



Virginia Standards Alignment
2009 Standards of Learning, produced by the State Department of Education
Kindergarten through Trigonometry



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Virginia Standards Alignment

Standards List with Aligned Product Skills

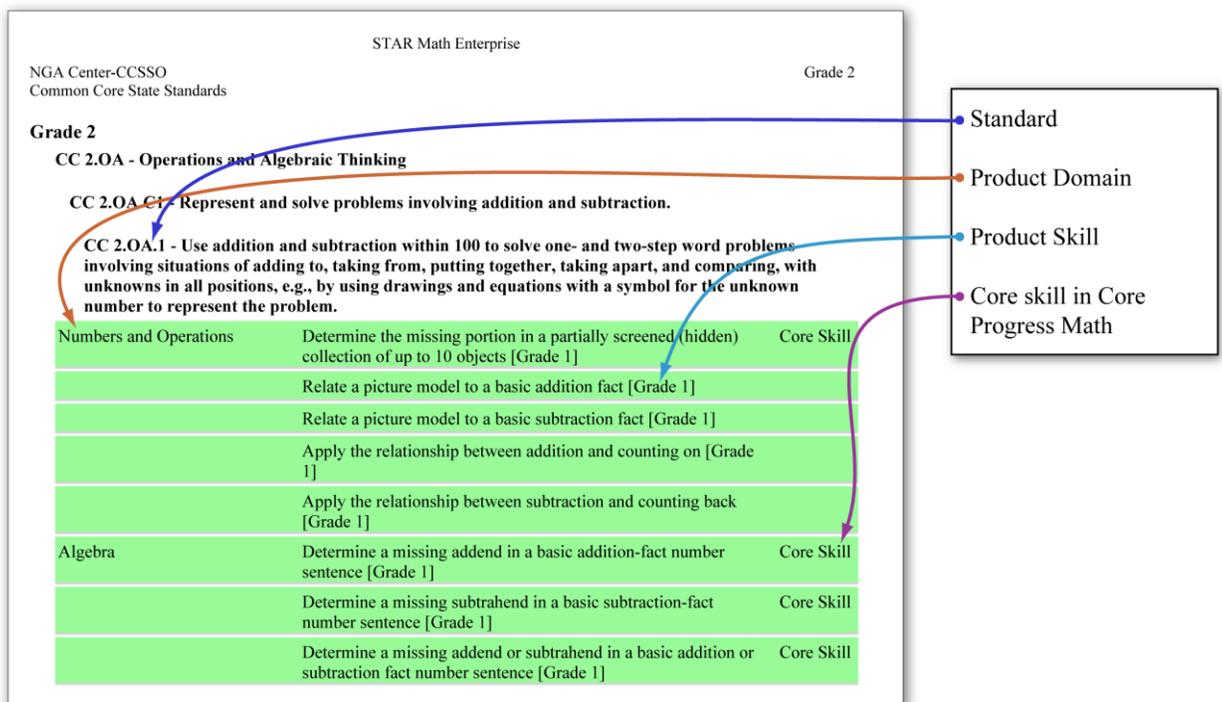
The Standards List with Aligned Product Skills Report is a standards-oriented document showing the entire list of standards for the subject and grade and the product skills aligned to those standards. This alignment report shows the breadth of standards coverage for the purpose and focus of this product.

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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

Kindergarten

Number and Number Sense

VA K.1 - The student, given two sets, each containing 10 or fewer concrete objects, will identify and describe one set as having more, fewer, or the same number of members as the other set, using the concept of one-to-one correspondence.

Numbers and Operations	Compare sets of up to 5 objects [Early Numeracy]
	Compare sets of up to 10 objects using "more" or "fewer" [Early Numeracy]
	Identify two sets with equal numbers of up to 10 objects [Early Numeracy]
	Determine the difference in number between two sets of objects [Early Numeracy]
	Compare sets of objects using words [Grade 1]

VA K.2 - The student, given a set containing 15 or fewer concrete objects, will

VA K.2.a - The student, given a set containing 15 or fewer concrete objects, will tell how many are in the set by counting the number of objects orally;

Numbers and Operations	Count up to 7 objects [Early Numeracy]
	Count up to 9 objects [Early Numeracy]
	Count up to 10 objects [Early Numeracy]
	Count up to 15 objects [Early Numeracy]

VA K.2.b - The student, given a set containing 15 or fewer concrete objects, will write the numeral to tell how many are in the set; and

VA K.2.c - The student, given a set containing 15 or fewer concrete objects, will select the corresponding numeral from a given set of numerals.

VA K.3 - The student, given an ordered set of ten objects and/or pictures, will indicate the ordinal position of each object, first through tenth, and the ordered position of each object.

Numbers and Operations	Recognize ordinal numbers 1st - 10th [Early Numeracy]
	Identify the object in a given ordinal position up to "tenth" [Early Numeracy]
	Answer a question involving an ordinal number up to "tenth" [Grade 1]

VA K.4 - The student will

VA K.4.a - The student will count forward to 100 and backward from 10;

Numbers and Operations	Count 1-20 [Early Numeracy]	
	Count on or count back with numbers 1 to 5 [Early Numeracy]	
	Count on or count back with numbers 1 to 10 [Early Numeracy]	
	Count on by ones from a number less than 100 [Grade 1]	Core Skill

VA K.4.b - The student will identify one more than a number and one less than a number; and

Numbers and Operations	Determine one more than or one less than a given number [Grade 1]	Core Skill
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VA K.4.c - The student will count by fives and tens to 100.

Numbers and Operations	Count by 5s or 10s to 100 starting from a multiple of 5 or 10, respectively [Grade 1]	Core Skill
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VA K.5 - The student will identify the parts of a set and/or region that represent fractions for halves and fourths.

Numbers and Operations	Identify a shape divided into equal parts [Grade 1]	
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Computation and Estimation

VA K.6 - The student will model adding and subtracting whole numbers, using up to 10 concrete objects.

Numbers and Operations	Add numbers with a sum up to 5 using pictures [Early Numeracy]	
	Add numbers with a sum up to 7 using pictures [Early Numeracy]	
	Add numbers with a sum up to 9 using pictures [Early Numeracy]	
	Add numbers with a sum up to 10 using pictures [Early Numeracy]	
	Subtract numbers with a minuend up to 5 using pictures [Early Numeracy]	
	Subtract numbers with a minuend up to 7 using pictures [Early Numeracy]	
	Subtract numbers with a minuend up to 9 using pictures [Early Numeracy]	
	Subtract numbers with a minuend up to 10 using pictures [Early Numeracy]	

Measurement

VA K.7 - The student will recognize a penny, nickel, dime, and quarter and will determine the value of a collection of pennies and/or nickels whose total value is 10 cents or less.

VA K.8 - The student will identify the instruments used to measure length (ruler), weight (scale), time (clock: digital and analog; calendar: day, month, and season), and temperature (thermometer).

VA K.9 - The student will tell time to the hour, using analog and digital clocks.

Geometry and Measurement	Tell time to the hour [Grade 1]	Core Skill
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VA K.10 - The student will compare two objects or events, using direct comparisons or nonstandard units of measure, according to one or more of the following attributes: length (shorter, longer), height (taller, shorter), weight (heavier, lighter), temperature (hotter, colder). Examples of nonstandard units include foot length, hand span, new pencil, paper clip, and block.

Geometry and Measurement	Compare the weights of two objects [Early Numeracy]	
	Compare the temperatures of two objects [Early Numeracy]	
	Compare objects using the vocabulary of measurement [Grade 1]	Core Skill
	Compare and order objects by attributes of height or length [Grade 1]	Core Skill

Estimate length in nonstandard units [Grade 1]

Geometry

VA K.11 - The student will

VA K.11.a - The student will identify, describe, and trace plane geometric figures (circle, triangle, square, and rectangle); and

Geometry and Measurement	Identify a circle, a triangle, a square, or a rectangle [Grade 1]	Core Skill
	Determine the group in which a geometric shape belongs [Grade 1]	

VA K.11.b - The student will compare the size (larger, smaller) and shape of plane geometric figures (circle, triangle, square, and rectangle).

Geometry and Measurement	Identify a circle, a triangle, a square, or a rectangle [Grade 1]	Core Skill
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VA K.12 - The student will describe the location of one object relative to another (above, below, next to) and identify representations of plane geometric figures (circle, triangle, square, and rectangle) regardless of their positions and orientations in space.

Geometry and Measurement	Apply the vocabulary of position or direction [Grade 1]	
	Identify a circle, a triangle, a square, or a rectangle [Grade 1]	Core Skill

Probability and Statistics

VA K.13 - The student will gather data by counting and tallying.

Data Analysis, Statistics, and Probability	Use a 2-category tally chart to represent groups of objects (1 symbol = 1 object) [Grade 1]	
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VA K.14 - The student will display gathered data in object graphs, picture graphs, and tables, and will answer questions related to the data.

Data Analysis, Statistics, and Probability	Answer a question using information from a 2-category tally chart [Grade 1]	
	Use a picture graph to represent groups of objects (1 symbol = 1 object) [Grade 1]	
	Answer a question using information from a picture graph [Grade 1]	
	Use a pictograph to represent groups of objects (1 symbol = 1 object) [Grade 1]	
	Answer a question using information from a pictograph (1 symbol = 1 object) [Grade 1]	
	Use a bar graph to represent groups of objects [Grade 1]	
	Answer a question using information from a bar graph [Grade 1]	

Patterns, Functions, and Algebra

VA K.15 - The student will sort and classify objects according to attributes.

Geometry and Measurement	Sort objects according to one attribute [Early Numeracy]	
	Determine the common attributes in a set of geometric shapes [Grade 1]	Core Skill
	Determine the group in which a geometric shape belongs [Grade 1]	

	Determine the rule used to sort geometric shapes [Grade 1]
Data Analysis, Statistics, and Probability	Determine the rule used to sort objects [Grade 1]
VA K.16 - The student will identify, describe, and extend repeating patterns.	
Algebra	Complete a picture pattern [Early Numeracy]
	Extend a repeating picture pattern [Grade 1]

Grade 1

Number and Number Sense

VA 1.1 - The student will

VA 1.1.a - The student will count from 0 to 100 and write the corresponding numerals; and

Numbers and Operations	Count 1-20 [Early Numeracy]	
	Read a whole number to 30 [Grade 1]	
	Read a whole number from 31 to 100 [Grade 1]	
	Count objects to 20 [Grade 1]	Core Skill
	Count on by ones from a number less than 100 [Grade 1]	Core Skill

VA 1.1.b - The student will group a collection of up to 100 objects into tens and ones and write the corresponding numeral to develop an understanding of place value.

Numbers and Operations	Count objects grouped in tens and ones [Grade 1]	Core Skill
	Model a number to 100 using tens and ones [Grade 1]	
	Recognize a number from a model of tens and ones to 100 [Grade 1]	
	Represent a 2-digit number as tens and ones [Grade 1]	Core Skill
	Determine the 2-digit number represented as tens and ones [Grade 1]	Core Skill

VA 1.2 - The student will count forward by ones, twos, fives, and tens to 100 and backward by ones from 30.

Numbers and Operations	Count objects to 20 [Grade 1]	Core Skill
	Count on by ones from a number less than 100 [Grade 1]	Core Skill
	Count back by ones from a number less than 20 [Grade 1]	Core Skill
	Determine ten more than or ten less than a given number [Grade 1]	Core Skill
	Count by 2s to 50 starting from a multiple of 2 [Grade 1]	Core Skill
	Count by 5s or 10s to 100 starting from a multiple of 5 or 10, respectively [Grade 1]	Core Skill

VA 1.3 - The student will identify the parts of a set and/or region that represent fractions for halves, thirds, and fourths and write the fractions.

Numbers and Operations	Identify a shape divided into equal parts [Grade 1]	
	Identify a unit fraction as part of a set of objects [Grade 2]	
	Identify a fraction as part of a set of objects [Grade 2]	

Computation and Estimation

VA 1.4 - The student, given a familiar problem situation involving magnitude, will

VA 1.4.a - The student, given a familiar problem situation involving magnitude, will select a reasonable order of magnitude from three given quantities: a one-digit numeral, a two-digit numeral, and a three-digit numeral (e.g., 5, 50, 500); and

VA 1.4.b - The student, given a familiar problem situation involving magnitude, will explain the reasonableness of the choice.

VA 1.5 - The student will recall basic addition facts with sums to 18 or less and the corresponding subtraction facts.

Numbers and Operations	Know basic addition facts to 10 plus 10 [Grade 1]	Core Skill
	Know basic subtraction facts to 20 minus 10 [Grade 1]	Core Skill
	Complete an addition and subtraction fact family [Grade 1]	
	Apply the inverse relationship between addition facts and subtraction facts [Grade 1]	

VA 1.6 - The student will create and solve one-step story and picture problems using basic addition facts with sums to 18 or less and the corresponding subtraction facts.

Numbers and Operations	Determine the missing portion in a partially screened (hidden) collection of up to 10 objects [Grade 1]	Core Skill
	Relate a picture model to a basic addition fact [Grade 1]	
	Determine the basic addition fact shown by a picture model [Grade 1]	
	Relate a picture model to a basic subtraction fact [Grade 1]	
	Determine the basic subtraction fact shown by a picture model [Grade 1]	
	WP: Use basic addition or subtraction facts to solve problems [Grade 1]	Core Skill
Algebra	WP: Determine a missing addend or subtrahend in a basic addition- or subtraction-fact number sentence [Grade 1]	Core Skill
	WP: Determine a basic addition- or subtraction-fact number sentence for a given situation [Grade 1]	Core Skill

Measurement

VA 1.7 - The student will

VA 1.7.a - The student will identify the number of pennies equivalent to a nickel, a dime, and a quarter; and

Numbers and Operations	Determine the value of a collection of like coins [Grade 1]	
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VA 1.7.b - The student will determine the value of a collection of pennies, nickels, and dimes whose total value is 100 cents or less.

Numbers and Operations	Determine the value of a collection of like coins [Grade 1]	
	Determine the value of a collection of mixed coins [Grade 1]	
	Determine cent amounts that total a dollar [Grade 2]	Core Skill

VA 1.8 - The student will tell time to the half-hour, using analog and digital clocks.

Geometry and Measurement	Tell time to the hour [Grade 1]	Core Skill
	Tell time to the half hour [Grade 1]	Core Skill

VA 1.9 - The student will use nonstandard units to measure length, weight/mass, and volume.

Geometry and Measurement Estimate length in nonstandard units [Grade 1]

VA 1.10 - The student will compare, using the concepts of more, less, and equivalent,

VA 1.10.a - The student will compare, using the concepts of more, less, and equivalent, the volumes of two given containers; and

Geometry and Measurement Compare the volumes of two objects [Early Numeracy]

VA 1.10.b - The student will compare, using the concepts of more, less, and equivalent, the weight/mass of two objects, using a balance scale.

Geometry and Measurement Compare the weights of two objects [Early Numeracy]

VA 1.11 - The student will use calendar language appropriately (e.g., names of the months, today, yesterday, next week, last week).

Geometry and Measurement Order the months of the year [Grade 1]

Determine the day of the week from a date on a calendar [Grade 1]

Geometry

VA 1.12 - The student will identify and trace, describe, and sort plane geometric figures (triangle, square, rectangle, and circle) according to number of sides, vertices, and right angles.

Geometry and Measurement Identify a circle, a triangle, a square, or a rectangle [Grade 1] Core Skill

Determine the common attributes in a set of geometric shapes [Grade 1] Core Skill

Determine the group in which a geometric shape belongs [Grade 1]

Determine the rule used to sort geometric shapes [Grade 1]

Identify figures that are the same size and shape [Grade 2]

VA 1.13 - The student will construct, model, and describe objects in the environment as geometric shapes (triangle, rectangle, square, and circle) and explain the reasonableness of each choice.

Geometry and Measurement Identify figures that are the same size and shape [Grade 2]

Probability and Statistics

VA 1.14 - The student will investigate, identify, and describe various forms of data collection (e.g., recording daily temperature, lunch count, attendance, favorite ice cream), using tables, picture graphs, and object graphs.

Data Analysis, Statistics, and Probability Use a picture graph to represent groups of objects (1 symbol = 1 object) [Grade 1]

Use a pictograph to represent groups of objects (1 symbol = 1 object) [Grade 1]

Use a tally chart to represent data [Grade 2]

Use a pictograph to represent data (1 symbol = more than 1 object) Core Skill [Grade 2]

VA 1.15 - The student will interpret information displayed in a picture or object graph, using the vocabulary more, less, fewer, greater than, less than, and equal to.

Data Analysis, Statistics, and Probability	Answer a question using information from a picture graph [Grade 1]	
	Answer a question using information from a pictograph (1 symbol = 1 object) [Grade 1]	
	Answer a question using information from a pictograph (1 symbol = more than 1 object) [Grade 2]	Core Skill

Patterns, Functions, and Algebra

VA 1.16 - The student will sort and classify concrete objects according to one or more attributes, including color, size, shape, and thickness.

Geometry and Measurement	Sort objects according to one attribute [Early Numeracy]	
	Determine the group in which a geometric shape belongs [Grade 1]	
Data Analysis, Statistics, and Probability	Determine the group in which an object belongs [Grade 1]	
	Determine the rule used to sort objects [Grade 1]	

VA 1.17 - The student will recognize, describe, extend, and create a wide variety of growing and repeating patterns.

Numbers and Operations	Complete a skip pattern starting from a multiple of 2, 5, or 10 [Grade 2]	Core Skill
Algebra	Extend a repeating picture pattern [Grade 1]	
	Extend a pictorial growth pattern [Grade 1]	
	Determine a pattern on a 1 to 100 chart [Grade 1]	
	Complete a pattern on a 1 to 100 chart [Grade 1]	
	Extend a number pattern involving addition [Grade 2]	Core Skill
	Extend a number pattern involving subtraction [Grade 2]	Core Skill

VA 1.18 - The student will demonstrate an understanding of equality through the use of the equal sign.

Numbers and Operations	Relate a picture model to a basic addition fact [Grade 1]	
Algebra	Determine equivalent addition or subtraction expressions involving 1-digit numbers [Grade 1]	

Grade 2

Number and Number Sense

VA 2.1 - The student will

VA 2.1.a - The student will read, write, and identify the place value of each digit in a three-digit numeral, using numeration models;

Numbers and Operations	Read a whole number to 1,000 [Grade 2]	Core Skill
	Determine the value of a digit in a 3-digit number [Grade 2]	
	Model a number using hundreds, tens, and ones to 1,000 [Grade 2]	
	Recognize a number from a model of hundreds, tens, and ones to 1,000 [Grade 2]	
	Represent a 3-digit number as hundreds, tens, and ones [Grade 2]	Core Skill
	Determine the 3-digit number represented as hundreds, tens, and ones [Grade 2]	Core Skill
	Recognize equivalent forms of a 3-digit number using hundreds, tens, and ones [Grade 2]	Core Skill

VA 2.1.b - The student will round two-digit numbers to the nearest ten; and

VA 2.1.c - The student will compare two whole numbers between 0 and 999, using symbols (>, <, or =) and words (greater than, less than, or equal to).

Numbers and Operations	Compare whole numbers to 100 using words [Grade 1]	Core Skill
	Compare whole numbers to 1,000 using words [Grade 2]	
	Compare whole numbers to 1,000 using the symbols <, >, and = [Grade 2]	Core Skill

VA 2.2 - The student will

VA 2.2.a - The student will identify the ordinal positions first through twentieth, using an ordered set of objects; and

Numbers and Operations	Recognize ordinal numbers 1st - 10th [Early Numeracy]	
	Identify the object in a given ordinal position up to "tenth" [Early Numeracy]	
	Answer a question involving an ordinal number up to "tenth" [Grade 1]	
	Answer a question using an ordinal number up to "twentieth" [Grade 2]	

VA 2.2.b - The student will write the ordinal numbers.

VA 2.3 - The student will

VA 2.3.a - The student will identify the parts of a set and/or region that represent fractions for halves, thirds, fourths, sixths, eighths, and tenths;

Numbers and Operations	Identify a unit fraction as part of a whole [Grade 2]	
	Identify a unit fraction as part of a set of objects [Grade 2]	

	Identify a fraction as part of a set of objects [Grade 2]	
	Determine a pictorial model of a fraction of a whole [Grade 3]	Core Skill
	Determine a pictorial model of a fraction of a set of objects [Grade 3]	Core Skill

VA 2.3.b - The student will write the fractions; and

VA 2.3.c - The student will compare the unit fractions for halves, thirds, fourths, sixths, eighths, and tenths.

