determine the graph of a radical function [Algebra 1]	

	Determine the graph of a rational function [Algebra 1]	
Overall Product Skills	Develop understanding and ability to analyze mathematical relationships including those between and among arithmetic operations.	

VA 15 - Use knowledge of transformations to write an equation, given the graph of a function (linear, quadratic, exponential, and logarithmic).

VA 16 - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include

VA 16.a - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include continuity;

VA 16.b - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include local and absolute maxima and minima;

VA 16.c - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include domain and range, including limited and discontinuous domains and ranges;

	Determine the domain or range of a function [Algebra 1]	
	WP: Determine a reasonable domain or range for a function in a given situation [Algebra 1]	Core Skill

VA 16.d - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include zeros;

	Solve a quadratic equation by graphing the associated quadratic function [Algebra 1]	
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VA 16.e - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include x- and y-intercepts;

	Determine the x- or y-intercept of a line given its graph [Grade 8]	Core Skill
	WP: Interpret the meaning of the y-intercept of a graphed line [Grade 8]	Core Skill
	Determine the x- or y-intercept of a line given an equation [Algebra 1]	Core Skill

VA 16.f - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include intervals in which a function is increasing or decreasing;

VA 16.g - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include asymptotes;

VA 16.h - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include end behavior;

VA 16.i - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include inverse of a function;

VA 16.j - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include composition of multiple functions;

VA 16.k - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include finding the values of a function for elements in its domain; and

Algebra	Evaluate a function written in function notation for a given value [Algebra 1]	Core Skill
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VA 16.l - Investigate and analyze functions (linear, quadratic, exponential, and logarithmic families) algebraically and graphically. Key concepts include making connections between and among multiple representations of functions including concrete, verbal, numeric, graphic, and algebraic.

VA 17 - Determine optimal values in problem situations by identifying constraints and using linear programming techniques.

Students will be able to perform and justify steps in mathematical procedures and calculations and graph and solve a range of equations types. Students will reason from a variety of representations such as graphs, tables, and charts and will use displays of univariate data to identify and interpret patterns. Students will be able to calculate probabilities and analyze distributions of data to make decisions.

VA 18 - Given rational, radical, or polynomial expressions,

VA 18.a - Given rational, radical, or polynomial expressions, add, subtract, multiply, divide, and simplify rational algebraic expressions;

Algebra	Simplify a rational expression involving polynomial terms [Algebra 1]	Core Skill
	Multiply rational expressions [Algebra 1]	Core Skill
	Divide rational expressions [Algebra 1]	
	Divide a polynomial expression by a monomial [Algebra 1]	Core Skill
	Determine the LCD of two rational expressions [Algebra 1]	
	Add or subtract two rational expressions with like denominators [Algebra 1]	
	Add or subtract two rational expressions with unlike monomial denominators [Algebra 1]	
	Add or subtract two rational expressions with unlike polynomial denominators [Algebra 1]	Core Skill

VA 18.b - Given rational, radical, or polynomial expressions, add, subtract, multiply, divide, and simplify radical expressions containing rational numbers and variables, and expressions containing rational exponents;

	Add and/or subtract numerical radical expressions [Algebra 1]	
	Multiply a binomial numerical radical expression by a numerical radical expression [Algebra 1]	
	Rationalize the denominator of a numerical radical expression [Algebra 1]	
	Simplify a monomial algebraic radical expression [Algebra 1]	Core Skill
	Rationalize the denominator of an algebraic radical expression [Algebra 1]	
	Add or subtract algebraic radical expressions [Algebra 1]	

Multiply monomial algebraic radical expressions [Algebra 1]

Divide monomial algebraic radical expressions [Algebra 1]

VA 18.c - Given rational, radical, or polynomial expressions, write radical expressions as expressions containing rational exponents and vice versa; and

VA 18.d - Given rational, radical, or polynomial expressions, factor polynomials completely.