Numbers and Operations	Compare unit fractions using pictorial models [Grade 2]	
	WP: Compare equal unit fractions of different-sized wholes [Grade 3]	

VA 2.4 - The student will

VA 2.4.a - The student will count forward by twos, fives, and tens to 100, starting at various multiples of 2, 5, or 10;

Numbers and Operations	Count by 2s to 50 starting from a multiple of 2 [Grade 1]	Core Skill
	Count by 5s or 10s to 100 starting from a multiple of 5 or 10, respectively [Grade 1]	Core Skill
	Complete a skip pattern starting from a multiple of 2, 5, or 10 [Grade 2]	Core Skill

VA 2.4.b - The student will count backward by tens from 100; and

Numbers and Operations	Count back by ones from a number less than 20 [Grade 1]	Core Skill
	Count back by ones from a number between 20 and 100 [Grade 1]	

VA 2.4.c - The student will recognize even and odd numbers.

Numbers and Operations	Identify odd and even numbers less than 100 [Grade 1]	Core Skill
	Identify odd and even numbers between 100 and 1,000 [Grade 2]	

Computation and Estimation

VA 2.5 - The student will recall addition facts with sums to 20 or less and the corresponding subtraction facts.

Numbers and Operations	Determine the basic addition fact shown by a picture model [Grade 1]	
	Determine the basic addition fact shown by a number-line model [Grade 1]	
	Determine the basic subtraction fact shown by a picture model [Grade 1]	
	Determine the basic subtraction fact shown by a number-line model [Grade 1]	
	Know basic addition facts to 10 plus 10 [Grade 1]	Core Skill
	Know basic subtraction facts to 20 minus 10 [Grade 1]	Core Skill
	Complete an addition and subtraction fact family [Grade 1]	

Apply the inverse relationship between addition facts and subtraction facts [Grade 1]

VA 2.6 - The student, given two whole numbers whose sum is 99 or less, will

VA 2.6.a - The student, given two whole numbers whose sum is 99 or less, will estimate the sum; and

VA 2.6.b - The student, given two whole numbers whose sum is 99 or less, will find the sum, using various methods of calculation.

Numbers and Operations	Know basic addition facts to 10 plus 10 [Grade 1]	Core Skill
	WP: Use basic addition or subtraction facts to solve problems [Grade 1]	Core Skill
	Add a 2-digit and a 1-digit number without regrouping [Grade 1]	Core Skill
	Add two 2-digit numbers without regrouping [Grade 1]	Core Skill
	WP: Add or subtract a 1- and 2-digit number without regrouping [Grade 1]	Core Skill
	WP: Add or subtract two 2-digit numbers without regrouping [Grade 1]	Core Skill
	Determine a number pair that totals 100 [Grade 2]	Core Skill
	Add a 2-digit number to a 1-digit number with regrouping [Grade 2]	

VA 2.7 - The student, given two whole numbers, each of which is 99 or less, will

VA 2.7.a - The student, given two whole numbers, each of which is 99 or less, will estimate the difference; and

VA 2.7.b - The student, given two whole numbers, each of which is 99 or less, will find the difference, using various methods of calculation.

Numbers and Operations	Estimate the difference of two 2-digit numbers [Grade 2]	
Numbers and Operations	Know basic subtraction facts to 20 minus 10 [Grade 1]	Core Skill
	WP: Use basic addition or subtraction facts to solve problems [Grade 1]	Core Skill
	Subtract a 1-digit number from a 2-digit number without regrouping [Grade 1]	Core Skill
	Subtract a 2-digit number from a 2-digit number without regrouping [Grade 1]	Core Skill
	WP: Add or subtract two 2-digit numbers without regrouping [Grade 1]	Core Skill
	Subtract a 1- or 2-digit number from a 2-digit number with one regrouping [Grade 2]	Core Skill

VA 2.8 - The student will create and solve one- and two-step addition and subtraction problems, using data from simple tables, picture graphs, and bar graphs.

Data Analysis, Statistics, and Probability	Read a picture graph [Grade 1]	
	Use a picture graph to represent groups of objects (1 symbol = 1 object) [Grade 1]	

Answer a question using information from a picture graph [Grade 1]	
Read a bar graph [Grade 1]	
Use a bar graph to represent groups of objects [Grade 1]	
Answer a question using information from a bar graph [Grade 1]	
Answer a question using information from a tally chart [Grade 2]	
Answer a question using information from a pictograph (1 symbol = Core Skill more than 1 object) [Grade 2]	
Read a bar graph with a y-axis scale by 2s [Grade 2]	
Use a bar graph with a y-axis scale by 2s to represent data [Grade 2]	Core Skill
Answer a question using information from a bar graph with a y-axis scale by 2s [Grade 2]	Core Skill
Use a bar graph with a scale interval of 5 or 10 to represent data [Grade 3]	
Answer a question using information from a bar graph with a scale interval of 5 or 10 [Grade 3]	

VA 2.9 - The student will recognize and describe the related facts that represent and describe the inverse relationship between addition and subtraction.

Numbers and Operations	Apply the inverse relationship between addition facts and subtraction facts [Grade 1]	
	Apply the inverse relationship between addition and subtraction with 2- and 3-digit numbers [Grade 2]	

Measurement

VA 2.10 - The student will

VA 2.10.a - The student will count and compare a collection of pennies, nickels, dimes, and quarters whose total value is \$2.00 or less; and

Numbers and Operations	Determine the value of a collection of mixed coins [Grade 1]	
	Determine cent amounts that total a dollar [Grade 2]	Core Skill

VA 2.10.b - The student will correctly use the cent symbol (¢), dollar symbol (\$), and decimal point (.).

Numbers and Operations	Translate between a dollar sign and a cent sign [Grade 2]	Core Skill
	Convert money amounts in words to amounts in symbols [Grade 2]	Core Skill

VA 2.11 - The student will estimate and measure

VA 2.11.a - The student will estimate and measure length to the nearest centimeter and inch;

Geometry and Measurement	Measure length in inches [Grade 2]	Core Skill
	Measure length in centimeters [Grade 2]	Core Skill

VA 2.11.b - The student will estimate and measure weight/mass of objects in pounds/ounces and kilograms/grams, using a scale; and

VA 2.11.c - The student will estimate and measure liquid volume in cups, pints, quarts, gallons, and liters.

VA 2.12 - The student will tell and write time to the nearest five minutes, using analog and digital clocks.

Geometry and Measurement	Tell time to the quarter hour [Grade 2]	Core Skill
	Tell time to 5-minute intervals [Grade 2]	Core Skill

VA 2.13 - The student will**VA 2.13.a - The student will determine past and future days of the week; and**

Geometry and Measurement	Determine the day of the week from a date on a calendar [Grade 1]	
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VA 2.13.b - The student will identify specific days and dates on a given calendar.

Geometry and Measurement	Determine a date using a calendar [Grade 3]	
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VA 2.14 - The student will read the temperature on a Celsius and/or Fahrenheit thermometer to the nearest 10 degrees.

Geometry and Measurement	Read a thermometer in degrees Celsius [Grade 2]	
	Read a thermometer in degrees Fahrenheit [Grade 2]	
	Read a thermometer in degrees Fahrenheit or Celsius [Grade 3]	

Geometry**VA 2.15 - The student will****VA 2.15.a - The student will draw a line of symmetry in a figure; and**

Geometry and Measurement	Identify a line of symmetry [Grade 1]	Core Skill
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VA 2.15.b - The student will identify and create figures with at least one line of symmetry.

Geometry and Measurement	Identify a line of symmetry [Grade 1]	Core Skill
	Identify symmetry in a 2-dimensional shape [Grade 2]	

VA 2.16 - The student will identify, describe, compare, and contrast plane and solid geometric figures (circle/sphere, square/cube, and rectangle/rectangular prism).

Geometry and Measurement	Identify a circle, a triangle, a square, or a rectangle [Grade 1]	Core Skill
	Name a 3-dimensional geometric shape [Grade 2]	
	Identify a picture of a 3-dimensional shape [Grade 3]	
	Name a 3-dimensional shape from a picture [Grade 3]	

Probability and Statistics**VA 2.17 - The student will use data from experiments to construct picture graphs, pictographs, and bar graphs.**

Data Analysis, Statistics, and Probability	Use a picture graph to represent groups of objects (1 symbol = 1 object) [Grade 1]	
	Use a pictograph to represent groups of objects (1 symbol = 1 object) [Grade 1]	
	Use a bar graph to represent groups of objects [Grade 1]	
	Read a pictograph (1 symbol = more than 1 object) [Grade 2]	

	Use a pictograph to represent data (1 symbol = more than 1 object) [Grade 2]	Core Skill
	Read a bar graph with a y-axis scale by 2s [Grade 2]	
	Use a bar graph with a y-axis scale by 2s to represent data [Grade 2]	Core Skill
	Use a bar graph with a scale interval of 5 or 10 to represent data [Grade 3]	

VA 2.18 - The student will use data from experiments to predict outcomes when the experiment is repeated.

VA 2.19 - The student will analyze data displayed in picture graphs, pictographs, and bar graphs.

Data Analysis, Statistics, and Probability	Answer a question using information from a picture graph [Grade 1]	
	Answer a question using information from a bar graph [Grade 1]	
	Answer a question using information from a pictograph (1 symbol = more than 1 object) [Grade 2]	Core Skill
	Answer a question using information from a bar graph with a y-axis scale by 2s [Grade 2]	Core Skill

Patterns, Functions, and Algebra

VA 2.20 - The student will identify, create, and extend a wide variety of patterns.

Numbers and Operations	Complete a skip pattern starting from a multiple of 2, 5, or 10 [Grade 2]	Core Skill
	Complete a skip pattern of 2, 5, or 10 starting from any number [Grade 2]	Core Skill
Algebra	Determine an addition or subtraction number pattern given a rule [Grade 2]	
	Determine the rule for an addition or subtraction number pattern [Grade 2]	Core Skill
	Extend a number pattern involving addition [Grade 2]	Core Skill
	Extend a number pattern involving subtraction [Grade 2]	Core Skill
	Extend a pattern given a table of related number pairs [Grade 2]	
	Determine a repeating pattern corresponding to the same pattern expressed using different elements [Grade 2]	
	Extend a number pattern [Grade 3]	

VA 2.21 - The student will solve problems by completing numerical sentences involving the basic facts for addition and subtraction. The student will create story problems, using the numerical sentences.

Algebra	Determine the missing addend in an addition sentence using pictures [Early Numeracy]	
	Determine a missing addend in a basic addition-fact number sentence [Grade 1]	Core Skill
	Determine a missing subtrahend in a basic subtraction-fact number sentence [Grade 1]	Core Skill

	Determine a missing addend in an addition sentence with three 1-digit numbers [Grade 1]	
	WP: Determine a missing addend or subtrahend in a basic addition- or subtraction-fact number sentence [Grade 1]	Core Skill
	Determine a missing addend in a number sentence involving 2-digit numbers [Grade 2]	
	Determine the operation needed to make a number sentence true [Grade 3]	

VA 2.22 - The student will demonstrate an understanding of equality by recognizing that the symbol = in an equation indicates equivalent quantities and the symbol ≠ indicates that quantities are not equivalent.

Numbers and Operations	Determine equivalent addition or subtraction expressions involving words or symbols [Grade 1]
Algebra	Determine equivalent addition or subtraction expressions involving 1-digit numbers [Grade 1]
	Determine equivalent addition expressions involving 2-digit numbers [Grade 2]

Grade 3

Number and Number Sense[Focus: Place Value and Fractions]

VA 3.1 - The student will

VA 3.1.a - The student will read and write six-digit numerals and identify the place value and value of each digit;

Numbers and Operations	Read a 4- or 5-digit whole number [Grade 3]	Core Skill
	Determine the word form of a 4- or 5-digit whole number [Grade 3]	Core Skill
	Determine the value of a digit in a 4- or 5-digit whole number [Grade 3]	
	Determine which digit is in a specified place in a 4- or 5-digit whole number [Grade 3]	
	Represent a 4-digit whole number as thousands, hundreds, tens, and ones [Grade 3]	Core Skill
	Determine the 4-digit whole number represented in thousands, hundreds, tens, and ones [Grade 3]	Core Skill
	Represent a 4- or 5-digit whole number in expanded form [Grade 3]	Core Skill
	Determine the 4- or 5-digit whole number represented in expanded form [Grade 3]	Core Skill
	Read a 6-digit whole number [Grade 4]	
	Determine the word form of a 6-digit whole number [Grade 4]	
	Determine the value of a digit in a 6-digit whole number [Grade 4]	
	Determine which digit is in a specified place in a 6-digit whole number [Grade 4]	

VA 3.1.b - The student will round whole numbers, 9,999 or less, to the nearest ten, hundred, and thousand; and

Numbers and Operations	Round a 2- to 4-digit whole number to its greatest place [Grade 3]	
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VA 3.1.c - The student will compare two whole numbers between 0 and 9,999, using symbols (>, <, or =) and words (greater than, less than, or equal to).

Numbers and Operations	Compare whole numbers to 1,000 using words [Grade 2]	
	Compare whole numbers to 1,000 using the symbols <, >, and = [Grade 2]	Core Skill
	Compare 4- or 5-digit whole numbers using the symbols <, >, and = [Grade 3]	

VA 3.2 - The student will recognize and use the inverse relationships between addition/subtraction and multiplication/division to complete basic fact sentences. The student will use these relationships to solve problems.

Numbers and Operations	Apply the inverse relationship between addition facts and subtraction facts [Grade 1]	
	Apply the inverse relationship between addition and subtraction with 2- and 3-digit numbers [Grade 2]	

	Know basic multiplication facts to 10×10 [Grade 3]	Core Skill
	Know basic multiplication facts for 11 and 12 [Grade 3]	
	Know basic division facts to $100 \div 10$ [Grade 3]	Core Skill
	Know basic division facts for 11 and 12 [Grade 3]	
	WP: Multiply using basic facts to 10×10 [Grade 3]	Core Skill
	WP: Divide using basic facts to $100 \div 10$ [Grade 3]	Core Skill
	Complete a multiplication and division fact family [Grade 3]	
Algebra	Determine a missing addend in a basic addition-fact number sentence [Grade 1]	Core Skill
	Determine a missing subtrahend in a basic subtraction-fact number sentence [Grade 1]	Core Skill

VA 3.3 - The student will**VA 3.3.a - The student will name and write fractions (including mixed numbers) represented by a model;**

Numbers and Operations	Identify a fraction as part of a set of objects [Grade 2]	
	Identify a fraction as part of a whole [Grade 2]	
	Relate a fraction equal to a whole to a pictorial model [Grade 2]	
	Determine a pictorial model of a fraction of a whole [Grade 3]	Core Skill
	Determine a pictorial model of a fraction of a set of objects [Grade 3]	Core Skill
	Identify a fraction represented by a point on a number line [Grade 3]	Core Skill
	Identify a mixed number represented by a model [Grade 4]	
	Identify an improper fraction represented by a model of a mixed number [Grade 4]	

VA 3.3.b - The student will model fractions (including mixed numbers) and write the fractions' names; and

Numbers and Operations	Relate a fraction equal to a whole to a pictorial model [Grade 2]	
	Determine a pictorial model of a fraction of a whole [Grade 3]	Core Skill
	Determine a pictorial model of a fraction of a set of objects [Grade 3]	Core Skill
	Identify a fraction represented by a point on a number line [Grade 3]	Core Skill
	Locate a fraction on a number line [Grade 3]	Core Skill
	Identify a mixed number represented by a model [Grade 4]	
	Identify an improper fraction represented by a model of a mixed number [Grade 4]	

VA 3.3.c - The student will compare fractions having like and unlike denominators, using words and symbols ($>$, $<$, or $=$).

Numbers and Operations	Compare unit fractions using pictorial models [Grade 2]	
	Compare fractions using models [Grade 3]	Core Skill

Compare fractions with like denominators [Grade 3]
Compare fractions with like numerators [Grade 3]
WP: Compare equal unit fractions of different-sized wholes [Grade 3]
Compare fractions on a number line [Grade 4]

Computation and Estimation[Focus: Computation and Fraction Operations]

VA 3.4 - The student will estimate solutions to and solve single-step and multistep problems involving the sum or difference of two whole numbers, each 9,999 or less, with or without regrouping.

Numbers and Operations	Add two 3-digit numbers with one regrouping [Grade 2]	Core Skill
	Subtract a 1- or 2-digit number from a 2-digit number with one regrouping [Grade 2]	Core Skill
	Subtract a 1- or 2-digit number from a 3-digit number with one regrouping [Grade 2]	Core Skill
	Estimate the sum of two 2-digit numbers [Grade 2]	
	Estimate the difference of two 2-digit numbers [Grade 2]	
	Subtract 3- and 4-digit whole numbers with regrouping [Grade 3]	Core Skill
	WP: Add or subtract 3- and 4-digit whole numbers with regrouping [Grade 3]	Core Skill
	Estimate a sum or difference of whole numbers to 10,000 by rounding [Grade 3]	
	Estimate a sum or difference of two 3- or 4-digit whole numbers using front-end estimation [Grade 3]	
	Estimate a sum or difference of 2- to 4-digit whole numbers using any method [Grade 3]	Core Skill
	Estimate a sum of three 2- to 4-digit numbers using any method [Grade 3]	
	WP: Estimate a sum or difference of two 3- or 4-digit whole numbers using any method [Grade 3]	Core Skill
	WP: Solve a 2-step problem involving addition and/or subtraction of multi-digit whole numbers [Grade 4]	

VA 3.5 - The student will recall multiplication facts through the twelves table, and the corresponding division facts.

Numbers and Operations	Know basic multiplication facts to 10 x 10 [Grade 3]	Core Skill
	Know basic multiplication facts for 11 and 12 [Grade 3]	
	Know basic division facts to 100 ÷ 10 [Grade 3]	Core Skill
	Know basic division facts for 11 and 12 [Grade 3]	

VA 3.6 - The student will represent multiplication and division, using area, set, and number line models, and create and solve problems that involve multiplication of two whole numbers, one factor 99 or less and the second factor 5 or less.

Numbers and Operations	WP: Multiply a 1-digit number by 2, 5, or 10 [Grade 2]
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	Use a multiplication sentence to represent an area or an array model [Grade 3]	Core Skill
	Use a division sentence to represent objects divided into equal groups [Grade 3]	Core Skill
	WP: Multiply using basic facts to 10×10 [Grade 3]	Core Skill
	WP: Divide using basic facts to $100 \div 10$ [Grade 3]	Core Skill
	Multiply a 1-digit whole number by a multiple of 10 to 100 [Grade 3]	
	Multiply a 2-digit whole number by a 1-digit number [Grade 3]	

VA 3.7 - The student will add and subtract proper fractions having like denominators of 12 or less.

Numbers and Operations	Add fractions with like denominators no greater than 10 using models [Grade 4]	
	Add fractions with like denominators no greater than 10 [Grade 4]	Core Skill
	Add fractions with like denominators no greater than 10 and simplify the sum [Grade 4]	
	WP: Add fractions with like denominators no greater than 10 and simplify the sum [Grade 4]	
	Subtract fractions with like denominators no greater than 10 using models [Grade 4]	
	Subtract fractions with like denominators no greater than 10 [Grade 4]	Core Skill
	Subtract fractions with like denominators no greater than 10 and simplify the difference [Grade 4]	
	WP: Subtract fractions with like denominators no greater than 10 and simplify the difference [Grade 4]	

Measurement [Focus: U.S. Customary and Metric Units, Area and Perimeter, and Time]**VA 3.8 - The student will determine, by counting, the value of a collection of bills and coins whose total value is \$5.00 or less, compare the value of the bills and coins, and make change.**

Numbers and Operations	Determine the value of a collection of bills and coins [Grade 2]	
	WP: Determine the amount of change from whole dollar amounts [Grade 3]	Core Skill

VA 3.9 - The student will estimate and use U.S. Customary and metric units to measure**VA 3.9.a - The student will estimate and use U.S. Customary and metric units to measure length to the nearest 1/2-inch, inch, foot, yard, centimeter, and meter;**

Geometry and Measurement	Measure length in inches [Grade 2]	Core Skill
	Measure length in centimeters [Grade 2]	Core Skill
	Measure length to the nearest half inch or quarter inch [Grade 3]	

VA 3.9.b - The student will estimate and use U.S. Customary and metric units to measure liquid volume in cups, pints, quarts, gallons, and liters;

VA 3.9.c - The student will estimate and use U.S. Customary and metric units to measure weight/mass in ounces, pounds, grams, and kilograms; and

VA 3.9.d - The student will estimate and use U.S. Customary and metric units to measure area and perimeter.

VA 3.10 - The student will

VA 3.10.a - The student will measure the distance around a polygon in order to determine perimeter; and

Geometry and Measurement	WP: Determine the perimeter of a rectangular shape given a grid with a reference unit [Grade 3]	
	WP: Determine the perimeter of a shape given a model showing all side lengths [Grade 3]	
	Determine the perimeter of a rectangle given a picture showing length and width [Grade 4]	Core Skill
	WP: Determine the perimeter of a rectangle given a picture showing length and width [Grade 4]	Core Skill

VA 3.10.b - The student will count the number of square units needed to cover a given surface in order to determine area.