Factor the GCF from a polynomial expression [Algebra 1]	Core Skill
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Factor trinomials that result in factors of the form $(x +/- a)(x +/- b)$ [Algebra 1]	
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Factor trinomials that result in factors of the form $(ax +/- b)(cx +/- d)$ [Algebra 1]	Core Skill
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Factor trinomials that result in factors of the form $(ax +/- by)(cx +/- dy)$ [Algebra 1]	
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Factor the difference of two squares [Algebra 1]	
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Factor a perfect-square trinomial [Algebra 1]	
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Factor a polynomial that has a GCF and two linear binomial factors [Algebra 1]	
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VA 19 - Graph linear equations and linear inequalities in two variables, including

Algebra	Determine the graph of a line using given information [Algebra 1]	Core Skill
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	Determine the graph of a linear equation given in slope-intercept, point-slope, or standard form [Algebra 1]	Core Skill
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	Determine the graph of a 2-variable linear inequality [Algebra 1]	
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	Determine the graph of the solutions to a problem that can be described by a 2-variable linear inequality [Algebra 1]	
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VA 19.a - Graph linear equations and linear inequalities in two variables, including determining the slope of a line when given an equation of the line, the graph of the line, or two points on the line; describing slope as rate of change and determine if it is positive, negative, zero, or undefined; and

Algebra	Determine the slope of a line given its graph or a graph of a line with a given slope [Grade 8]	Core Skill
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	WP: Interpret the meaning of the slope of a graphed line [Grade 8]	Core Skill
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	Determine the slope of a line given two points on the line [Algebra 1]	Core Skill
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	Determine the slope of a line given an equation of the line [Algebra 1]	Core Skill
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VA 19.b - Graph linear equations and linear inequalities in two variables, including writing the equation of a line when given the graph of the line, two points on the line, or the slope and a point on the line.

Algebra	Determine the slope of a line given two points on the line [Algebra 1]	Core Skill
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	Determine the slope of a line given an equation of the line [Algebra 1]	Core Skill
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	Determine the x- or y-intercept of a line given an equation [Algebra 1]	Core Skill
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	Determine an equation of a line given the slope and y-intercept of the line [Algebra 1]	Core Skill
	Determine an equation that represents a graphed line [Algebra 1]	Core Skill
	Determine an equation for a line given the slope of the line and a point on the line that is not the y-intercept [Algebra 1]	Core Skill
	Determine an equation of a line given two points on the line [Algebra 1]	Core Skill
	Determine a 2-variable linear inequality represented by a graph [Algebra 1]	

VA 20 - Given a point other than the origin on the terminal side of an angle, use the definitions of the six trigonometric functions to find the sine, cosine, tangent, cotangent, secant, and cosecant of the angle in standard position. Relate trigonometric functions defined on the unit circle to trigonometric functions defined in right triangles.

VA 21 - Given the coordinates of the center of a circle and a point on the circle, write the equation of the circle.

Geometry and Measurement	Determine an equation of a circle [Geometry]
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VA 22 - Analyze graphical displays of univariate data, including dotplots, stemplots, and histograms, to identify and describe patterns and departures from patterns, using central tendency, spread, clusters, gaps, and outliers. Use appropriate technology to create graphical displays.

Data Analysis, Statistics, and Probability	Read a box-and-whisker plot [Grade 8]
	Use a box-and-whisker plot to organize data [Grade 8]
	Answer a question using information from a box-and-whisker plot [Grade 8]
	Answer a question using information from two box-and-whisker plots [Grade 8]
	Compare the medians, the modes, or the ranges of the data in a double stem-and-leaf plot [Grade 8]
	Determine the median of the data in a frequency table or a bar graph [Grade 8]
	Determine the mean of the data in a frequency table or a bar graph [Grade 8]

VA 23 - Analyze the normal distribution. Key concepts include

VA 23.a - Analyze the normal distribution. Key concepts include characteristics of normally distributed data;

Overall Product Skills	Demonstrate and develop understanding of mathematical concepts and ideas
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VA 23.b - Analyze the normal distribution. Key concepts include percentiles;

Overall Product Skills	Demonstrate and develop understanding of mathematical concepts and ideas
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VA 23.c - Analyze the normal distribution. Key concepts include normalizing data, using z-scores; and

Overall Product Skills	Demonstrate and develop understanding of mathematical concepts and ideas
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VA 23.d - Analyze the normal distribution. Key concepts include area under the standard normal curve and probability.

Overall Product Skills	Demonstrate and develop understanding of mathematical concepts and ideas
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VA 24 - Describe orally and in writing the relationships between the subsets of the real number system.**VA 25 - Perform operations on complex numbers, express the results in simplest form using patterns of the powers of i , and identify field properties that are valid for the complex numbers.****VA 26 - Solve, algebraically and graphically, [Use graphing calculators for solving and for confirming the algebraic solutions.]****VA 26.a - Solve, algebraically and graphically, absolute value equations and inequalities;**

Evaluate a multi-step numerical expression involving absolute value [Algebra 1]	
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Solve a 1-variable absolute value equation [Algebra 1]	
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Determine the graph of a 2-variable absolute value equation [Algebra 1]	
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Solve a 1-variable absolute value inequality [Algebra 1]	Core Skill
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Determine the graph of a 1-variable absolute value inequality [Algebra 1]	
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VA 26.b - Solve, algebraically and graphically, quadratic equations over the set of complex numbers;**VA 26.c - Solve, algebraically and graphically, equations containing rational algebraic expressions; and**

Determine the excluded values of a rational algebraic expression [Algebra 1]	
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Solve a rational equation involving terms with monomial denominators [Algebra 1]	Core Skill
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Solve a rational equation involving terms with polynomial denominators [Algebra 1]	Core Skill
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Determine the graph of a rational function [Algebra 1]	
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WP: Solve a problem involving a rational equation [Algebra 1]	
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VA 26.d - Solve, algebraically and graphically, equations containing radical expressions.

Solve a radical equation that leads to a linear equation [Algebra 1]	Core Skill
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Solve a radical equation that leads to a quadratic equation [Algebra 1]	Core Skill
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Determine the graph of a radical function [Algebra 1]	
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WP: Solve a problem involving a radical function [Algebra 1]	
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VA 27 - Given one of the six trigonometric functions in standard form,

VA 27.a - Given one of the six trigonometric functions in standard form, state the domain and the range of the function;

VA 27.b - Given one of the six trigonometric functions in standard form, determine the amplitude, period, phase shift, vertical shift, and asymptotes;

VA 27.c - Given one of the six trigonometric functions in standard form, sketch the graph of the function by using transformations for at least a two-period interval; and

VA 27.d - Given one of the six trigonometric functions in standard form, investigate the effect of changing the parameters in a trigonometric function on the graph of the function.

VA 28 - Find, without the aid of a calculator, the values of the trigonometric functions of the special angles and their related angles as found in the unit circle. This includes converting angle measures from radians to degrees and vice versa.

Determine a length using the properties of a 45-45-90 degree triangle or a 30-60-90 degree triangle [Geometry]	Core Skill
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VA 29 - Investigate and identify the characteristics of conic section equations in (h, k) and standard forms. Use transformations in the coordinate plane to graph conic sections.

VA 30 - Using two-way tables, analyze categorical data to describe patterns and departure from patterns and to find marginal frequency and relative frequencies, including conditional frequencies.