Geometry and Measurement	Relate area to the number of square units [Grade 2]	
	Determine the area of a shape composed of rectangles given a picture on a grid [Grade 3]	
	WP: Determine the area of a rectangular shape given a picture on a grid [Grade 3]	
	Determine the area of a polygon on a grid [Grade 4]	Core Skill

VA 3.11 - The student will

VA 3.11.a - The student will tell time to the nearest minute, using analog and digital clocks; and

Geometry and Measurement	Tell time to the quarter hour [Grade 2]	Core Skill
	Tell time to 5-minute intervals [Grade 2]	Core Skill
	Tell time to the minute [Grade 3]	Core Skill

VA 3.11.b - The student will determine elapsed time in one-hour increments over a 12-hour period.

Geometry and Measurement	WP: Calculate elapsed time [Grade 2]	
	Calculate elapsed time within an hour, given two clocks, without regrouping [Grade 3]	
	Calculate elapsed time within an hour, given two clocks, with regrouping [Grade 3]	
	WP: Calculate elapsed time within an hour given two clocks [Grade 3]	
	WP: Calculate elapsed time within an hour [Grade 3]	
	Calculate elapsed time exceeding an hour without regrouping [Grade 4]	
	Calculate elapsed time exceeding an hour with regrouping [Grade 4]	Core Skill

	WP: Calculate elapsed time exceeding an hour without regrouping hours [Grade 4]	
	WP: Calculate elapsed time exceeding an hour with regrouping hours [Grade 4]	Core Skill

VA 3.12 - The student will identify equivalent periods of time, including relationships among days, months, and years, as well as minutes and hours.

Geometry and Measurement	Convert hours to minutes or minutes to seconds [Grade 3]
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VA 3.13 - The student will read temperature to the nearest degree from a Celsius thermometer and a Fahrenheit thermometer. Real thermometers and physical models of thermometers will be used.

Geometry and Measurement	Read a thermometer in degrees Celsius [Grade 2]
	Read a thermometer in degrees Fahrenheit [Grade 2]
	Read a thermometer in degrees Fahrenheit or Celsius [Grade 3]

Geometry[Focus: Properties and Congruence Characteristics of Plane and Solid Figures]

VA 3.14 - The student will identify, describe, compare, and contrast characteristics of plane and solid geometric figures (circle, square, rectangle, triangle, cube, rectangular prism, square pyramid, sphere, cone, and cylinder) by identifying relevant characteristics, including the number of angles, vertices, and edges, and the number and shape of faces, using concrete models.

Geometry and Measurement	Identify figures that are the same size and shape [Grade 2]
	Identify a parallelogram, a trapezoid, a pentagon, a hexagon, or an octagon [Grade 2]
	Name a 3-dimensional geometric shape [Grade 2]
	Determine attributes of a triangle or a quadrilateral from a model [Grade 3]
	Relate a model of a triangle or a quadrilateral to a list of attributes [Grade 3]
	Identify a picture of a 3-dimensional shape [Grade 3]
	Name a 3-dimensional shape from a picture [Grade 3]
	Relate a polygon to attributes or characteristics [Grade 4]
	Identify similar shapes [Grade 4]

VA 3.15 - The student will identify and draw representations of points, line segments, rays, angles, and lines.

VA 3.16 - The student will identify and describe congruent and noncongruent plane figures.

Geometry and Measurement	Identify congruent shapes [Grade 3]
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Probability and Statistics[Focus: Applications of Data and Chance]

VA 3.17 - The student will

VA 3.17.a - The student will collect and organize data, using observations, measurements, surveys, or experiments;

VA 3.17.b - The student will construct a line plot, a picture graph, or a bar graph to represent the data; and

Data Analysis, Statistics, and Probability	Use a pictograph to represent data (1 symbol = more than 1 object) [Grade 2]	Core Skill
	Use a bar graph with a y-axis scale by 2s to represent data [Grade 2]	Core Skill
	Use a bar graph with a scale interval of 5 or 10 to represent data [Grade 3]	
	Use a line plot to represent data [Grade 3]	

VA 3.17.c - The student will read and interpret the data represented in line plots, bar graphs, and picture graphs and write a sentence analyzing the data.

Data Analysis, Statistics, and Probability	Answer a question using information from a pictograph (1 symbol = more than 1 object) [Grade 2]	Core Skill
	Read a bar graph with a y-axis scale by 2s [Grade 2]	
	Answer a question using information from a bar graph with a y-axis scale by 2s [Grade 2]	Core Skill
	Answer a question using information from a bar graph with a scale interval of 5 or 10 [Grade 3]	
	Read a line plot [Grade 3]	
	Answer a question using information from a line plot [Grade 3]	

VA 3.18 - The student will investigate and describe the concept of probability as chance and list possible results of a given situation.

Data Analysis, Statistics, and Probability	Determine which event is least likely or most likely to occur [Grade 3]	
	List possible outcomes of a simple event [Grade 4]	

Patterns, Functions, and Algebra[Focus: Patterns and Property Concepts]

VA 3.19 - The student will recognize and describe a variety of patterns formed using numbers, tables, and pictures, and extend the patterns, using the same or different forms.

Algebra	Determine an addition or subtraction number pattern given a rule [Grade 2]	
	Determine the rule for an addition or subtraction number pattern [Grade 2]	Core Skill
	Extend a number pattern involving addition [Grade 2]	Core Skill
	Extend a number pattern involving subtraction [Grade 2]	Core Skill
	Extend a pattern given a table of related number pairs [Grade 2]	
	Determine a repeating pattern corresponding to the same pattern expressed using different elements [Grade 2]	
	Extend a number pattern [Grade 3]	
	Extend a growing pictorial or nonnumeric pattern [Grade 4]	
	Identify a missing figure in a growing pictorial or nonnumeric pattern [Grade 4]	Core Skill

Identify a missing figure in a repeating pictorial or nonnumeric pattern [Grade 4]

Core Skill

Extend a number pattern in a table of related pairs [Grade 4]

VA 3.20 - The student will

VA 3.20.a - The student will investigate the identity and the commutative properties for addition and multiplication; and

VA 3.20.b - The student will identify examples of the identity and commutative properties for addition and multiplication.

Grade 4

Number and Number Sense

VA 4.1 - The student will

VA 4.1.a - The student will identify orally and in writing the place value for each digit in a whole number expressed through millions;

Numbers and Operations	Determine the value of a digit in a 4- or 5-digit whole number [Grade 3]	
	Determine which digit is in a specified place in a 4- or 5-digit whole number [Grade 3]	
	Determine the value of a digit in a 6-digit whole number [Grade 4]	
	Determine which digit is in a specified place in a 6-digit whole number [Grade 4]	

VA 4.1.b - The student will compare two whole numbers expressed through millions, using symbols (>, <, or =); and

Numbers and Operations	Compare 4- or 5-digit whole numbers using the symbols <, >, and = [Grade 3]	
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VA 4.1.c - The student will round whole numbers expressed through millions to the nearest thousand, ten thousand, and hundred thousand.

Numbers and Operations	Round a 2- to 4-digit whole number to its greatest place [Grade 3]	
	Round a 4- to 6-digit whole number to a specified place [Grade 4]	Core Skill

VA 4.2 - The student will

VA 4.2.a - The student will compare and order fractions and mixed numbers;

Numbers and Operations	Compare fractions using models [Grade 3]	Core Skill
	Order fractions using models [Grade 3]	Core Skill
	Compare fractions with like denominators [Grade 3]	
	Compare fractions with like numerators [Grade 3]	
	WP: Compare equal unit fractions of different-sized wholes [Grade 3]	
	Compare fractions on a number line [Grade 4]	
	Order fractions on a number line [Grade 4]	
	Compare fractions with unlike denominators [Grade 5]	Core Skill
	Order fractions with unlike denominators in ascending or descending order [Grade 5]	Core Skill

VA 4.2.b - The student will represent equivalent fractions; and

Numbers and Operations	Identify equivalent fractions using models [Grade 3]	Core Skill
	Determine a set of equivalent fractions [Grade 4]	
	Determine equivalent fractions not in simplest form [Grade 5]	Core Skill

VA 4.2.c - The student will identify the division statement that represents a fraction.

VA 4.3 - The student will**VA 4.3.a - The student will read, write, represent, and identify decimals expressed through thousandths;**

Numbers and Operations	Read a decimal number through the hundredths place [Grade 4]	Core Skill
	Determine the word form of a decimal number through the hundredths place [Grade 4]	
	Determine the decimal number from a pictorial model of tenths or hundredths [Grade 4]	Core Skill
	Identify a pictorial model of tenths or hundredths of a decimal number [Grade 4]	Core Skill
	Identify a decimal number to tenths represented by a point on a number line [Grade 4]	Core Skill
	Locate a decimal number to tenths on a number line [Grade 4]	Core Skill
	Determine the decimal number equivalent to a fraction with a denominator of 10 or 100 [Grade 4]	
	Determine a fraction equivalent to a decimal, using a denominator of 10 or 100 [Grade 4]	
	Determine the decimal number equivalent to a fraction model [Grade 4]	Core Skill
	Determine the fraction equivalent to a decimal number model [Grade 4]	Core Skill
	Determine the value of a digit in a decimal number to thousandths [Grade 5]	
	Convert a fraction with a denominator that is a factor of 10, 100, or 1,000 to decimal notation [Grade 5]	

VA 4.3.b - The student will round decimals to the nearest whole number, tenth, and hundredth;

Numbers and Operations	Round a decimal number to a specified place through hundredths [Grade 4]	Core Skill
	Round a decimal number to a specified decimal place to thousandths [Grade 5]	

VA 4.3.c - The student will compare and order decimals; and

Numbers and Operations	Compare decimal numbers through the hundredths place [Grade 4]	Core Skill
	Order decimal numbers through the hundredths place [Grade 4]	Core Skill
	Compare decimal numbers to thousandths represented in expanded form [Grade 5]	
	Compare decimal numbers of differing places to thousandths [Grade 5]	Core Skill
	Order decimal numbers of differing places to thousandths in ascending or descending order [Grade 5]	Core Skill

VA 4.3.d - The student will given a model, write the decimal and fraction equivalents.

Numbers and Operations	Determine a pictorial model of a fraction of a whole [Grade 3]	Core Skill
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	Determine a pictorial model of a fraction of a set of objects [Grade 3]	Core Skill
	Identify equivalent fractions using models [Grade 3]	Core Skill
	Identify a mixed number represented by a model [Grade 4]	
	Identify an improper fraction represented by a model of a mixed number [Grade 4]	
	Determine the decimal number from a pictorial model of tenths or hundredths [Grade 4]	Core Skill
	Identify a pictorial model of tenths or hundredths of a decimal number [Grade 4]	Core Skill
	Determine the decimal number equivalent to a fraction model [Grade 4]	Core Skill
	Determine the fraction equivalent to a decimal number model [Grade 4]	Core Skill

Computation and Estimation

VA 4.4 - The student will

VA 4.4.a - The student will estimate sums, differences, products, and quotients of whole numbers;

Numbers and Operations	Estimate a sum or difference of whole numbers to 10,000 by rounding [Grade 3]	
	Estimate a sum or difference of two 3- or 4-digit whole numbers using front-end estimation [Grade 3]	
	Estimate a sum or difference of 2- to 4-digit whole numbers using any method [Grade 3]	Core Skill
	Estimate a sum of three 2- to 4-digit numbers using any method [Grade 3]	
	WP: Estimate a sum or difference of two 3- or 4-digit whole numbers using any method [Grade 3]	Core Skill
	WP: Estimate the sum or difference of two whole numbers, all values less than 1,000,000 [Grade 4]	
	Estimate a product of whole numbers by rounding [Grade 4]	
	Estimate a product of whole numbers using any method [Grade 4]	Core Skill
	WP: Estimate a product of two whole numbers using any method [Grade 4]	Core Skill
	Estimate a quotient using compatible numbers [Grade 5]	
	Estimate a quotient using any method [Grade 5]	Core Skill
	WP: Estimate a quotient using any method [Grade 5]	Core Skill

VA 4.4.b - The student will add, subtract, and multiply whole numbers;

Numbers and Operations	Add 3- and 4-digit whole numbers with regrouping [Grade 3]	Core Skill
	Add three 2- to 3-digit whole numbers [Grade 3]	
	Subtract 3- and 4-digit whole numbers with regrouping [Grade 3]	Core Skill

	WP: Add or subtract 3- and 4-digit whole numbers with regrouping [Grade 3]	Core Skill
	WP: Multiply using basic facts to 10×10 [Grade 3]	Core Skill
	Multiply a 1-digit whole number by a multiple of 10 to 100 [Grade 3]	
	Multiply a 2-digit whole number by a 1-digit number [Grade 3]	
	Add up to 4-digit whole numbers in expanded form [Grade 4]	
	Add a 5-digit or greater whole number and a 3-digit or greater whole number [Grade 4]	
	Add three multi-digit whole numbers [Grade 4]	
	Subtract a smaller number from a 3- or 4-digit whole number in expanded form [Grade 4]	
	Subtract a 3-digit or greater whole number from a 5-digit or greater whole number [Grade 4]	
	WP: Add a 5-digit or greater whole number and a 3-digit or greater whole number [Grade 4]	
	WP: Add three multi-digit whole numbers [Grade 4]	
	WP: Subtract a 3-digit or greater whole number from a 5-digit or greater whole number [Grade 4]	
	WP: Solve a 2-step problem involving addition and/or subtraction of multi-digit whole numbers [Grade 4]	
	Multiply a 1- or 2-digit whole number by a multiple of 10, 100, or 1,000 [Grade 4]	Core Skill
	Multiply a 3- or 4-digit whole number by a 1-digit whole number [Grade 4]	Core Skill
	Multiply a 2-digit whole number by a 2-digit whole number [Grade 4]	Core Skill
	Multiply a 3-digit whole number by a 2-digit whole number [Grade 4]	
	Multiply three 1- and 2-digit whole numbers [Grade 4]	
	WP: Multiply a multi-digit whole number by a 1-digit whole number [Grade 4]	Core Skill
	WP: Multiply a 2-digit whole number by a 2-digit whole number [Grade 4]	Core Skill
	WP: Multiply a 3-digit whole number by a 2-digit whole number [Grade 4]	
	Multiply a 3- or 4-digit whole number by a 3-digit whole number [Grade 5]	
VA 4.4.c - The student will divide whole numbers, finding quotients with and without remainders; and		
Numbers and Operations	WP: Divide using basic facts to $100 \div 10$ [Grade 3]	Core Skill
	Divide a multi-digit whole number by 10 or 100 with no remainder [Grade 4]	

	Divide a 2-digit whole number by a 1-digit whole number with no remainder in the quotient [Grade 4]	
	Divide a 3-digit whole number by a 1-digit whole number with no remainder in the quotient [Grade 4]	
	Divide a 2-digit whole number by a 1-digit whole number with a remainder in the quotient [Grade 4]	
	Divide a 3-digit whole number by a 1-digit whole number with a remainder in the quotient [Grade 4]	Core Skill
	WP: Divide a 2-digit whole number by a 1-digit whole number with no remainder in the quotient [Grade 4]	
	WP: Divide a 3-digit whole number by a 1-digit whole number with no remainder in the quotient [Grade 4]	Core Skill
	WP: Divide a 2-digit whole number by a 1-digit whole number with a remainder in the quotient [Grade 4]	
	WP: Divide a 3-digit whole number by a 1-digit whole number with a remainder in the quotient [Grade 4]	Core Skill
	Divide a multi-digit whole number by multiples of 100 or 1,000 [Grade 5]	
	Divide a multi-digit whole number by a 1-digit number, with no remainder and at least one zero in the quotient [Grade 5]	
	Divide a multi-digit whole number by a 1-digit number, with a remainder and at least one zero in the quotient [Grade 5]	
	Divide a multi-digit whole number by a 2-digit whole number, with no remainder and no zeros in the quotient [Grade 5]	
	Divide a multi-digit whole number by a 2-digit whole number, with a remainder and no zeros in the quotient [Grade 5]	
	Divide a multi-digit whole number by a 2-digit whole number, with no remainder and at least one zero in the quotient [Grade 5]	
	Divide a multi-digit whole number by a 2-digit whole number, with a remainder and at least one zero in the quotient [Grade 5]	Core Skill
	WP: Divide a whole number, with no remainder [Grade 5]	Core Skill
	WP: Divide a whole number and interpret the remainder [Grade 5]	Core Skill

VA 4.4.d - The student will solve single-step and multistep addition, subtraction, and multiplication problems with whole numbers.

Numbers and Operations	WP: Solve a 2-step problem involving addition and/or subtraction of multi-digit whole numbers [Grade 4]	
	WP: Multiply a multi-digit whole number by a 1-digit whole number [Grade 4]	Core Skill
	WP: Solve a 2-step whole number problem using more than 1 operation [Grade 4]	
	WP: Solve a 2-step problem involving whole numbers [Grade 5]	Core Skill
	WP: Solve a multi-step problem involving whole numbers [Grade 6]	Core Skill

VA 4.5 - The student will

VA 4.5.a - The student will determine common multiples and factors, including least common multiple and greatest common factor of up to two fractions;

Numbers and Operations	Determine a complete list of whole number factor pairs for a number to 50 [Grade 5]
	Determine all the factors of a whole number to 50 [Grade 5]
	Determine the prime factorization of a number to 50 [Grade 5]
	Determine the common factors for two whole numbers to 50 [Grade 5]
	Determine the greatest common factor of two whole numbers to 50 [Grade 5]
	Determine the multiple(s) of a number [Grade 5]
	Determine common multiples for two whole numbers [Grade 5]
	Determine the least common multiple of two whole numbers [Grade 5]
	WP: Determine the least common multiple of two or more numbers [Grade 6]

VA 4.5.b - The student will add and subtract fractions having like and unlike denominators that are limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fractions, using common multiples and factors;

Numbers and Operations	Add fractions with like denominators no greater than 10 using models [Grade 4]	
	Add fractions with like denominators no greater than 10 [Grade 4]	Core Skill
	Add fractions with like denominators no greater than 10 and simplify the sum [Grade 4]	
	WP: Add fractions with like denominators no greater than 10 and simplify the sum [Grade 4]	
	Subtract fractions with like denominators no greater than 10 using models [Grade 4]	
	Subtract fractions with like denominators no greater than 10 [Grade 4]	Core Skill
	Subtract fractions with like denominators no greater than 10 and simplify the difference [Grade 4]	
	WP: Subtract fractions with like denominators no greater than 10 and simplify the difference [Grade 4]	
	Add fractions with unlike denominators using a model and do not simplify the sum [Grade 5]	
	Add fractions with unlike denominators and do not simplify the sum [Grade 5]	
	Add fractions with unlike denominators that have factors in common and simplify the sum [Grade 5]	Core Skill

	Add fractions with unlike denominators that have no factors in common [Grade 5]	Core Skill
	Subtract fractions with unlike denominators and do not simplify the difference [Grade 5]	
	Subtract fractions with unlike denominators that have factors in common and simplify the difference [Grade 5]	Core Skill
	WP: Add or subtract fractions with like denominators and simplify the sum or difference [Grade 5]	Core Skill
	WP: Add or subtract fractions with unlike denominators that have no factors in common [Grade 5]	Core Skill

VA 4.5.c - The student will add and subtract with decimals; and

Numbers and Operations	Add two money amounts less than \$1 in decimal notation [Grade 3]	
	Subtract two money amounts less than \$1 in decimal notation [Grade 3]	
	Add or subtract cent amounts to or from whole dollar amounts [Grade 3]	
	Add dollars and cents to cents [Grade 3]	
	Add dollars and cents to dollars [Grade 3]	
	Subtract cents from dollars and cents [Grade 3]	
	Subtract dollars from dollars and cents [Grade 3]	
	Determine money amounts that total \$10 [Grade 3]	Core Skill
	WP: Determine the amount of change from whole dollar amounts [Grade 3]	Core Skill
	WP: Add or subtract money amounts less than \$1 [Grade 3]	
	Add two decimal numbers through hundredths [Grade 4]	
	Subtract two decimal numbers through hundredths [Grade 4]	
	WP: Add or subtract money amounts greater than \$1 [Grade 4]	
	WP: Solve a money problem involving 2 steps [Grade 4]	
	WP: Add or subtract decimal numbers of the same place through hundredths [Grade 4]	
	Add two decimal numbers of differing places to thousandths [Grade 5]	Core Skill
	Subtract two decimal numbers of differing places to thousandths [Grade 5]	Core Skill
	Subtract a decimal number from a whole number or a whole number from a decimal number [Grade 5]	
	WP: Add or subtract decimal numbers through thousandths [Grade 5]	Core Skill
	WP: Add or subtract a decimal number through thousandths and a whole number [Grade 5]	Core Skill

VA 4.5.d - The student will solve single-step and multistep practical problems involving addition and subtraction with fractions and with decimals.

Numbers and Operations	WP: Determine the amount of change from whole dollar amounts [Grade 3]	Core Skill
	WP: Subtract fractions with like denominators no greater than 10 and simplify the difference [Grade 4]	
	WP: Solve a money problem involving 2 steps [Grade 4]	

Measurement

VA 4.6 - The student will

VA 4.6.a - The student will estimate and measure weight/mass and describe the results in U.S. Customary and metric units as appropriate; and

VA 4.6.b - The student will identify equivalent measurements between units within the U.S. Customary system (ounces, pounds, and tons) and between units within the metric system (grams and kilograms).

Geometry and Measurement	Convert between customary units of weight using whole numbers [Grade 4]
	Convert between customary units of weight using fractional amounts [Grade 5]

VA 4.7 - The student will

VA 4.7.a - The student will estimate and measure length, and describe the result in both metric and U.S. Customary units; and

Geometry and Measurement	Measure length to the nearest half inch or quarter inch [Grade 3]
	Measure length to the nearest eighth of an inch [Grade 4]
	Measure length to the nearest millimeter [Grade 4]

VA 4.7.b - The student will identify equivalent measurements between units within the U.S. Customary system (inches and feet; feet and yards; inches and yards; yards and miles) and between units within the metric system (millimeters and centimeters; centimeters and meters; and millimeters and meters).

Geometry and Measurement	Convert between inches, feet, and yards [Grade 3]
	Convert between centimeters and meters [Grade 3]
	Convert between millimeters and centimeters or meters using whole numbers [Grade 4]
	Convert between customary units of length using fractional amounts [Grade 5]
	Convert between millimeters or centimeters and meters, or meters and kilometers using decimal amounts [Grade 5]

VA 4.8 - The student will

VA 4.8.a - The student will estimate and measure liquid volume and describe the results in U.S. Customary units; and

VA 4.8.b - The student will identify equivalent measurements between units within the U.S. Customary system (cups, pints, quarts, and gallons).

Geometry and Measurement	Convert between customary units of capacity using whole numbers [Grade 4]
	Convert between customary units of capacity using fractional amounts [Grade 5]

VA 4.9 - The student will determine elapsed time in hours and minutes within a 12-hour period.

Geometry and Measurement	Calculate elapsed time within an hour, given two clocks, without regrouping [Grade 3]
	Calculate elapsed time within an hour, given two clocks, with regrouping [Grade 3]
	WP: Calculate elapsed time within an hour given two clocks [Grade 3]
	WP: Calculate elapsed time within an hour [Grade 3]
	WP: Determine the end time given the start time and the elapsed time within an hour [Grade 3]
	Calculate elapsed time exceeding an hour without regrouping [Grade 4]
	Calculate elapsed time exceeding an hour with regrouping [Grade 4] Core Skill
	WP: Calculate elapsed time exceeding an hour without regrouping hours [Grade 4]
	WP: Calculate elapsed time exceeding an hour with regrouping hours [Grade 4] Core Skill
	WP: Determine the end time given the start time and the elapsed time exceeding an hour [Grade 4]
	WP: Determine the start time given the end time and the elapsed time exceeding an hour [Grade 4]
	Calculate elapsed time using a.m. and p.m. [Grade 5]

Geometry

VA 4.10 - The student will

VA 4.10.a - The student will identify and describe representations of points, lines, line segments, rays, and angles, including endpoints and vertices; and

Geometry and Measurement	Measure an angle, between two rays or in a shape, to the nearest degree [Grade 6]
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VA 4.10.b - The student will identify representations of lines that illustrate intersection, parallelism, and perpendicularity.

Geometry and Measurement	Identify parallel, perpendicular, and intersecting lines [Grade 3]
	Identify a shape that has parallel or perpendicular sides [Grade 4]

VA 4.11 - The student will

VA 4.11.a - The student will investigate congruence of plane figures after geometric transformations, such as reflection, translation, and rotation, using mirrors, paper folding, and tracing; and

Geometry and Measurement	Identify congruent shapes [Grade 3]	
	Determine the result of a reflection, a rotation, or a translation on a grid [Grade 5]	

VA 4.11.b - The student will recognize the images of figures resulting from geometric transformations, such as translation, reflection, and rotation.

Geometry and Measurement	Determine the result of a flip, a turn, or a slide [Grade 4]	Core Skill
	Determine the result of a reflection, a rotation, or a translation on a grid [Grade 5]	
	Determine the transformation that generates the image of a figure on a grid [Grade 5]	

VA 4.12 - The student will

VA 4.12.a - The student will define polygon; and

Geometry and Measurement	Determine attributes of a triangle or a quadrilateral from a model [Grade 3]	
	Relate a model of a triangle or a quadrilateral to a list of attributes [Grade 3]	
	Relate a polygon to attributes or characteristics [Grade 4]	

VA 4.12.b - The student will identify polygons with 10 or fewer sides.

Geometry and Measurement	Classify a triangle by its sides [Grade 4]	
	Classify a quadrilateral [Grade 4]	
	Classify a triangle by its sides and angles [Grade 5]	

Probability and Statistics

VA 4.13 - The student will

VA 4.13.a - The student will predict the likelihood of an outcome of a simple event; and

Data Analysis, Statistics, and Probability	Determine which event is least likely or most likely to occur [Grade 3]	
	List possible outcomes of a simple event [Grade 4]	
	Determine the probability of a single event given the total number of possible outcomes [Grade 5]	

VA 4.13.b - The student will represent probability as a number between 0 and 1, inclusive.

Data Analysis, Statistics, and Probability	Determine the probability of a single event given the total number of possible outcomes [Grade 5]	
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VA 4.14 - The student will collect, organize, display, and interpret data from a variety of graphs.

Algebra	Use a first quadrant graph to represent the values from a table generated in context [Grade 5]	Core Skill
Data Analysis, Statistics, and Probability	Use a line graph to represent data [Grade 4]	Core Skill

	Answer a question using information from a line graph [Grade 4]	Core Skill
	Answer a question using information from a circle graph [Grade 4]	
	Use a double-bar graph to represent data [Grade 4]	Core Skill
	Answer a question using information from a double-bar graph [Grade 4]	Core Skill

Patterns, Functions, and Algebra

VA 4.15 - The student will recognize, create, and extend numerical and geometric patterns.

Algebra	Extend a number pattern [Grade 3]	
	Identify a missing term in a multiplication or a division number pattern [Grade 4]	Core Skill
	Extend a growing pictorial or nonnumeric pattern [Grade 4]	
	Identify a missing figure in a growing pictorial or nonnumeric pattern [Grade 4]	Core Skill
	Identify a missing figure in a repeating pictorial or nonnumeric pattern [Grade 4]	Core Skill
	Determine a rule that relates two variables [Grade 4]	Core Skill
	Extend a number pattern in a table of related pairs [Grade 4]	
	WP: Extend a pattern to solve a problem [Grade 5]	

VA 4.16 - The student will

VA 4.16.a - The student will recognize and demonstrate the meaning of equality in an equation; and

Numbers and Operations	Use a division sentence to represent objects divided into equal groups [Grade 3]	Core Skill
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VA 4.16.b - The student will investigate and describe the associative property for addition and multiplication.

Grade 5

Number and Number Sense

VA 5.1 - The student, given a decimal through thousandths, will round to the nearest whole number, tenth, or hundredth.

Numbers and Operations	Round a decimal number to a specified place through hundredths [Grade 4]	Core Skill
	Know the effects of rounding [Grade 5]	
	Round a decimal number to a specified decimal place to thousandths [Grade 5]	

VA 5.2 - The student will

VA 5.2.a - The student will recognize and name fractions in their equivalent decimal form and vice versa; and

Numbers and Operations	Determine the decimal number equivalent to a fraction with a denominator of 10 or 100 [Grade 4]	
	Determine a fraction equivalent to a decimal, using a denominator of 10 or 100 [Grade 4]	
	Determine the decimal number equivalent to a fraction model [Grade 4]	Core Skill
	Determine the fraction equivalent to a decimal number model [Grade 4]	Core Skill

VA 5.2.b - The student will compare and order fractions and decimals in a given set from least to greatest and greatest to least.

Numbers and Operations	Compare fractions on a number line [Grade 4]	
	Order fractions on a number line [Grade 4]	
	Compare decimal numbers through the hundredths place [Grade 4]	Core Skill
	Order decimal numbers through the hundredths place [Grade 4]	Core Skill
	Compare fractions with unlike denominators [Grade 5]	Core Skill
	Order fractions with unlike denominators in ascending or descending order [Grade 5]	Core Skill
	Compare decimal numbers to thousandths represented in expanded form [Grade 5]	
	Compare decimal numbers of differing places to thousandths [Grade 5]	Core Skill
	Order decimal numbers of differing places to thousandths in ascending or descending order [Grade 5]	Core Skill
	Compare numbers in decimal and fractional forms [Grade 6]	Core Skill
	Order numbers in decimal and fractional forms [Grade 6]	Core Skill

VA 5.3 - The student will

VA 5.3.a - The student will identify and describe the characteristics of prime and composite numbers; and

Numbers and Operations	Determine if a number to 50 is prime or composite [Grade 5]
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VA 5.3.b - The student will identify and describe the characteristics of even and odd numbers.

Computation and Estimation

VA 5.4 - The student will create and solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division with and without remainders of whole numbers.

Numbers and Operations	WP: Solve a 2-step problem involving addition and/or subtraction of multi-digit whole numbers [Grade 4]	
	WP: Multiply a multi-digit whole number by a 1-digit whole number [Grade 4]	Core Skill
	WP: Divide a 2-digit whole number by a 1-digit whole number with no remainder in the quotient [Grade 4]	
	WP: Divide a 3-digit whole number by a 1-digit whole number with no remainder in the quotient [Grade 4]	Core Skill
	WP: Divide a 3-digit whole number by a 1-digit whole number with a remainder in the quotient [Grade 4]	Core Skill
	WP: Solve a 2-step whole number problem using more than 1 operation [Grade 4]	
	Divide a multi-digit whole number by a 2-digit whole number, with a remainder and at least one zero in the quotient [Grade 5]	Core Skill
	Divide a multi-digit whole number by a 2-digit whole number and express the quotient as a mixed number [Grade 5]	Core Skill
	WP: Divide a whole number and interpret the remainder [Grade 5]	Core Skill
	WP: Solve a 2-step problem involving whole numbers [Grade 5]	Core Skill
	WP: Solve a multi-step problem involving whole numbers [Grade 6]	Core Skill

VA 5.5 - The student will

VA 5.5.a - The student will find the sum, difference, product, and quotient of two numbers expressed as decimals through thousandths (divisors with only one nonzero digit); and

Numbers and Operations	Add two decimal numbers through hundredths [Grade 4]	
	Subtract two decimal numbers through hundredths [Grade 4]	
	Add two decimal numbers of differing places to thousandths [Grade 5]	Core Skill
	Add decimal numbers and whole numbers [Grade 5]	Core Skill
	Subtract two decimal numbers of differing places to thousandths [Grade 5]	Core Skill
	Multiply a decimal number through thousandths by 10, 100, or 1,000 [Grade 5]	Core Skill
	Multiply a decimal number through thousandths by a whole number [Grade 6]	Core Skill

Multiply a decimal number greater than one, in tenths, by a decimal number in tenths [Grade 6]	
Multiply decimal numbers to thousandths using basic facts [Grade 6]	
Multiply decimal numbers less than one in hundredths or thousandths [Grade 6]	Core Skill
Multiply a decimal number greater than one by a decimal number to thousandths that has only 1 nonzero digit [Grade 6]	
Multiply decimal numbers greater than one where the product has 2 or 3 decimal places [Grade 6]	Core Skill
Divide a decimal number by 10, 100, or 1,000 [Grade 6]	Core Skill
Divide a decimal number through thousandths by a 1- or 2-digit whole number where the quotient has 2-5 decimal places [Grade 6]	Core Skill
Divide a decimal number by a decimal number through thousandths, rounded quotient if needed [Grade 6]	Core Skill

VA 5.5.b - The student will create and solve single-step and multistep practical problems involving decimals.

Numbers and Operations	WP: Add or subtract money amounts greater than \$1 [Grade 4]	
	WP: Solve a money problem involving 2 steps [Grade 4]	
	WP: Add or subtract decimal numbers of the same place through hundredths [Grade 4]	
	WP: Multiply a money amount by a 1-digit number [Grade 4]	
	WP: Divide a money amount by a 1-digit number [Grade 4]	
	WP: Add or subtract decimal numbers through thousandths [Grade 5]	Core Skill
	WP: Add or subtract a decimal number through thousandths and a whole number [Grade 5]	Core Skill
	WP: Multiply a decimal through thousandths by 10, 100, or 1,000 [Grade 5]	
	WP: Multiply a money amount by a 2-digit whole number [Grade 5]	
	WP: Divide a whole number by a 1- or 2-digit whole number resulting in a decimal quotient [Grade 6]	Core Skill
	WP: Multiply a decimal number through thousandths by a whole number [Grade 6]	Core Skill
	WP: Multiply a money expression by a decimal number [Grade 6]	
	WP: Multiply two decimal numbers to thousandths [Grade 6]	Core Skill
	WP: Divide a decimal number through thousandths by a 1- or 2-digit whole number [Grade 6]	Core Skill
	WP: Divide a whole number by a decimal number through thousandths, rounded quotient if needed [Grade 6]	Core Skill
	WP: Divide a decimal through thousandths by a decimal through thousandths, rounded quotient if needed [Grade 6]	Core Skill

WP: Solve a 2-step problem involving decimals [Grade 6] Core Skill

VA 5.6 - The student will solve single-step and multistep practical problems involving addition and subtraction with fractions and mixed numbers and express answers in simplest form.

Numbers and Operations	WP: Add fractions with like denominators no greater than 10 and simplify the sum [Grade 4]	
	WP: Subtract fractions with like denominators no greater than 10 and simplify the difference [Grade 4]	
	WP: Add or subtract fractions with like denominators and simplify the sum or difference [Grade 5]	Core Skill
	WP: Add or subtract fractions with unlike denominators that have no factors in common [Grade 5]	Core Skill
	WP: Add or subtract mixed numbers with like denominators and simplify the sum or difference [Grade 5]	Core Skill
	WP: Add or subtract mixed numbers with unlike denominators that have no factors in common [Grade 5]	
	WP: Add or subtract fractions with unlike denominators and simplify the sum or difference [Grade 6]	
	WP: Add or subtract mixed numbers with unlike denominators or a mixed number and a fraction with unlike denominators and simplify the sum or difference [Grade 6]	

VA 5.7 - The student will evaluate whole number numerical expressions, using the order of operations limited to parentheses, addition, subtraction, multiplication, and division.

Numbers and Operations	Evaluate a numerical expression involving three operations, with no parentheses, using order of operations [Grade 5]	
	Evaluate a numerical expression involving three operations, with parentheses, using order of operations [Grade 5]	
	Evaluate a numerical expression of four or more operations, with parentheses, using order of operations [Grade 6]	Core Skill
Algebra	Evaluate a numeric expression involving two operations [Grade 4]	

Measurement

VA 5.8 - The student will

VA 5.8.a - The student will find perimeter, area, and volume in standard units of measure;

Geometry and Measurement	Determine the perimeter of a rectangle given a picture showing length and width [Grade 4]	Core Skill
	WP: Determine the perimeter of a rectangle given a picture showing length and width [Grade 4]	Core Skill
	WP: Determine the perimeter of a square or rectangle [Grade 4]	
	Determine the area of a polygon on a grid [Grade 4]	Core Skill
	Determine the area of a rectangle given a picture showing the length and width [Grade 4]	

Determine the area of a rectangle given the length and width [Grade 4]	Core Skill
WP: Determine the area of a rectangle [Grade 4]	Core Skill
Determine the volume of a rectangular prism given a diagram showing unit cubes [Grade 4]	
Determine the perimeter of a polygon [Grade 5]	
Use a formula to determine the area of a triangle [Grade 5]	Core Skill
Use a formula to determine the area of a parallelogram [Grade 5]	
WP: Determine the area of a triangle [Grade 5]	Core Skill
WP: Determine the area of a square or rectangle [Grade 5]	Core Skill
Determine the volume of a rectangular prism given a diagram [Grade 5]	Core Skill
WP: Determine the volume of a rectangular prism given a diagram [Grade 5]	
Determine the volume of a rectangular prism [Grade 5]	
WP: Determine the volume of a rectangular prism [Grade 5]	Core Skill
Determine the volume of an object composed of rectangular prisms by counting units [Grade 5]	
Determine the perimeter of a complex shape [Grade 6]	
Determine the area of a complex shape [Grade 6]	Core Skill
WP: Determine the perimeter or the area of a complex shape [Grade 6]	Core Skill
Determine the volume of a prism with a right triangle base [Grade 6]	

VA 5.8.b - The student will differentiate among perimeter, area, and volume and identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation;

VA 5.8.c - The student will identify equivalent measurements within the metric system;

Geometry and Measurement	Convert between metric units of capacity using whole numbers [Grade 4]
	Convert between metric units of mass using whole numbers [Grade 4]
	Convert between millimeters and centimeters or meters using whole numbers [Grade 4]
	Convert between metric units of capacity using decimal amounts [Grade 5]
	Convert between metric units of mass using decimal amounts [Grade 5]
	Convert between millimeters or centimeters and meters, or meters and kilometers using decimal amounts [Grade 5]

VA 5.8.d - The student will estimate and then measure to solve problems, using U.S. Customary and metric units; and

Geometry and Measurement	Measure length to the nearest eighth of an inch [Grade 4]
	Measure length to the nearest millimeter [Grade 4]
	WP: Add or subtract customary measures of capacity requiring unit conversion [Grade 6]
	WP: Add or subtract metric measures of capacity requiring unit conversion [Grade 6]
	WP: Add or subtract customary measures of weight requiring unit conversion [Grade 6]
	WP: Add or subtract metric measures of mass requiring unit conversion [Grade 6]
	WP: Multiply or divide customary measures of capacity requiring unit conversion [Grade 6]
	WP: Multiply or divide metric measures of capacity requiring unit conversion [Grade 6]
	WP: Multiply or divide customary measures of weight requiring unit conversion [Grade 6]
	WP: Multiply or divide metric measures of mass requiring unit conversion [Grade 6]

VA 5.8.e - The student will choose an appropriate unit of measure for a given situation involving measurement using U.S. Customary and metric units.

Geometry and Measurement	Determine an appropriate unit of measure [Grade 5]
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VA 5.9 - The student will identify and describe the diameter, radius, chord, and circumference of a circle.

Geometry and Measurement	Answer a question about the parts and relationships in a circle [Grade 6]
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VA 5.10 - The student will determine an amount of elapsed time in hours and minutes within a 24-hour period.

Geometry and Measurement	Calculate elapsed time exceeding an hour without regrouping [Grade 4]
	Calculate elapsed time exceeding an hour with regrouping [Grade 4] Core Skill
	WP: Calculate elapsed time exceeding an hour without regrouping hours [Grade 4]
	WP: Calculate elapsed time exceeding an hour with regrouping hours [Grade 4] Core Skill
	Calculate elapsed time using a.m. and p.m. [Grade 5]
	WP: Calculate elapsed time using a.m. and p.m. [Grade 5]

VA 5.11 - The student will measure right, acute, obtuse, and straight angles.

Geometry and Measurement	Measure an angle to the nearest 5 degrees [Grade 5]
	Measure an angle, between two rays or in a shape, to the nearest degree [Grade 6]

Geometry

VA 5.12 - The student will classify

VA 5.12.a - The student will classify angles as right, acute, obtuse, or straight; and

Geometry and Measurement	Classify an angle given a picture [Grade 4]	Core Skill
	Classify an angle given its measure [Grade 4]	Core Skill

VA 5.12.b - The student will classify triangles as right, acute, obtuse, equilateral, scalene, or isosceles.

Geometry and Measurement	Classify a triangle by its sides [Grade 4]
	Classify a triangle by its sides and angles [Grade 5]
	Know the properties of a triangle or a quadrilateral [Grade 6]

VA 5.13 - The student, using plane figures (square, rectangle, triangle, parallelogram, rhombus, and trapezoid), will

VA 5.13.a - The student, using plane figures (square, rectangle, triangle, parallelogram, rhombus, and trapezoid), will develop definitions of these plane figures; and

Geometry and Measurement	Determine attributes of a triangle or a quadrilateral from a model [Grade 3]
	Relate a model of a triangle or a quadrilateral to a list of attributes [Grade 3]
	Relate a polygon to attributes or characteristics [Grade 4]

VA 5.13.b - The student, using plane figures (square, rectangle, triangle, parallelogram, rhombus, and trapezoid), will investigate and describe the results of combining and subdividing plane figures.