Overall Product Skills	Develop understanding and ability to analyze mathematical relationships including those between and among arithmetic operations.
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VA 31 - Calculate probabilities. Key concepts include

VA 31.a - Calculate probabilities. Key concepts include conditional probability;

Data Analysis, Statistics, and Probability	Determine the probability of three or more dependent events [Grade 8]
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VA 31.b - Calculate probabilities. Key concepts include dependent and independent events;

Data Analysis, Statistics, and Probability	Determine the probability of three or more independent events [Grade 8]
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Determine the probability of three or more dependent events [Grade 8]

Make a prediction involving the probability of compound events [Grade 8]
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VA 31.c - Calculate probabilities. Key concepts include addition and multiplication rules;

Data Analysis, Statistics, and Probability	Determine the probability of three or more independent events [Grade 8]
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Determine the probability of three or more dependent events [Grade 8]

Make a prediction involving the probability of compound events [Grade 8]
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VA 31.d - Calculate probabilities. Key concepts include counting techniques (permutations and combinations); and

Data Analysis, Statistics, and Probability	Determine the number of permutations possible in a given situation [Grade 8]
	Determine the number of combinations possible in a given situation [Grade 8]

VA 31.e - Calculate probabilities. Key concepts include Law of Large Numbers.

Data Analysis, Statistics, and Probability	Make a prediction involving the probability of compound events [Grade 8]
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Students will recognize verification and proof as fundamental aspects of mathematical reasoning. Students will integrate and apply inductive and deductive reasoning skills to make, test, and evaluate mathematical statements. This applies equally through simple mathematical calculations, in geometric applications, and more abstract statistical and algebraic processes. Students will use logical reasoning to analyze an argument and to determine whether conclusions are valid.

VA 32 - Use the relationships between angles formed by two lines cut by a transversal to

VA 32.a - Use the relationships between angles formed by two lines cut by a transversal to determine whether two lines are parallel;

Geometry and Measurement	Identify angle relationships formed by parallel lines cut by a transversal [Grade 8]
	Determine an angle measure formed by parallel lines cut by a transversal [Grade 8]
	Identify angle relationships formed by multiple lines and transversals [Geometry]
	Determine the measure of an angle formed by parallel lines and one or more transversals [Geometry] Core Skill
	Identify parallel lines using angle relationships [Geometry]

VA 32.b - Use the relationships between angles formed by two lines cut by a transversal to verify the parallelism, using algebraic and coordinate methods as well as deductive proofs; and

Algebra	Determine if two lines are perpendicular or parallel given the equations of the lines [Algebra 1]
	Determine an equation for a line that goes through a given point and is parallel or perpendicular to a given line [Algebra 1]
Geometry and Measurement	Determine if lines through points with given coordinates are parallel or perpendicular [Geometry]
	Determine the coordinates of a point through which a line must pass in order to be parallel or perpendicular to a given line [Geometry]

VA 32.c - Use the relationships between angles formed by two lines cut by a transversal to solve real-world problems involving angles formed when parallel lines are cut by a transversal.

Overall Product Skills	Develop ability to apply mathematical solutions to everyday life and real world situations
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VA 33 - Given information in the form of a figure or statement, prove two triangles are congruent, using algebraic and coordinate methods as well as deductive proofs.

Geometry and Measurement	Identify a triangle congruence postulate that justifies a congruence statement [Geometry]	Core Skill
	Identify congruent triangles using triangle congruence postulates or theorems [Geometry]	Core Skill

VA 34 - Given information in the form of a figure or statement, prove two triangles are similar, using algebraic and coordinate methods as well as deductive proofs.

Geometry and Measurement	Identify a triangle similarity postulate that justifies a similarity statement [Geometry]	Core Skill
	Identify similar triangles using triangle similarity postulates or theorems [Geometry]	Core Skill

VA 35 - Construct and justify the constructions of**VA 35.a - Construct and justify the constructions of a line segment congruent to a given line segment;****VA 35.b - Construct and justify the constructions of the perpendicular bisector of a line segment;****VA 35.c - Construct and justify the constructions of a perpendicular to a given line from a point not on the line;****VA 35.d - Construct and justify the constructions of a perpendicular to a given line at a given point on the line;****VA 35.e - Construct and justify the constructions of the bisector of a given angle,****VA 35.f - Construct and justify the constructions of an angle congruent to a given angle; and****VA 35.g - Construct and justify the constructions of a line parallel to a given line through a point not on the given line.****VA 36 - Verify basic trigonometric identities and make substitutions, using the basic identities.**