Probability and Statistics

VA 5.14 - The student will make predictions and determine the probability of an outcome by constructing a sample space.

Data Analysis, Statistics, and Probability	List possible outcomes of a simple event [Grade 4]
	Determine all possible outcomes of a compound event using a list [Grade 5]
	Determine all possible outcomes of a compound event using a tree diagram [Grade 5]
	Determine the probability of a single event given the total number of possible outcomes [Grade 5]
	Determine an experimental probability given a list of results [Grade 6]
	Determine the probability of a single event [Grade 6]
	Make a prediction based on an experimental probability [Grade 6]
	Make a prediction based on a theoretical probability [Grade 6]
	Compare predictions from experimental and theoretical probability [Grade 6]

VA 5.15 - The student, given a problem situation, will collect, organize, and interpret data in a variety of forms, using stem-and-leaf plots and line graphs.

Data Analysis, Statistics, and Probability	Read a line graph [Grade 4]	Core Skill
	Use a line graph to represent data [Grade 4]	Core Skill
	Answer a question using information from a line graph [Grade 4]	Core Skill
	Answer a question using information from a line graph that does not start at zero or has a broken vertical scale [Grade 5]	
	WP: Extend a line graph to solve a problem [Grade 5]	
	Answer a question using information from a double-line graph [Grade 6]	
	Use a stem-and-leaf plot to represent data [Grade 6]	
	Answer a question using information from a stem-and-leaf plot [Grade 6]	

VA 5.16 - The student will

VA 5.16.a - The student will describe mean, median, and mode as measures of center;

VA 5.16.b - The student will describe mean as fair share;

VA 5.16.c - The student will find the mean, median, mode, and range of a set of data; and

Data Analysis, Statistics, and Probability	Determine the mode from a graph [Grade 5]	
	Determine the range from a graph [Grade 5]	
	Determine the mean of a set of whole number data, whole number results [Grade 5]	
	Determine the median of an odd number of data values [Grade 5]	Core Skill
	Determine the mode of a set of whole number data [Grade 5]	
	Determine the range of a set of whole number data [Grade 5]	
	Determine the mean of a set of whole number data [Grade 6]	
	Determine the median of a set of whole number data [Grade 6]	

VA 5.16.d - The student will describe the range of a set of data as a measure of variation.

Patterns, Functions, and Algebra

VA 5.17 - The student will describe the relationship found in a number pattern and express the relationship.

Algebra	Identify a missing term in a multiplication or a division number pattern [Grade 4]	Core Skill
	Determine a rule that relates two variables [Grade 4]	Core Skill
	Extend a number pattern in a table of related pairs [Grade 4]	

WP: Extend a pattern to solve a problem [Grade 5]

VA 5.18 - The student will

VA 5.18.a - The student will investigate and describe the concept of variable;

Overall Product Skills	Build comprehension of math vocabulary
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VA 5.18.b - The student will write an open sentence to represent a given mathematical relationship, using a variable;

Algebra	Determine a rule that relates two variables [Grade 4]	Core Skill
	Use a variable expression with one operation to represent a verbal expression [Grade 5]	
	WP: Use a variable expression with one operation to represent a situation [Grade 5]	
	Determine the variable expression with one operation for a table of paired numbers [Grade 5]	Core Skill
	WP: Determine the variable expression with one operation for a table of paired numbers [Grade 5]	Core Skill

VA 5.18.c - The student will model one-step linear equations in one variable, using addition and subtraction; and

Algebra	Solve a 1-step addition or subtraction equation using a model [Grade 4]	
	Solve a 1-step equation involving whole numbers [Grade 6]	Core Skill

VA 5.18.d - The student will create a problem situation based on a given open sentence, using a single variable.

Algebra	Use a verbal expression to represent a variable expression with one operation [Grade 5]	
	WP: Use a variable expression with one operation to represent a situation [Grade 5]	

VA 5.19 - The student will investigate and recognize the distributive property of multiplication over addition.

Numbers and Operations	Apply the distributive property to the multiplication of a 2-digit number by a 1- or 2-digit number [Grade 4]	
	Apply the distributive property to multiply a multi-digit number by a 1-digit number [Grade 4]	Core Skill

Grade 6

Number and Number Sense

VA 6.1 - The student will describe and compare data, using ratios, and will use appropriate notations, such as a/b , a to b , and $a:b$.

VA 6.2 - The student will

VA 6.2.a - The student will investigate and describe fractions, decimals, and percents as ratios;

Numbers and Operations	Determine a percent where a ratio, not in 100ths, is given in words [Grade 6]	Core Skill
	Determine if ratios, using whole numbers less than 50, are equivalent [Grade 6]	Core Skill

VA 6.2.b - The student will identify a given fraction, decimal, or percent from a representation;

Numbers and Operations	Identify a mixed number represented by a model [Grade 4]	
	Identify a mixed number represented by a point on a number line [Grade 4]	
	Identify an improper fraction represented by a model of a mixed number [Grade 4]	
	Identify a pictorial model of tenths or hundredths of a decimal number [Grade 4]	Core Skill
	Identify a decimal number to tenths represented by a point on a number line [Grade 4]	Core Skill
	Locate a decimal number to tenths on a number line [Grade 4]	Core Skill
	Determine the decimal number equivalent to a fraction model [Grade 4]	Core Skill
	Determine the fraction equivalent to a decimal number model [Grade 4]	Core Skill
	Determine a model of a percent on a 100 grid [Grade 5]	
	Determine the percent represented by a model on a 100 grid [Grade 5]	
	Relate an equivalent fraction and percent given a grid [Grade 5]	
	Relate an equivalent decimal and percent given a grid [Grade 5]	
	Determine the decimal number represented in expanded form using powers of ten [Grade 6]	Core Skill
	Determine the approximate percent of a region shaded [Grade 6]	

VA 6.2.c - The student will demonstrate equivalent relationships among fractions, decimals, and percents; and

Numbers and Operations	Determine equivalent fractions not in simplest form [Grade 5]	Core Skill
	Convert a mixed number to an improper fraction [Grade 5]	Core Skill
	Convert an improper fraction to a mixed number [Grade 5]	Core Skill
	Convert a decimal number through thousandths to a simplified fraction [Grade 5]	

Relate an equivalent fraction and percent given a grid [Grade 5]
Relate an equivalent decimal and percent given a grid [Grade 5]
Convert a mixed number to a decimal number [Grade 6]
Convert a decimal number to a mixed number [Grade 6]
Convert a fraction to a repeating decimal number [Grade 6]
Convert a decimal number to a percentage [Grade 6]
Convert a percentage to a decimal number [Grade 6]
Convert a fraction to a percentage [Grade 6]
Convert a percentage to a fraction [Grade 6]
Convert a decimal number to a percentage greater than 100% [Grade 7]
Convert a percentage to a decimal number greater than 1 [Grade 7]
Convert a decimal number in thousandths to a percentage [Grade 7]
Convert a percentage to a decimal number in thousandths [Grade 7]
Convert a mixed number to a percentage [Grade 7]
Convert a percentage to a mixed number [Grade 7]

VA 6.2.d - The student will compare and order fractions, decimals, and percents.

Numbers and Operations	Compare fractions with unlike denominators [Grade 5]	Core Skill
	Order fractions with unlike denominators in ascending or descending order [Grade 5]	Core Skill
	Compare decimal numbers to thousandths represented in expanded form [Grade 5]	
	Compare decimal numbers of differing places to thousandths [Grade 5]	Core Skill
	Order decimal numbers of differing places to thousandths in ascending or descending order [Grade 5]	Core Skill
	Compare numbers in decimal and fractional forms [Grade 6]	Core Skill
	Order numbers in decimal and fractional forms [Grade 6]	Core Skill

VA 6.3 - The student will**VA 6.3.a - The student will identify and represent integers;**

Numbers and Operations	Identify or locate an integer on a number line [Grade 6]
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VA 6.3.b - The student will order and compare integers; and

Numbers and Operations	Compare two negative integers or a negative integer and a positive integer [Grade 6]
	Order negative integers or a mix of positive and negative integers [Grade 6]

VA 6.3.c - The student will identify and describe absolute value of integers.

Numbers and Operations	Evaluate the absolute value of an integer [Grade 7]
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VA 6.4 - The student will demonstrate multiple representations of multiplication and division of fractions.

Numbers and Operations	Multiply a whole number by a unit fraction using a model [Grade 5]
	Multiply a proper fraction by a whole number using a model [Grade 5]
	Divide a whole number by a unit fraction using a model [Grade 5]
	Divide a whole number by a fraction, with a whole number quotient using a model [Grade 5]

VA 6.5 - The student will investigate and describe concepts of positive exponents and perfect squares.

Numbers and Operations	Determine the exponential notation that represents a repeated multiplication [Grade 7]
	Determine the repeated multiplication that is represented by a number raised to a power [Grade 7]
	Determine the whole number that can be squared to make a given number [Grade 7]
	Evaluate the positive square root of a perfect square [Grade 7]

Computation and Estimation

VA 6.6 - The student will

VA 6.6.a - The student will multiply and divide fractions and mixed numbers; and

Numbers and Operations	Multiply a whole number by a unit fraction using a model [Grade 5]	
	Multiply a whole number by a unit fraction [Grade 5]	
	Multiply a proper fraction by a whole number using a model [Grade 5]	
	Multiply a proper fraction by a whole number [Grade 5]	
	Divide a whole number by a unit fraction using a model [Grade 5]	
	Divide a whole number by a unit fraction [Grade 5]	
	Divide a unit fraction by a whole number [Grade 5]	
	Divide a whole number by a fraction, with a whole number quotient using a model [Grade 5]	
	Divide a whole number by a fraction, with a whole number quotient [Grade 5]	
	WP: Multiply or divide a whole number by a unit fraction [Grade 5]	
	Multiply a fraction by a fraction [Grade 6]	Core Skill
	Multiply a mixed number by a whole number [Grade 6]	Core Skill
	Multiply a mixed number by a fraction [Grade 6]	Core Skill
	Multiply a mixed number by a mixed number [Grade 6]	Core Skill
	Divide a fraction by a whole number resulting in a fractional quotient [Grade 6]	Core Skill
Divide a fraction by a fraction [Grade 6]	Core Skill	

	Divide a whole number by a fraction resulting in a fractional quotient [Grade 6]	Core Skill
	Divide a mixed number by a fraction [Grade 6]	
	Divide a mixed number by a mixed number [Grade 6]	
	WP: Multiply or divide a fraction by a fraction [Grade 6]	Core Skill
	WP: Multiply or divide two mixed numbers or a mixed number and a fraction [Grade 6]	Core Skill

VA 6.6.b - The student will estimate solutions and then solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of fractions.

Numbers and Operations	WP: Add or subtract fractions with like denominators and simplify the sum or difference [Grade 5]	Core Skill
	WP: Add or subtract fractions with unlike denominators that have no factors in common [Grade 5]	Core Skill
	WP: Add or subtract mixed numbers with like denominators and simplify the sum or difference [Grade 5]	Core Skill
	WP: Estimate a fraction sum or difference using benchmark numbers 0, $\frac{1}{2}$, and 1 [Grade 5]	
	WP: Add or subtract fractions with unlike denominators and simplify the sum or difference [Grade 6]	
	WP: Add or subtract mixed numbers with unlike denominators or a mixed number and a fraction with unlike denominators and simplify the sum or difference [Grade 6]	
	WP: Multiply or divide a fraction by a fraction [Grade 6]	Core Skill
	WP: Multiply or divide two mixed numbers or a mixed number and a fraction [Grade 6]	Core Skill
	WP: Solve a 2-step problem involving fractions [Grade 6]	Core Skill
	WP: Solve a multi-step problem involving fractions or mixed numbers [Grade 7]	Core Skill
	WP: Estimate the result of dividing or multiplying a whole number by a fraction [Grade 7]	

VA 6.7 - The student will solve single-step and multistep practical problems involving addition, subtraction, multiplication, and division of decimals.

Numbers and Operations	WP: Add or subtract decimal numbers through thousandths [Grade 5]	Core Skill
	WP: Add or subtract a decimal number through thousandths and a whole number [Grade 5]	Core Skill
	WP: Multiply a decimal number through thousandths by a whole number [Grade 6]	Core Skill
	WP: Divide a decimal number through thousandths by a 1- or 2-digit whole number [Grade 6]	Core Skill
	WP: Divide a whole number by a decimal number through thousandths, rounded quotient if needed [Grade 6]	Core Skill

	WP: Divide a decimal through thousandths by a decimal through thousandths, rounded quotient if needed [Grade 6]	Core Skill
	WP: Solve a 2-step problem involving decimals [Grade 6]	Core Skill
	WP: Solve a multi-step problem involving decimal numbers [Grade 7]	Core Skill

VA 6.8 - The student will evaluate whole number numerical expressions, using the order of operations.

Numbers and Operations	Evaluate a numerical expression involving three operations, with no parentheses, using order of operations [Grade 5]	
	Evaluate a numerical expression involving three operations, with parentheses, using order of operations [Grade 5]	
	Evaluate a numerical expression of four or more operations, with parentheses, using order of operations [Grade 6]	Core Skill

Measurement

VA 6.9 - The student will make ballpark comparisons between measurements in the U.S. Customary System of measurement and measurements in the metric system.

Geometry and Measurement	Determine approximate conversions between metric and customary units of length [Grade 7]	
	Determine approximate conversions between metric and customary units of capacity [Grade 7]	

VA 6.10 - The student will

VA 6.10.a - The student will define "pi" (π) as the ratio of the circumference of a circle to its diameter;

Geometry and Measurement	Determine the circumference of a circle using $22/7$ for π [Grade 6]	
	Determine the circumference of a circle using 3.14 for π [Grade 6]	
	Determine the circumference of a circle in terms of π [Grade 7]	

VA 6.10.b - The student will solve practical problems involving circumference and area of a circle, given the diameter or radius;

Geometry and Measurement	WP: Determine the circumference of a circle [Grade 6]	
	WP: Determine the area of a circle using 3.14 for π [Grade 7]	

VA 6.10.c - The student will solve practical problems involving area and perimeter; and

Geometry and Measurement	WP: Determine the area of a triangle [Grade 5]	Core Skill
	WP: Determine the area of a square or rectangle [Grade 5]	Core Skill
	WP: Determine a missing dimension given the area and another dimension [Grade 5]	Core Skill
	Determine the area of a complex shape [Grade 6]	Core Skill
	WP: Determine the perimeter or the area of a complex shape [Grade 6]	Core Skill
	WP: Determine the area of a circle using 3.14 for π [Grade 7]	

VA 6.10.d - The student will describe and determine the volume and surface area of a rectangular prism.

Geometry and Measurement	Determine the volume of a rectangular prism given a diagram [Grade 5]	Core Skill
	WP: Determine the volume of a rectangular prism given a diagram [Grade 5]	
	Determine the volume of a rectangular prism [Grade 5]	
	WP: Determine the volume of a rectangular prism [Grade 5]	Core Skill
	Determine the surface area of a cube or a rectangular prism given a net [Grade 5]	
	Determine the surface area of a rectangular prism [Grade 5]	Core Skill
	WP: Find the surface area of a rectangular prism [Grade 5]	Core Skill

Geometry

VA 6.11 - The student will

VA 6.11.a - The student will identify the coordinates of a point in a coordinate plane; and

Geometry and Measurement	Determine the ordered pair of a point in the first quadrant [Grade 5]
	Determine the ordered pair of a point in any quadrant [Grade 6]

VA 6.11.b - The student will graph ordered pairs in a coordinate plane.

Geometry and Measurement	Determine the location of an ordered pair in any quadrant [Grade 6]
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VA 6.12 - The student will determine congruence of segments, angles, and polygons.

Geometry and Measurement	Identify congruent shapes shown on a grid or within pattern block arrangements, with different orientations [Grade 6]
	Identify congruent shapes given side and angle measures [Grade 7]

VA 6.13 - The student will describe and identify properties of quadrilaterals.

Geometry and Measurement	Classify a quadrilateral [Grade 4]
	Know the properties of a triangle or a quadrilateral [Grade 6]

Probability and Statistics

VA 6.14 - The student, given a problem situation, will

VA 6.14.a - The student, given a problem situation, will construct circle graphs;

Data Analysis, Statistics, and Probability	Use a circle graph to represent percentage data [Grade 7]	Core Skill
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VA 6.14.b - The student, given a problem situation, will draw conclusions and make predictions, using circle graphs; and

Data Analysis, Statistics, and Probability	Answer a question using information from a circle graph using percentage calculations [Grade 7]	Core Skill
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VA 6.14.c - The student, given a problem situation, will compare and contrast graphs that present information from the same data set.

VA 6.15 - The student will

VA 6.15.a - The student will describe mean as balance point; and

VA 6.15.b - The student will decide which measure of center is appropriate for a given purpose.

VA 6.16 - The student will

VA 6.16.a - The student will compare and contrast dependent and independent events; and

VA 6.16.b - The student will determine probabilities for dependent and independent events.

Data Analysis, Statistics, and
Probability

Determine the probability for independent events [Grade 7]

Determine the probability for dependent events [Grade 7]

Patterns, Functions, and Algebra

VA 6.17 - The student will identify and extend geometric and arithmetic sequences.

Algebra

Identify a missing term in a multiplication or a division number
pattern [Grade 4]

Core Skill

VA 6.18 - The student will solve one-step linear equations in one variable involving whole number coefficients and positive rational solutions.

Algebra

Solve a 1-step addition or subtraction equation using a model
[Grade 4]

Solve a 1-step equation involving whole numbers [Grade 6]

Core Skill

VA 6.19 - The student will investigate and recognize

VA 6.19.a - The student will investigate and recognize the identity properties for addition and multiplication;

VA 6.19.b - The student will investigate and recognize the multiplicative property of zero; and

VA 6.19.c - The student will investigate and recognize the inverse property for multiplication.

VA 6.20 - The student will graph inequalities on a number line.

Algebra

Determine the graph of an inequality on a number line [Grade 7]

Grade 7**Number and Number Sense[Focus: Proportional Reasoning]****VA 7.1 - The student will****VA 7.1.a - The student will investigate and describe the concept of negative exponents for powers of ten;**

Numbers and Operations	Convert a number less than 1 to scientific notation [Grade 8]	Core Skill
	Convert a number less than 1 from scientific notation to standard form [Grade 8]	Core Skill

VA 7.1.b - The student will determine scientific notation for numbers greater than zero;

Numbers and Operations	Convert a whole number greater than 10 to scientific notation [Grade 7]	
	Convert a number less than 1 to scientific notation [Grade 8]	Core Skill
	Convert a number less than 1 from scientific notation to standard form [Grade 8]	Core Skill

VA 7.1.c - The student will compare and order fractions, decimals, percents, and numbers written in scientific notation;

Numbers and Operations	Compare numbers in decimal and fractional forms [Grade 6]	Core Skill
	Order numbers in decimal and fractional forms [Grade 6]	Core Skill
	Compare rational numbers (positive and negative) [Grade 7]	
	Order rational numbers (positive and negative) [Grade 7]	

VA 7.1.d - The student will determine square roots; and

Numbers and Operations	Evaluate the positive square root of a perfect square [Grade 7]	
	Determine the square root of a perfect-square fraction or decimal [Grade 8]	Core Skill
	Determine both square roots of a perfect square [Grade 8]	
	Determine the square root of a whole number to the nearest tenth [Grade 8]	

VA 7.1.e - The student will identify and describe absolute value for rational numbers.

Numbers and Operations	Evaluate the absolute value of an integer [Grade 7]	
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VA 7.2 - The student will describe and represent arithmetic and geometric sequences, using variable expressions.**Computation and Estimation[Focus: Integer Operations and Proportional Reasoning]****VA 7.3 - The student will****VA 7.3.a - The student will model addition, subtraction, multiplication, and division of integers; and**

Numbers and Operations	Add integers using a model [Grade 7]	
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VA 7.3.b - The student will add, subtract, multiply, and divide integers.

Numbers and Operations	Add integers [Grade 7]	Core Skill
	Subtract integers [Grade 7]	Core Skill

	WP: Add and subtract using integers [Grade 7]	Core Skill
	Multiply integers [Grade 7]	Core Skill
	Divide integers [Grade 7]	Core Skill
	WP: Multiply or divide integers [Grade 7]	Core Skill

VA 7.4 - The student will solve single-step and multistep practical problems, using proportional reasoning.

Numbers and Operations	WP: Determine a ratio using whole numbers less than 50 [Grade 6]	
	WP: Determine a part given a ratio and the whole where the whole is less than 50 [Grade 6]	Core Skill
	WP: Determine a part given a ratio and another part where the whole is less than 50 [Grade 6]	
	WP: Determine the whole given a ratio and a part where the whole is less than 50 [Grade 6]	Core Skill
	WP: Use a unit rate, with a whole number or whole cent value, to solve a problem [Grade 6]	Core Skill
	WP: Determine the ratio of two whole numbers, at least one of which is larger than 50 [Grade 7]	
	WP: Determine a part, given part to whole ratio and the whole, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine a part, given part to part ratio and the whole, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine a part, given part to whole ratio and a part, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine a part, given part to part ratio and a part, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine the whole, given part to whole ratio and a part, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine the whole, given part to part ratio and a part, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Use a unit rate to solve a problem [Grade 7]	Core Skill
Algebra	Solve a proportion involving decimals [Grade 7]	Core Skill
	WP: Solve a proportion [Grade 7]	Core Skill

Measurement[Focus: Proportional Reasoning]**VA 7.5 - The student will****VA 7.5.a - The student will describe volume and surface area of cylinders;**

Geometry and Measurement	Determine the volume of a cylinder [Grade 7]	
	Determine the surface area of a cylinder [Grade 7]	

VA 7.5.b - The student will solve practical problems involving the volume and surface area of rectangular prisms and cylinders; and

Geometry and Measurement	WP: Determine the volume of a rectangular prism given a diagram [Grade 5]	
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	WP: Determine the volume of a rectangular prism [Grade 5]	Core Skill
	WP: Find the surface area of a rectangular prism [Grade 5]	Core Skill
	WP: Determine the volume of a cylinder [Grade 7]	

VA 7.5.c - The student will describe how changing one measured attribute of a rectangular prism affects its volume and surface area.

VA 7.6 - The student will determine whether plane figures—quadrilaterals and triangles—are similar and write proportions to express the relationships between corresponding sides of similar figures.

Geometry and Measurement	Determine a missing dimension given two similar shapes [Grade 7]	Core Skill
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Geometry[Focus: Relationships between Figures]

VA 7.7 - The student will compare and contrast the following quadrilaterals based on properties: parallelogram, rectangle, square, rhombus, and trapezoid.

Geometry and Measurement	Know the properties of a triangle or a quadrilateral [Grade 6]	
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VA 7.8 - The student, given a polygon in the coordinate plane, will represent transformations (reflections, dilations, rotations, and translations) by graphing in the coordinate plane.

Geometry and Measurement	Determine the result of a reflection, a rotation, or a translation on the Cartesian plane [Grade 6]	
	Determine the transformation that generates the image of a figure in the Cartesian plane [Grade 6]	

Probability and Statistics[Focus: Applications of Statistics and Probability]

VA 7.9 - The student will investigate and describe the difference between the experimental probability and theoretical probability of an event.

Data Analysis, Statistics, and Probability	Compare predictions from experimental and theoretical probability [Grade 6]	
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VA 7.10 - The student will determine the probability of compound events, using the Fundamental (Basic) Counting Principle.

Data Analysis, Statistics, and Probability	Determine the probability for independent events [Grade 7]	
	Determine the probability for dependent events [Grade 7]	
	Make a prediction involving the probability of compound events [Grade 8]	

VA 7.11 - The student, given data for a practical situation, will

VA 7.11.a - The student, given data for a practical situation, will construct and analyze histograms; and

Data Analysis, Statistics, and Probability	Use a histogram to represent data [Grade 7]	Core Skill
	Answer a question using information from a histogram [Grade 7]	Core Skill

VA 7.11.b - The student, given data for a practical situation, will compare and contrast histograms with other types of graphs presenting information from the same data set.

Patterns, Functions, and Algebra[Focus: Linear Equations]

VA 7.12 - The student will represent relationships with tables, graphs, rules, and words.

Algebra	WP: Use a 2-variable equation to represent a situation involving a direct proportion [Grade 6]	Core Skill
	WP: Use a 2-variable linear equation to represent a situation [Grade 6]	Core Skill
	WP: Generate a table of paired numbers based on a variable expression with two operations [Grade 6]	
	Use a 2-variable equation to construct an input-output table [Grade 6]	Core Skill
	Use a 2-variable equation to represent a relationship expressed in a table [Grade 6]	Core Skill
	WP: Use a 1-variable 1-step equation to represent a situation [Grade 7]	Core Skill
	Use a table to represent a linear function [Grade 7]	
	Determine the graph of a 1-operation linear function [Grade 7]	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
	Determine the graph of a line for a given table of values [Grade 8]	
	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
	WP: Determine a linear graph that can represent a situation [Grade 8]	
	WP: Determine a graph that can represent a situation involving a varying rate of change [Grade 8]	

VA 7.13 - The student will**VA 7.13.a - The student will write verbal expressions as algebraic expressions and sentences as equations and vice versa; and**

Algebra	Use a variable expression with two operations to represent a verbal expression [Grade 6]	
	Use a verbal expression to represent a variable expression with two operations [Grade 6]	
	WP: Use a variable expression with two operations to represent a situation [Grade 6]	
	WP: Use a 2-variable expression to represent a situation [Grade 7]	

VA 7.13.b - The student will evaluate algebraic expressions for given replacement values of the variables.

Algebra	Evaluate a 1-variable expression, with two or three operations, using whole number substitution [Grade 6]	
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	Evaluate a 2-variable expression, with two or three operations, using whole number substitution [Grade 6]	Core Skill
	WP: Evaluate a 1- or 2-variable expression or formula using whole numbers [Grade 6]	Core Skill
	Evaluate a rational expression involving variables with two or more terms in the numerator or denominator [Grade 7]	
	Evaluate a 1-variable expression, with two or three operations, using integer substitution [Grade 7]	
	Evaluate a 2-variable expression, with two or three operations, using integer substitution [Grade 7]	Core Skill
	Evaluate an algebraic expression involving whole number exponents [Grade 7]	
	WP: Evaluate a variable expression [Grade 7]	
	WP: Evaluate a variable expression involving exponents [Grade 7]	
	Evaluate a 2-variable expression with two or three operations substituting fractions or decimals [Grade 8]	
	Evaluate an algebraic expression involving negative integer exponents [Grade 8]	

VA 7.14 - The student will**VA 7.14.a - The student will solve one- and two-step linear equations in one variable; and**

Algebra	Solve a 1-step equation involving whole numbers [Grade 6]	Core Skill
	Solve a 1-step linear equation involving integers [Grade 7]	Core Skill
	Solve a 2-step linear equation involving integers [Grade 7]	Core Skill
	Solve a 1-step equation involving rational numbers [Grade 8]	Core Skill
	Solve a 2-step equation involving rational numbers [Grade 8]	Core Skill

VA 7.14.b - The student will solve practical problems requiring the solution of one- and two-step linear equations.

Algebra	WP: Solve a problem involving a 1-variable, 2-step equation [Grade 8]	Core Skill
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VA 7.15 - The student will**VA 7.15.a - The student will solve one-step inequalities in one variable; and**

Algebra	Solve a 1-step linear inequality [Grade 7]	
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VA 7.15.b - The student will graph solutions to inequalities on the number line.

Algebra	Determine the graph of the solution set of a 1-step linear inequality [Grade 7]	
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VA 7.16 - The student will apply the following properties of operations with real numbers:**VA 7.16.a - The student will apply the following properties of operations with real numbers: the commutative and associative properties for addition and multiplication;**

VA 7.16.b - The student will apply the following properties of operations with real numbers: the distributive property;

Algebra

Use the distributive property to simplify an algebraic expression
[Grade 8]

VA 7.16.c - The student will apply the following properties of operations with real numbers: the additive and multiplicative identity properties;

VA 7.16.d - The student will apply the following properties of operations with real numbers: the additive and multiplicative inverse properties; and

VA 7.16.e - The student will apply the following properties of operations with real numbers: the multiplicative property of zero.

Grade 8

Number and Number Sense

VA 8.1 - The student will

VA 8.1.a - The student will simplify numerical expressions involving positive exponents, using rational numbers, order of operations, and properties of operations with real numbers; and

Numbers and Operations	Evaluate a numerical expression, with parentheses and exponents, using order of operations [Grade 7]	
	Evaluate an integer raised to a whole number power [Grade 8]	Core Skill

VA 8.1.b - The student will compare and order decimals, fractions, percents, and numbers written in scientific notation.

Numbers and Operations	Compare rational numbers (positive and negative) [Grade 7]	
	Order rational numbers (positive and negative) [Grade 7]	

VA 8.2 - The student will describe orally and in writing the relationships between the subsets of the real number system.

Computation and Estimation

VA 8.3 - The student will

VA 8.3.a - The student will solve practical problems involving rational numbers, percents, ratios, and proportions; and

Numbers and Operations	WP: Determine a percent of a whole number using less than 100% [Grade 7]	Core Skill
	WP: Determine the percent a whole number is of another whole number, with a result less than 100% [Grade 7]	Core Skill
	WP: Determine a whole number given a part and a percentage [Grade 7]	Core Skill
	WP: Determine the percent of decrease applied to a number [Grade 7]	Core Skill
	WP: Determine the percent of increase applied to a number [Grade 7]	Core Skill
	WP: Determine the result of applying a percent of decrease to a value [Grade 7]	Core Skill
	WP: Determine the result of applying a percent of increase to a value [Grade 7]	Core Skill
	WP: Answer a question involving a fraction and a percent [Grade 7]	Core Skill
	WP: Answer a question involving a fraction and a decimal [Grade 7]	
	WP: Solve a multi-step problem involving decimal numbers [Grade 7]	Core Skill
	WP: Solve a multi-step problem involving fractions or mixed numbers [Grade 7]	Core Skill

	WP: Determine the ratio of two whole numbers, at least one of which is larger than 50 [Grade 7]	
	WP: Determine a part, given part to whole ratio and the whole, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine a part, given part to part ratio and the whole, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine a part, given part to whole ratio and a part, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine a part, given part to part ratio and a part, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine the whole, given part to whole ratio and a part, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine the whole, given part to part ratio and a part, where the whole is greater than 50 [Grade 7]	Core Skill
	WP: Determine a unit rate [Grade 7]	Core Skill
	WP: Use a unit rate to solve a problem [Grade 7]	Core Skill
	Determine a percent of a number given a percent that is not a whole percent [Grade 8]	Core Skill
	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
	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

VA 8.3.b - The student will determine the percent increase or decrease for a given situation.

Numbers and Operations	WP: Determine the percent of decrease applied to a number [Grade 7]	Core Skill
	WP: Determine the percent of increase applied to a number [Grade 7]	Core Skill

VA 8.4 - The student will apply the order of operations to evaluate algebraic expressions for given replacement values of the variables.

Algebra	Evaluate a 2-variable expression, with two or three operations, using integer substitution [Grade 7]	Core Skill
	Evaluate an algebraic expression involving whole number exponents [Grade 7]	
	Evaluate an algebraic expression involving negative integer exponents [Grade 8]	

VA 8.5 - The student will

VA 8.5.a - The student will determine whether a given number is a perfect square; and

Numbers and Operations	Evaluate the positive square root of a perfect square [Grade 7]	
	Determine the square root of a perfect-square fraction or decimal [Grade 8]	Core Skill
	Determine both square roots of a perfect square [Grade 8]	

VA 8.5.b - The student will find the two consecutive whole numbers between which a square root lies.

Numbers and Operations	Determine the two closest integers to a given square root [Grade 8]	Core Skill
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Measurement

VA 8.6 - The student will

VA 8.6.a - The student will verify by measuring and describe the relationships among vertical angles, adjacent angles, supplementary angles, and complementary angles; and

Geometry and Measurement	Identify vertical, adjacent, complementary, or supplementary angles [Grade 7]	
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VA 8.6.b - The student will measure angles of less than 360°.

VA 8.7 - The student will

VA 8.7.a - The student will investigate and solve practical problems involving volume and surface area of prisms, cylinders, cones, and pyramids; and

Geometry and Measurement	WP: Solve a problem involving the volume of a geometric solid [Grade 7]	Core Skill
	WP: Determine the surface area of a geometric solid [Grade 7]	Core Skill
	WP: Determine the volume of a pyramid or a cone [Grade 8]	
	WP: Determine the surface area of a pyramid or a cone [Grade 8]	

VA 8.7.b - The student will describe how changing one measured attribute of a figure affects the volume and surface area.

Geometry

VA 8.8 - The student will

VA 8.8.a - The student will apply transformations to plane figures; and

Geometry and Measurement	Determine the result of a reflection, a rotation, or a translation on the Cartesian plane [Grade 6]	
	Determine the transformation that generates the image of a figure in the Cartesian plane [Grade 6]	
	Determine the coordinates of a translated, a rotated, or a reflected shape on the Cartesian plane [Grade 7]	

VA 8.8.b - The student will identify applications of transformations.

VA 8.9 - The student will construct a three-dimensional model, given the top or bottom, side, and front views.

Geometry and Measurement	Relate a 3-dimensional shape to its top and side views [Grade 7]	
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VA 8.10 - The student will**VA 8.10.a - The student will verify the Pythagorean Theorem; and****VA 8.10.b - The student will apply the Pythagorean Theorem.**

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 a distance on the Cartesian plane using the Pythagorean theorem [Grade 8]	
	Determine if a triangle is a right triangle by using the Pythagorean theorem [Grade 8]	

VA 8.11 - The student will solve practical area and perimeter problems involving composite plane figures.

Geometry and Measurement	Determine the area of a complex shape [Grade 6]	Core Skill
	WP: Determine the perimeter or the area of a complex shape [Grade 6]	Core Skill

Probability and Statistics**VA 8.12 - The student will determine the probability of independent and dependent events with and without replacement.**

Data Analysis, Statistics, and Probability	Determine the probability for independent events [Grade 7]	
	Determine the probability for dependent events [Grade 7]	
	Determine the probability of three or more independent events [Grade 8]	
	Determine the probability of three or more dependent events [Grade 8]	

VA 8.13 - The student will**VA 8.13.a - The student will make comparisons, predictions, and inferences, using information displayed in graphs; and**

Data Analysis, Statistics, and Probability	Answer a question using information from a circle graph using percentage calculations [Grade 7]	Core Skill
	Answer a question using information from a histogram [Grade 7]	Core Skill
	Answer a question using information from a double stem-and-leaf plot [Grade 7]	
	Answer a question using information from a Venn diagram containing summarized data [Grade 7]	
	Answer a question using information from a scatter plot [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]

Answer a question using information from a Venn diagram with three circles [Grade 8]

VA 8.13.b - The student will construct and analyze scatterplots.

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]

Patterns, Functions, and Algebra

VA 8.14 - The student will make connections between any two representations (tables, graphs, words, and rules) of a given relationship.

Algebra	WP: Use a 1-variable 1-step equation to represent a situation [Grade 7]	Core Skill
	Use a table to represent a linear function [Grade 7]	
	Use a graph to represent the ordered pairs in a function table [Grade 7]	
	Determine the graph of a 1-operation linear function [Grade 7]	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
	Determine the graph of a line for a given table of values [Grade 8]	
	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
	WP: Determine a linear graph that can represent a situation [Grade 8]	
	WP: Determine a graph that can represent a situation involving a varying rate of change [Grade 8]	

VA 8.15 - The student will

VA 8.15.a - The student will solve multistep linear equations in one variable with the variable on one and two sides of the equation;

Algebra	Solve a 2-step linear equation involving integers [Grade 7]	Core Skill
	Solve a 2-step equation involving rational numbers [Grade 8]	Core Skill

	WP: Solve a problem involving a 1-variable, 2-step equation [Grade 8]	Core Skill
	Solve a 1-variable linear equation with the variable on both sides [Algebra 1]	Core Skill

VA 8.15.b - The student will solve two-step linear inequalities and graph the results on a number line; and

Algebra	Solve a 2-step linear inequality in one variable [Grade 8]	Core Skill
	WP: Solve a problem involving a 2-step linear inequality in one variable [Grade 8]	Core Skill
	Determine the graph of the solutions to a 2-step linear inequality in one variable [Grade 8]	Core Skill

VA 8.15.c - The student will identify properties of operations used to solve an equation.

VA 8.16 - The student will graph a linear equation in two variables.

Algebra	Determine the graph of a 1-operation linear function [Grade 7]	Core Skill
	Determine the graph of a 2-operation linear function [Grade 8]	Core Skill

VA 8.17 - The student will identify the domain, range, independent variable, or dependent variable in a given situation.

Algebra	WP: Determine a reasonable domain or range for a function in a given situation [Algebra 1]	Core Skill
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Algebra**Algebra and Functions**

VA AFDA.1 - The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include

VA AFDA.1.a - The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include continuity;

VA AFDA.1.b - The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include local and absolute maxima and minima;

VA AFDA.1.c - The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include domain and range;

Algebra	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
	Identify the domain, range, asymptotes, or intercepts of a logarithmic function [Algebra 2]	

VA AFDA.1.d - The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include zeros;

Algebra	Solve a quadratic equation by graphing the associated quadratic function [Algebra 1]	
	Solve a quadratic equation by taking the square root [Algebra 1]	
	Solve a quadratic equation by factoring [Algebra 1]	Core Skill
	Solve a quadratic equation using the quadratic formula [Algebra 1]	Core Skill
	Identify the end behavior, the intercepts, or the zeros of a polynomial function [Algebra 2]	Core Skill
	Solve an exponential equation using the properties of exponents [Algebra 2]	
	Solve an exponential equation using logarithms [Algebra 2]	Core Skill
	Solve a logarithmic equation [Algebra 2]	Core Skill

VA AFDA.1.e - The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include intercepts;

Algebra	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 AFDA.1.f - The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include intervals in which the function is increasing/decreasing;

VA AFDA.1.g - The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include end behaviors; and

VA AFDA.1.h - The student will investigate and analyze function (linear, quadratic, exponential, and logarithmic) families and their characteristics. Key concepts include asymptotes.

Algebra	Identify the asymptotes, growth or decay, or half-life of an exponential function [Algebra 2]	
	Identify the domain, range, asymptotes, or intercepts of a logarithmic function [Algebra 2]	

VA AFDA.2 - The student will use knowledge of transformations to write an equation, given the graph of a function (linear, quadratic, exponential, and logarithmic).

Algebra	Determine an equation that represents a graphed line [Algebra 1]	Core Skill
	Determine the equation of a function resulting from a translation and/or scaling of a given function [Algebra 2]	Core Skill
	Determine the resulting change in a linear function, $f(x)$, when replacing x with $x + b$, where b is an integer [Algebra 2]	

VA AFDA.3 - The student will collect data and generate an equation for the curve (linear, quadratic, exponential, and logarithmic) of best fit to model real-world problems or applications. Students will use the best fit equation to interpolate function values, make decisions, and justify conclusions with algebraic and/or graphical models.

Data Analysis, Statistics, and Probability	Use a scatter plot to organize data [Grade 8]	
	Approximate a trend line for a scatter plot [Grade 8]	

VA AFDA.4 - The student will transfer between and analyze multiple representations of functions, including algebraic formulas, graphs, tables, and words. Students will select and use appropriate representations for analysis, interpretation, and prediction.

Algebra	WP: Use a 2-variable equation with rational coefficients to represent a situation [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 linear equation given in slope-intercept, point-slope, or standard form [Algebra 1]	Core Skill
	Determine the graph of a given quadratic function [Algebra 1]	Core Skill

VA AFDA.5 - The student will determine optimal values in problem situations by identifying constraints and using linear programming techniques.

Algebra	WP: Solve a linear programming problem [Algebra 2]	
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Data Analysis

VA AFDA.6 - The student will calculate probabilities. Key concepts include

VA AFDA.6.a - The student will calculate probabilities. Key concepts include conditional probability;

VA AFDA.6.b - The student will 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]
	Determine the probability of three or more dependent events [Grade 8]

VA AFDA.6.c - The student will calculate probabilities. Key concepts include addition and multiplication rules;

Data Analysis, Statistics, and Probability	Determine the probability of an event consisting of mutually exclusive events [Grade 8]
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VA AFDA.6.d - The student will 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 AFDA.6.e - The student will calculate probabilities. Key concepts include Law of Large Numbers.

VA AFDA.7 - The student will analyze the normal distribution. Key concepts include

VA AFDA.7.a - The student will analyze the normal distribution. Key concepts include characteristics of normally distributed data;

VA AFDA.7.b - The student will analyze the normal distribution. Key concepts include percentiles;

VA AFDA.7.c - The student will analyze the normal distribution. Key concepts include normalizing data, using z-scores; and

VA AFDA.7.d - The student will analyze the normal distribution. Key concepts include area under the standard normal curve and probability.

VA AFDA.8 - The student will design and conduct an experiment/survey. Key concepts include

VA AFDA.8.a - The student will design and conduct an experiment/survey. Key concepts include sample size;

VA AFDA.8.b - The student will 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 AFDA.8.c - The student will 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 AFDA.8.d - The student will design and conduct an experiment/survey. Key concepts include data collection; and

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 AFDA.8.e - The student will design and conduct an experiment/survey. Key concepts include data analysis and reporting.

Data Analysis, Statistics, and Probability	Use a circle graph to organize data [Grade 8]
	Use a scatter plot to organize data [Grade 8]
	Use a box-and-whisker plot to organize data [Grade 8]
	Use a Venn diagram to organize summarized data [Grade 8]

Algebra 2**Expressions and Operations****VA AII.1 - The student, given rational, radical, or polynomial expressions, will****VA AII.1.a - The student, given rational, radical, or polynomial expressions, will 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]	
	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 AII.1.b - The student, given rational, radical, or polynomial expressions, will add, subtract, multiply, divide, and simplify radical expressions containing rational numbers and variables, and expressions containing rational exponents;

Algebra	Multiply monomial numerical expressions involving radicals [Algebra 1]	
	Divide monomial numerical expressions involving radicals [Algebra 1]	
	Add and/or subtract numerical radical expressions [Algebra 1]	
	Simplify a monomial algebraic radical expression [Algebra 1]	Core Skill
	Add or subtract algebraic radical expressions [Algebra 1]	
	Multiply monomial algebraic radical expressions [Algebra 1]	
	Divide monomial algebraic radical expressions [Algebra 1]	

VA AII.1.c - The student, given rational, radical, or polynomial expressions, will write radical expressions as expressions containing rational exponents and vice versa; and

Algebra	Simplify a monomial algebraic expression that includes fractional exponents and/or nth roots [Algebra 2]	
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VA AII.1.d - The student, given rational, radical, or polynomial expressions, will factor polynomials completely.

Algebra	Factor the GCF from a polynomial expression [Algebra 1]	Core Skill
	Factor trinomials that result in factors of the form $(x +/- a)(x +/- b)$ [Algebra 1]	
	Factor trinomials that result in factors of the form $(ax +/- b)(cx +/- d)$ [Algebra 1]	Core Skill
	Factor trinomials that result in factors of the form $(ax +/- by)(cx +/- dy)$ [Algebra 1]	

	Factor the difference of two squares [Algebra 1]	
	Factor a perfect-square trinomial [Algebra 1]	
	Factor a polynomial that has a GCF and two linear binomial factors [Algebra 1]	
	Solve a quadratic equation by factoring [Algebra 1]	Core Skill

VA AII.2 - The student will 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 n th term, and evaluating summation formulas. Notation will include "Sigma" and a subscript n .

Algebra	Find a specific term of an arithmetic sequence [Algebra 2]	
	Determine the recursive formula for an arithmetic sequence [Algebra 2]	
	Determine the explicit formula for an arithmetic sequence [Algebra 2]	
	Find the sum of a finite arithmetic series [Algebra 2]	
	WP: Solve a problem that can be represented by an arithmetic sequence [Algebra 2]	
	WP: Solve a problem that can be represented by a finite arithmetic series [Algebra 2]	
	Find a specific term of a geometric sequence [Algebra 2]	
	Determine the common ratio for a geometric sequence [Algebra 2]	
	Determine the recursive formula for a geometric sequence [Algebra 2]	
	Determine the explicit formula for a geometric sequence [Algebra 2]	
	Find the sum of a finite geometric series [Algebra 2]	Core Skill
	Find the sum of a finite geometric series given in summation notation [Algebra 2]	
	Find the sum of an infinite geometric series if it exists [Algebra 2]	
	WP: Solve a problem that can be represented by a geometric sequence [Algebra 2]	Core Skill
	WP: Solve a problem that can be represented by a finite geometric series [Algebra 2]	Core Skill

VA AII.3 - The student will 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.

Algebra	Solve a quadratic equation with complex solutions [Algebra 2]	Core Skill
	Determine the absolute value of a complex number [Algebra 2]	
	Add or subtract complex numbers [Algebra 2]	
	Multiply complex numbers [Algebra 2]	
	Simplify an expression involving a complex denominator [Algebra 2]	Core Skill

Equations and Inequalities

VA AII.4 - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically,

VA AII.4.a - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically, absolute value equations and inequalities;

Algebra	Determine the graph of a 2-variable absolute value equation [Algebra 1]	
	Solve a 1-variable absolute value inequality [Algebra 1]	Core Skill
	Determine the graph of a 1-variable absolute value inequality [Algebra 1]	

VA AII.4.b - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically, quadratic equations over the set of complex numbers;

Algebra	Determine the graph of a given quadratic function [Algebra 1]	Core Skill
	Solve a quadratic equation by graphing the associated quadratic function [Algebra 1]	
	Solve a quadratic equation by taking the square root [Algebra 1]	
	Solve a quadratic equation by factoring [Algebra 1]	Core Skill
	Solve a quadratic equation using the quadratic formula [Algebra 1]	Core Skill
	Solve a radical equation that leads to a quadratic equation [Algebra 1]	Core Skill
	Solve a quadratic equation with complex solutions [Algebra 2]	Core Skill

VA AII.4.c - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically, equations containing rational algebraic expressions; and

Algebra	Simplify a rational expression involving polynomial terms [Algebra 1]	Core Skill
	Solve a rational equation involving terms with monomial denominators [Algebra 1]	Core Skill
	Solve a rational equation involving terms with polynomial denominators [Algebra 1]	Core Skill
	Determine the graph of a rational function [Algebra 1]	
	WP: Solve a problem involving a rational equation [Algebra 1]	

VA AII.4.d - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically, equations containing radical expressions.

VA AII.5 - The student will solve nonlinear systems of equations, including linear-quadratic and quadratic-quadratic, algebraically and graphically. Graphing calculators will be used as a tool to visualize graphs and predict the number of solutions.

Algebra	Solve a system of linear equations in two variables by graphing [Algebra 1]	
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	Solve a system of linear equations in two variables by substitution [Algebra 1]	
	Solve a system of linear equations in two variables by elimination [Algebra 1]	
	Solve a system consisting of a linear equation and a nonlinear equation in two variables [Algebra 2]	Core Skill

Functions

VA AII.6 - The student will recognize the general shape of function (absolute value, square root, cube root, rational, polynomial, exponential, and logarithmic) families and will convert between graphic and symbolic forms of functions. A transformational approach to graphing will be employed. Graphing calculators will be used as a tool to investigate the shapes and behaviors of these functions.

Algebra	Determine the graph of a 2-variable absolute value equation [Algebra 1]	
	Determine the graph of a rational function [Algebra 1]	
	Relate a graph to a polynomial function given in factored form [Algebra 2]	Core Skill
	Identify the end behavior, the intercepts, or the zeros of a polynomial function [Algebra 2]	Core Skill
	Relate a graph to a square or cube root function [Algebra 2]	
	Determine an exponential function that represents a graph [Algebra 2]	
	Relate a logarithmic function to its graph [Algebra 2]	

VA AII.7 - Graphing calculators will be used as a tool to assist in investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include

VA AII.7.a - Graphing calculators will be used as a tool to assist in investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include domain and range, including limited and discontinuous domains and ranges;

Algebra	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 AII.7.b - Graphing calculators will be used as a tool to assist in investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include zeros;

Algebra	Identify the end behavior, the intercepts, or the zeros of a polynomial function [Algebra 2]	Core Skill
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VA AII.7.c - Graphing calculators will be used as a tool to assist in investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include x- and y-intercepts;

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

	Identify the end behavior, the intercepts, or the zeros of a polynomial function [Algebra 2]	Core Skill
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VA AII.7.d - Graphing calculators will be used as a tool to assist in investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include intervals in which a function is increasing or decreasing;

VA AII.7.e - Graphing calculators will be used as a tool to assist in investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include asymptotes;

Algebra	Identify the end behavior, asymptotes, excluded values, or behavior near excluded values of a rational function [Algebra 2]	Core Skill
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VA AII.7.f - Graphing calculators will be used as a tool to assist in investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include end behavior;

Algebra	Identify the end behavior, asymptotes, excluded values, or behavior near excluded values of a rational function [Algebra 2]	Core Skill
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VA AII.7.g - Graphing calculators will be used as a tool to assist in investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include inverse of a function; and

Algebra	Determine values of the inverse of a function using a table or a graph [Algebra 2]	
	Determine the graph of the inverse of a function [Algebra 2]	

VA AII.7.h - Graphing calculators will be used as a tool to assist in investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include composition of multiple functions.

Algebra	Determine the composition of two functions [Algebra 2]	
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VA AII.8 - The student will 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.

Algebra	Identify the end behavior, the intercepts, or the zeros of a polynomial function [Algebra 2]	Core Skill
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Statistics

VA AII.9 - The student will 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.

VA AII.10 - The student will identify, create, and solve real-world problems involving inverse variation, joint variation, and a combination of direct and inverse variations.

Algebra	Determine if a table or an equation represents a direct variation, an inverse variation, or neither [Algebra 1]	
	WP: Determine an equation representing a direct variation or an inverse variation [Algebra 1]	
	WP: Solve a direct- or inverse-variation problem [Algebra 1]	

VA AII.11 - The student will identify properties of a normal distribution and apply those properties to determine probabilities associated with areas under the standard normal curve.

VA AII.12 - The student will compute and distinguish between permutations and combinations and use technology for applications.

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]

Algebra I**Expressions and Operations**

VA A.1 - The student will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables.

Algebra	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
	Determine if an ordered pair is a solution to a 2-variable linear inequality [Algebra 1]	

VA A.2 - The student will perform operations on polynomials, including

VA A.2.a - The student will perform operations on polynomials, including applying the laws of exponents to perform operations on expressions;

Algebra	Apply the product of powers property to a monomial numerical expression [Algebra 1]	
	Apply the product of powers property to a monomial algebraic expression [Algebra 1]	Core Skill
	Apply the power of a power property to a monomial numerical expression [Algebra 1]	
	Apply the power of a power property to a monomial algebraic expression [Algebra 1]	Core Skill
	Apply the power of a product property to a monomial algebraic expression [Algebra 1]	Core Skill
	Apply the quotient of powers property to monomial numerical expressions [Algebra 1]	
	Apply the quotient of powers property to monomial algebraic expressions [Algebra 1]	Core Skill
	Apply the power of a quotient property to monomial algebraic expressions [Algebra 1]	Core Skill
	Apply properties of exponents to monomial algebraic expressions [Algebra 1]	

VA A.2.b - The student will perform operations on polynomials, including adding, subtracting, multiplying, and dividing polynomials; and

Algebra	Add polynomial expressions [Algebra 1]	Core Skill
	Subtract polynomial expressions [Algebra 1]	Core Skill
	Multiply a polynomial by a monomial [Algebra 1]	
	Multiply two binomials of the form $(x \pm a)(x \pm b)$ [Algebra 1]	
	Multiply two binomials of the form $(ax \pm b)(cx \pm d)$ [Algebra 1]	Core Skill
	Multiply two binomials of the form $(ax \pm by)(cx \pm dy)$ [Algebra 1]	
	Square a binomial [Algebra 1]	

	Multiply two nonlinear binomials [Algebra 1]	
	Multiply a trinomial by a binomial [Algebra 1]	
	Divide a polynomial expression by a monomial [Algebra 1]	Core Skill
	Divide a polynomial expression by a binomial [Algebra 1]	

VA A.2.c - The student will perform operations on polynomials, including factoring completely first- and second-degree binomials and trinomials in one or two variables. Graphing calculators will be used as a tool for factoring and for confirming algebraic factorizations.

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

VA A.3 - The student will express the square roots and cube roots of whole numbers and the square root of a monomial algebraic expression in simplest radical form.

Numbers and Operations	Determine both square roots of a perfect square [Grade 8]	
	Determine the two closest integers to a given square root [Grade 8]	Core Skill
	Determine the square root of a whole number to the nearest tenth [Grade 8]	
Algebra	Simplify a monomial numerical expression involving the square root of a whole number [Algebra 1]	Core Skill
	Simplify a monomial algebraic radical expression [Algebra 1]	Core Skill

Equations and Inequalities

VA A.4 - Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions. The student will solve multistep linear and quadratic equations in two variables, including

VA A.4.a - Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions. The student will solve multistep linear and quadratic equations in two variables, including solving literal equations (formulas) for a given variable;

Algebra	Rewrite an equation to solve for a specified variable [Algebra 1]	Core Skill
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VA A.4.b - Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions. The student will solve multistep linear and quadratic equations in two variables, including justifying steps used in simplifying expressions and solving equations, using field properties and axioms of equality that are valid for the set of real numbers and its subsets;

Algebra	Solve a 1-variable linear equation with the variable on both sides [Algebra 1]	Core Skill
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VA A.4.c - Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions. The student will solve multistep linear and quadratic equations in two variables, including solving quadratic equations algebraically and graphically;

Algebra	Determine the graph of a given quadratic function [Algebra 1]	Core Skill
	Solve a quadratic equation by graphing the associated quadratic function [Algebra 1]	
	Solve a quadratic equation by taking the square root [Algebra 1]	
	Solve a quadratic equation by factoring [Algebra 1]	Core Skill
	Solve a quadratic equation using the quadratic formula [Algebra 1]	Core Skill

VA A.4.d - Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions. The student will solve multistep linear and quadratic equations in two variables, including solving multistep linear equations algebraically and graphically;

Algebra	Determine the graph of a 2-operation linear function [Grade 8]	Core Skill
	Solve a 1-variable linear equation that requires simplification and has the variable on one side [Algebra 1]	
	Solve a 1-variable linear equation with the variable on both sides [Algebra 1]	Core Skill

VA A.4.e - Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions. The student will solve multistep linear and quadratic equations in two variables, including solving systems of two linear equations in two variables algebraically and graphically; and

Algebra	Solve a system of linear equations in two variables by graphing [Algebra 1]	
	Solve a system of linear equations in two variables by substitution [Algebra 1]	
	Solve a system of linear equations in two variables by elimination [Algebra 1]	
	Solve a system of linear equations in two variables using any method [Algebra 1]	Core Skill

VA A.4.f - Graphing calculators will be used both as a primary tool in solving problems and to verify algebraic solutions. The student will solve multistep linear and quadratic equations in two variables, including solving real-world problems involving equations and systems of equations.

Algebra	WP: Solve a problem involving a 1-variable, 2-step equation [Grade 8]	Core Skill
	WP: Solve a direct- or inverse-variation problem [Algebra 1]	
	WP: Solve a mixture problem that can be represented by a system of linear equations [Algebra 1]	

	WP: Solve a motion problem that can be represented by a system of linear equations [Algebra 1]	
	WP: Answer a question using the graph of a quadratic function [Algebra 1]	Core Skill

VA A.5 - The student will solve multistep linear inequalities in two variables, including

VA A.5.a - The student will solve multistep linear inequalities in two variables, including solving multistep linear inequalities algebraically and graphically;

Algebra	Solve a 1-variable linear inequality with the variable on both sides [Algebra 1]	Core Skill
	Solve a 2-variable linear inequality for the dependent variable [Algebra 1]	
	Determine the graph of a 2-variable linear inequality [Algebra 1]	
	Determine the graph of the solutions to a problem that can be described by a 2-variable linear inequality [Algebra 1]	

VA A.5.b - The student will solve multistep linear inequalities in two variables, including justifying steps used in solving inequalities, using axioms of inequality and properties of order that are valid for the set of real numbers and its subsets;

VA A.5.c - The student will solve multistep linear inequalities in two variables, including solving real-world problems involving inequalities; and

Algebra	WP: Solve a problem involving a 2-step linear inequality in one variable [Grade 8]	Core Skill
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VA A.5.d - The student will solve multistep linear inequalities in two variables, including solving systems of inequalities.

Algebra	Determine if a given ordered pair is a solution to a system of linear inequalities [Algebra 1]	
	Determine the graph of the solution set of a system of linear inequalities in two variables [Algebra 1]	
	WP: Determine possible solutions to a problem that can be represented by a system of linear inequalities [Algebra 1]	

VA A.6 - The student will graph linear equations and linear inequalities in two variables, including

VA A.6.a - The student will 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. Slope will be described as rate of change and will be positive, negative, zero, or undefined; and

Algebra	Determine the slope of a line given two points on the line [Algebra 1]	Core Skill
	Determine the slope of a line given an equation of the line [Algebra 1]	Core Skill

VA A.6.b - The student will 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 an equation of a line given the slope and y-intercept of the line [Algebra 1]	Core Skill
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	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

Functions

VA A.7 - The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including

VA A.7.a - The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including determining whether a relation is a function;

Algebra	Determine if a relation is a function [Algebra 1]	
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VA A.7.b - The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including domain and range;

Algebra	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 A.7.c - The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including zeros of a function;

VA A.7.d - The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including x- and y-intercepts;

Algebra	Determine the x- or y-intercept of a line given an equation [Algebra 1]	Core Skill
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VA A.7.e - The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including 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 A.7.f - The student will investigate and analyze function (linear and quadratic) families and their characteristics both algebraically and graphically, including making connections between and among multiple representations of functions including concrete, verbal, numeric, graphic, and algebraic.

Algebra	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
	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 whether a graph or a table represents a linear or nonlinear function [Algebra 1]	

	Determine the graph of a linear equation given in slope-intercept, point-slope, or standard form [Algebra 1]	Core Skill
	Determine the graph of a given quadratic function [Algebra 1]	Core Skill
	Determine the graph of an exponential function [Algebra 1]	

VA A.8 - The student, given a situation in a real-world context, will analyze a relation to determine whether a direct or inverse variation exists, and represent a direct variation algebraically and graphically and an inverse variation algebraically.

Algebra	WP: Determine an equation representing a direct variation or an inverse variation [Algebra 1]
	WP: Solve a direct- or inverse-variation problem [Algebra 1]

Statistics

VA A.9 - The student, given a set of data, will interpret variation in real-world contexts and calculate and interpret mean absolute deviation, standard deviation, and z-scores.

VA A.10 - The student will compare and contrast multiple univariate data sets, using box-and-whisker plots.

Data Analysis, Statistics, and Probability	Answer a question using information from two box-and-whisker plots [Grade 8]
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VA A.11 - The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve real-world problems, using mathematical models. Mathematical models will include linear and quadratic functions.

Data Analysis, Statistics, and Probability	Analyze the effect that changing elements in a data set has on the mean, the median, or the range [Grade 8]
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Algebra II and Trigonometry**Expressions and Operations****VA AII/T.1 - The student, given rational, radical, or polynomial expressions, will****VA AII/T.1.a - The student, given rational, radical, or polynomial expressions, will add, subtract, multiply, divide, and simplify rational algebraic expressions;**

Algebra	Apply terminology related to polynomials [Algebra 1]	
	Simplify a polynomial expression by combining like terms [Algebra 1]	
	Add polynomial expressions [Algebra 1]	Core Skill
	Subtract polynomial expressions [Algebra 1]	Core Skill
	Multiply a polynomial by a monomial [Algebra 1]	
	Multiply two binomials of the form $(x \pm a)(x \pm b)$ [Algebra 1]	
	Multiply two binomials of the form $(ax \pm b)(cx \pm d)$ [Algebra 1]	Core Skill
	Multiply two binomials of the form $(ax \pm by)(cx \pm dy)$ [Algebra 1]	
	Square a binomial [Algebra 1]	
	Multiply two nonlinear binomials [Algebra 1]	
	Multiply a trinomial by a binomial [Algebra 1]	
	Rationalize the denominator of a numerical radical expression [Algebra 1]	
	Simplify a monomial algebraic radical expression [Algebra 1]	Core Skill
	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
	Divide a polynomial expression by a binomial [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 AII/T.1.b - The student, given rational, radical, or polynomial expressions, will add, subtract, multiply, divide, and simplify radical expressions containing rational numbers and variables, and expressions containing rational exponents;

Algebra	Multiply monomial numerical expressions involving radicals [Algebra 1]	
	Divide monomial numerical expressions involving radicals [Algebra 1]	

	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]
	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]
	Simplify a monomial algebraic expression that includes fractional exponents and/or nth roots [Algebra 2]

VA AII/T.1.c - The student, given rational, radical, or polynomial expressions, will write radical expressions as expressions containing rational exponents and vice versa; and

Algebra	Simplify a monomial algebraic expression that includes fractional exponents and/or nth roots [Algebra 2]
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VA AII/T.1.d - The student, given rational, radical, or polynomial expressions, will factor polynomials completely.

Algebra	Factor the GCF from a polynomial expression [Algebra 1]	Core Skill
	Factor trinomials that result in factors of the form $(x +/- a)(x +/- b)$ [Algebra 1]	
	Factor trinomials that result in factors of the form $(ax +/- b)(cx +/- d)$ [Algebra 1]	Core Skill
	Factor trinomials that result in factors of the form $(ax +/- by)(cx +/- dy)$ [Algebra 1]	
	Factor the difference of two squares [Algebra 1]	
	Factor a perfect-square trinomial [Algebra 1]	
	Factor a polynomial that has a GCF and two linear binomial factors [Algebra 1]	
	Determine factors of a polynomial by applying the remainder theorem [Algebra 2]	
	Factor a polynomial of degree 3 or higher [Algebra 2]	

VA AII/T.2 - The student will 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 "Sigma" and a subscript n.

Algebra	Find the sum of a finite arithmetic series [Algebra 2]	
	WP: Solve a problem that can be represented by an arithmetic sequence [Algebra 2]	
	WP: Solve a problem that can be represented by a finite arithmetic series [Algebra 2]	
	Find the sum of a finite geometric series [Algebra 2]	Core Skill

	Find the sum of a finite geometric series given in summation notation [Algebra 2]	
	Find the sum of an infinite geometric series if it exists [Algebra 2]	
	WP: Solve a problem that can be represented by a geometric sequence [Algebra 2]	Core Skill
	WP: Solve a problem that can be represented by a finite geometric series [Algebra 2]	Core Skill

VA AII/T.3 - The student will 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.

Algebra	Raise i to a power [Algebra 2]	
	Determine the absolute value of a complex number [Algebra 2]	
	Add or subtract complex numbers [Algebra 2]	
	Multiply complex numbers [Algebra 2]	
	Simplify an expression involving a complex denominator [Algebra 2]	Core Skill

Equations and Inequalities

VA AII/T.4 - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically,

VA AII/T.4.a - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically, absolute value equations and inequalities;

Algebra	Solve a 1-variable absolute value equation [Algebra 1]	
	Determine the graph of a 2-variable absolute value equation [Algebra 1]	
	Solve a 1-variable absolute value inequality [Algebra 1]	Core Skill
	Determine the graph of a 1-variable absolute value inequality [Algebra 1]	
	Solve a 1-variable absolute value equation with the variable on both sides [Algebra 2]	

VA AII/T.4.b - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically, quadratic equations over the set of complex numbers;

Algebra	Determine the graph of a given quadratic function [Algebra 1]	Core Skill
	Solve a quadratic equation by graphing the associated quadratic function [Algebra 1]	
	Solve a quadratic equation by taking the square root [Algebra 1]	
	Solve a quadratic equation by factoring [Algebra 1]	Core Skill
	Solve a quadratic equation using the quadratic formula [Algebra 1]	Core Skill
	Use the discriminant to determine the number of real solutions [Algebra 1]	
	Solve a quadratic equation with complex solutions [Algebra 2]	Core Skill

VA AII/T.4.c - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically, equations containing rational algebraic expressions; and

Algebra	Determine the excluded values of a rational algebraic expression [Algebra 1]	
	Solve a rational equation involving terms with monomial denominators [Algebra 1]	Core Skill
	Solve a rational equation involving terms with polynomial denominators [Algebra 1]	Core Skill
	Determine the graph of a rational function [Algebra 1]	

VA AII/T.4.d - Graphing calculators will be used for solving and for confirming the algebraic solutions. The student will solve, algebraically and graphically, equations containing radical expressions.

Algebra	Solve a radical equation that leads to a linear equation [Algebra 1]	Core Skill
	Solve a radical equation that leads to a quadratic equation [Algebra 1]	Core Skill
	Determine the graph of a radical function [Algebra 1]	

VA AII/T.5 - The student will solve nonlinear systems of equations, including linear-quadratic and quadratic-quadratic, algebraically and graphically. Graphing calculators will be used as a tool to visualize graphs and predict the number of solutions.

Algebra	Solve a system of linear equations in two variables by graphing [Algebra 1]	
	Solve a system of linear equations in two variables using any method [Algebra 1]	Core Skill
	Solve a system consisting of a linear equation and a nonlinear equation in two variables [Algebra 2]	Core Skill

Functions

VA AII/T.6 - The student will recognize the general shape of function (absolute value, square root, cube root, rational, polynomial, exponential, and logarithmic) families and will convert between graphic and symbolic forms of functions. A transformational approach to graphing will be employed. Graphing calculators will be used as a tool to investigate the shapes and behaviors of these functions.

Algebra	Determine whether a graph or a table represents a linear or nonlinear function [Algebra 1]	
	Determine the graph of a 2-variable absolute value equation [Algebra 1]	
	Determine the graph of a given quadratic function [Algebra 1]	Core Skill
	Solve a quadratic equation by graphing the associated quadratic function [Algebra 1]	
	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]	

VA AII/T.7 - Graphing calculators will be used as a tool to assist in the investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include

VA AII/T.7.a - Graphing calculators will be used as a tool to assist in the investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include domain and range, including limited and discontinuous domains and ranges;

Algebra	Determine the domain or range of a function [Algebra 1]	
	Identify the end behavior, asymptotes, excluded values, or behavior near excluded values of a rational function [Algebra 2]	Core Skill
	Identify the domain or range of a radical function [Algebra 2]	
	Identify the domain, range, asymptotes, or intercepts of a logarithmic function [Algebra 2]	

VA AII/T.7.b - Graphing calculators will be used as a tool to assist in the investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include zeros;

Algebra	Solve a quadratic equation by graphing the associated quadratic function [Algebra 1]	
	Relate a graph to a polynomial function given in factored form [Algebra 2]	Core Skill
	Determine approximate solutions to a polynomial equation [Algebra 2]	

VA AII/T.7.c - Graphing calculators will be used as a tool to assist in the investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include x- and y-intercepts;

Algebra	Determine the x- or y-intercept of a line given an equation [Algebra 1]	Core Skill
	Solve a quadratic equation by graphing the associated quadratic function [Algebra 1]	

VA AII/T.7.d - Graphing calculators will be used as a tool to assist in the investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include intervals in which a function is increasing or decreasing;

VA AII/T.7.e - Graphing calculators will be used as a tool to assist in the investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include asymptotes;

Algebra	Identify the end behavior, asymptotes, excluded values, or behavior near excluded values of a rational function [Algebra 2]	Core Skill
	Identify the domain, range, asymptotes, or intercepts of a logarithmic function [Algebra 2]	

VA AII/T.7.f - Graphing calculators will be used as a tool to assist in the investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include end behavior;

Algebra	Identify the end behavior, asymptotes, excluded values, or behavior near excluded values of a rational function [Algebra 2]	Core Skill
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VA AII/T.7.g - Graphing calculators will be used as a tool to assist in the investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include inverse of a function; and

Algebra	Determine values of the inverse of a function using a table or a graph [Algebra 2]	
	Determine if the inverse of a function is a function [Algebra 2]	
	Determine the graph of the inverse of a function [Algebra 2]	
	Determine the equation of the inverse of a linear, rational root, or polynomial function [Algebra 2]	Core Skill

VA AII/T.7.h - Graphing calculators will be used as a tool to assist in the investigation of functions. The student will investigate and analyze functions algebraically and graphically. Key concepts include composition of multiple functions.

Algebra	Determine the composition of two functions [Algebra 2]	
	WP: Apply function operations or compositions of functions to represent a situation [Algebra 2]	

VA AII/T.8 - The student will 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.

Algebra	Determine factors of a polynomial by applying the remainder theorem [Algebra 2]	
	Relate a graph to a polynomial function given in factored form [Algebra 2]	Core Skill
	Identify the end behavior, the intercepts, or the zeros of a polynomial function [Algebra 2]	Core Skill
	Determine approximate solutions to a polynomial equation [Algebra 2]	

Statistics

VA AII/T.9 - The student will 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.

VA AII/T.10 - The student will identify, create, and solve real-world problems involving inverse variation, joint variation, and a combination of direct and inverse variations.

Algebra	Determine if a table or an equation represents a direct variation, an inverse variation, or neither [Algebra 1]	
	Solve a problem involving inverse or joint variation [Algebra 2]	

VA AII/T.11 - The student will identify properties of a normal distribution and apply those properties to determine probabilities associated with areas under the standard normal curve.

VA AII/T.12 - The student will compute and distinguish between permutations and combinations and use technology for applications.

Algebra	Evaluate an expression involving factorial, permutation, or combination notation [Algebra 2]	
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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]

Trigonometry

VA AII/T.13 - The student, given a point other than the origin on the terminal side of an angle, will use the definitions of the six trigonometric functions to find the sine, cosine, tangent, cotangent, secant, and cosecant of the angle in standard position. Trigonometric functions defined on the unit circle will be related to trigonometric functions defined in right triangles.

VA AII/T.14 - The student, given the value of one trigonometric function, will find the values of the other trigonometric functions, using the definitions and properties of the trigonometric functions.

Algebra	Solve a problem involving the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ [Algebra 2]
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VA AII/T.15 - The student will 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 will include converting angle measures from radians to degrees and vice versa.

Algebra	Convert between degree measure and radian measure [Algebra 2]
	Determine the sine, cosine or tangent of an angle given in degrees or radians [Algebra 2]
	Determine the exact value of a sine, cosine or tangent function given an angle in degrees or radians [Algebra 2]

VA AII/T.16 - The student will find, with the aid of a calculator, the value of any trigonometric function and inverse trigonometric function.

Algebra	Determine the sine, cosine or tangent of an angle given in degrees or radians [Algebra 2]
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VA AII/T.17 - The student will verify basic trigonometric identities and make substitutions, using the basic identities.

VA AII/T.18 - The student, given one of the six trigonometric functions in standard form, will

VA AII/T.18.a - The student, given one of the six trigonometric functions in standard form, will state the domain and the range of the function;

VA AII/T.18.b - The student, given one of the six trigonometric functions in standard form, will determine the amplitude, period, phase shift, vertical shift, and asymptotes;

Algebra	Determine the amplitude, frequency, period, or phase shift of a sine or a cosine function [Algebra 2]
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VA AII/T.18.c - The student, given one of the six trigonometric functions in standard form, will sketch the graph of the function by using transformations for at least a two-period interval; and

Algebra	Determine the graph of a sine, cosine or tangent function [Algebra 2] Core Skill
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VA AII/T.18.d - The student, given one of the six trigonometric functions in standard form, will investigate the effect of changing the parameters in a trigonometric function on the graph of the function.

VA AII/T.19 - The student will identify the domain and range of the inverse trigonometric functions and recognize the graphs of these functions. Restrictions on the domains of the inverse trigonometric functions will be included.

Algebra	Determine the graph of an inverse sine, cosine, or tangent function [Algebra 2]
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VA AII/T.20 - The student will solve trigonometric equations that include both infinite solutions and restricted domain solutions and solve basic trigonometric inequalities.

Algebra	Determine an angle coterminal with a given angle [Algebra 2]
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VA AII/T.21 - The student will identify, create, and solve real-world problems involving triangles. Techniques will include using the trigonometric functions, the Pythagorean Theorem, the Law of Sines, and the Law of Cosines.

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 a distance on the Cartesian plane using the Pythagorean theorem [Grade 8]	
	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
	WP: Solve a problem involving a complex figure using the Pythagorean theorem [Geometry]	
	Determine the area of a triangle using the formula $A = 1/2absin(c)$ [Algebra 2]	
	Solve a problem involving the law of cosines [Algebra 2]	
	WP: Solve a problem involving the law of sines or the law of cosines [Algebra 2]	

Analysis

VA MA.1 - The student will investigate and identify the characteristics of polynomial and rational functions and use these to sketch the graphs of the functions. This will include determining zeros, upper and lower bounds, y-intercepts, symmetry, asymptotes, intervals for which the function is increasing or decreasing, and maximum or minimum points. Graphing utilities will be used to investigate and verify these characteristics.

Algebra	Apply terminology related to polynomials [Algebra 1]	
	Factor trinomials that result in factors of the form $(x \pm a)(x \pm b)$ [Algebra 1]	
	Factor trinomials that result in factors of the form $(ax \pm by)(cx \pm dy)$ [Algebra 1]	
	Factor the difference of two squares [Algebra 1]	
	Factor a perfect-square trinomial [Algebra 1]	
	Factor a polynomial that has a GCF and two linear binomial factors [Algebra 1]	
	Solve a quadratic equation by graphing the associated quadratic function [Algebra 1]	
	Solve a quadratic equation by taking the square root [Algebra 1]	
	Determine the solution(s) of an equation given in factored form [Algebra 1]	
	Use the discriminant to determine the number of real solutions [Algebra 1]	
	Simplify a rational expression involving polynomial terms [Algebra 1]	Core Skill
	Solve a rational equation involving terms with polynomial denominators [Algebra 1]	Core Skill
	Factor a polynomial of degree 3 or higher [Algebra 2]	
	Relate a graph to a polynomial function given in factored form [Algebra 2]	Core Skill
	Identify the end behavior, the intercepts, or the zeros of a polynomial function [Algebra 2]	Core Skill
	Determine approximate solutions to a polynomial equation [Algebra 2]	
	Determine a polynomial of lowest degree that has given roots or a graph of a given shape [Algebra 2]	
	Determine a polynomial function which goes through specified points on a graph [Algebra 2]	Core Skill
	WP: Solve a problem modeled by a polynomial equation [Algebra 2]	
	Identify the end behavior, asymptotes, excluded values, or behavior near excluded values of a rational function [Algebra 2]	Core Skill
	Determine the graph of a rational function involving linear or quadratic denominators [Algebra 2]	Core Skill

VA MA.2 - The student will apply compositions of functions and inverses of functions to real-world situations. Analytical methods and graphing utilities will be used to investigate and verify the domain and range of resulting functions.

Algebra	Determine values of the inverse of a function using a table or a graph [Algebra 2]	
	Determine the composition of two functions [Algebra 2]	
	WP: Apply function operations or compositions of functions to represent a situation [Algebra 2]	
	Determine if the inverse of a function is a function [Algebra 2]	
	Determine the graph of the inverse of a function [Algebra 2]	
	Determine the equation of the inverse of a linear, rational root, or polynomial function [Algebra 2]	Core Skill

VA MA.3 - The student will investigate and describe the continuity of functions, using graphs and algebraic methods.

VA MA.4 - The student will expand binomials having positive integral exponents through the use of the Binomial Theorem, the formula for combinations, and Pascal's Triangle.

Algebra	Evaluate an expression involving factorial, permutation, or combination notation [Algebra 2]	
	Find a specified term of a binomial expression raised to a positive integer power [Algebra 2]	Core Skill

VA MA.5 - The student will find the sum (sigma notation included) of finite and infinite convergent series, which will lead to an intuitive approach to a limit.

Algebra	Determine the explicit formula for an arithmetic sequence [Algebra 2]	
	Find the sum of a finite arithmetic series [Algebra 2]	
	WP: Solve a problem that can be represented by a finite arithmetic series [Algebra 2]	
	Determine the common ratio for a geometric sequence [Algebra 2]	
	Determine the explicit formula for a geometric sequence [Algebra 2]	
	Find the sum of a finite geometric series [Algebra 2]	Core Skill
	Find the sum of a finite geometric series given in summation notation [Algebra 2]	
	Find the sum of an infinite geometric series if it exists [Algebra 2]	

VA MA.6 - The student will use mathematical induction to prove formulas and mathematical statements.

VA MA.7 - The student will find the limit of an algebraic function, if it exists, as the variable approaches either a finite number or infinity. A graphing utility will be used to verify intuitive reasoning, algebraic methods, and numerical substitution.

VA MA.8 - The student will investigate and identify the characteristics of conic section equations in (h, k) and standard forms. Transformations in the coordinate plane will be used to graph conic sections.

Algebra	Determine the graph of a vertically or horizontally oriented parabola [Algebra 2]	Core Skill
	Determine the equation of a circle from given information [Algebra 2]	
	Determine the graph of a circle given the equation in standard form [Algebra 2]	
	Relate a graph of an ellipse centered at the origin to its equation [Algebra 2]	Core Skill
	Determine the graph of a circle or an ellipse given the equation in general form [Algebra 2]	Core Skill
	Determine the graph of a hyperbola given the equation in standard form [Algebra 2]	
	Determine the standard form of the equation for a conic section given its general form equation [Algebra 2]	
	Determine which conic section a given equation represents [Algebra 2]	
	Determine the equation of a parabola using given information [Algebra 2]	Core Skill
	Determine the equation of an ellipse using given information [Algebra 2]	
	Determine the equation of a hyperbola using given information [Algebra 2]	
	WP: Solve a problem involving an ellipse or a parabola [Algebra 2]	

VA MA.9 - The student will investigate and identify the characteristics of exponential and logarithmic functions in order to graph these functions and solve equations and real-world problems. This will include the role of e, natural and common logarithms, laws of exponents and logarithms, and the solution of logarithmic and exponential equations.

Algebra	Solve an exponential equation using the properties of exponents [Algebra 2]	
	WP: Interpret an interest rate, rate of change, initial amount, frequency of compounding and other parameters of an exponential function [Algebra 2]	Core Skill
	Convert between a simple exponential equation and its corresponding logarithmic equation [Algebra 2]	
	Determine the exact value of a logarithmic expression [Algebra 2]	
	Identify equivalent logarithmic expressions using the properties of logarithms [Algebra 2]	Core Skill
	Evaluate a logarithmic expression using the properties of logarithms [Algebra 2]	
	Relate a logarithmic function to its graph [Algebra 2]	

	Identify the domain, range, asymptotes, or intercepts of a logarithmic function [Algebra 2]	
	Solve an exponential equation using logarithms [Algebra 2]	Core Skill
	Solve a logarithmic equation [Algebra 2]	Core Skill
	Evaluate a logarithmic expression using the change of base formula [Algebra 2]	
	WP: Solve a problem that can be modeled using a logarithmic equation [Algebra 2]	
	WP: Solve an exponential growth or decay problem [Algebra 2]	Core Skill

VA MA.10 - The student will investigate and identify the characteristics of the graphs of polar equations, using graphing utilities. This will include classification of polar equations, the effects of changes in the parameters in polar equations, conversion of complex numbers from rectangular form to polar form and vice versa, and the intersection of the graphs of polar equations.

Algebra	Identify a complex number represented as a vector on a coordinate plane [Algebra 2]	
	Determine the absolute value of a complex number [Algebra 2]	
	Add or subtract complex numbers [Algebra 2]	
	Multiply complex numbers [Algebra 2]	
	Simplify an expression involving a complex denominator [Algebra 2]	Core Skill

VA MA.11 - The student will perform operations with vectors in the coordinate plane and solve real-world problems, using vectors. This will include the following topics: operations of addition, subtraction, scalar multiplication, and inner (dot) product; norm of a vector; unit vector; graphing; properties; simple proofs; complex numbers (as vectors); and perpendicular components.

Algebra	Determine the component form of a vector represented on a graph [Algebra 2]	
	Determine the magnitude of a vector [Algebra 2]	
	Determine the direction of a vector [Algebra 2]	
	Add or subtract vectors on a coordinate plane [Algebra 2]	
	Add or subtract vectors component-wise [Algebra 2]	
	Evaluate a linear combination of vectors [Algebra 2]	Core Skill
	Determine a unit vector in the same direction as a given vector [Algebra 2]	
	WP: Add or subtract vectors [Algebra 2]	

VA MA.12 - The student will use parametric equations to model and solve application problems.

VA MA.13 - The student will identify, create, and solve real-world problems involving triangles. Techniques will include using the trigonometric functions, the Pythagorean Theorem, the Law of Sines, and the Law of Cosines.

Algebra	Solve a problem involving the law of sines [Algebra 2]	
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Geometry and Measurement	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
	Solve a problem using multiple non-trigonometric right-triangle relationships [Geometry]	
	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]	
	Relate a trigonometric function to the sides of a right triangle [Algebra 2]	
	Determine the area of a triangle using the formula $A = 1/2absin(c)$ [Algebra 2]	
	Solve a problem involving the law of cosines [Algebra 2]	
	WP: Solve a problem involving the law of sines or the law of cosines [Algebra 2]	

VA MA.14 - The student will use matrices to organize data and will add and subtract matrices, multiply matrices, multiply matrices by a scalar, and use matrices to solve systems of equations.

Algebra	Multiply a matrix by a scalar [Algebra 2]	
	Add or subtract matrices [Algebra 2]	
	Combine matrix operations [Algebra 2]	
	Multiply matrices [Algebra 2]	
	Determine the determinant of a matrix [Algebra 2]	
	Represent a system of linear equations as a single matrix equation [Algebra 2]	
	Determine the inverse of a matrix [Algebra 2]	Core Skill
	Solve a system of linear equations using matrices [Algebra 2]	

Discrete Mathematics

VA DM.1 - The student will model problems, using vertex-edge graphs. The concepts of valence, connectedness, paths, planarity, and directed graphs will be investigated. Adjacency matrices and matrix operations will be used to solve problems (e.g., food chains, number of paths).

Algebra	Add or subtract matrices [Algebra 2]
	Multiply matrices [Algebra 2]

VA DM.2 - The student will solve problems through investigation and application of circuits, cycles, Euler Paths, Euler Circuits, Hamilton Paths, and Hamilton Circuits. Optimal solutions will be sought using existing algorithms and student-created algorithms.

VA DM.3 - The student will apply graphs to conflict-resolution problems, such as map coloring, scheduling, matching, and optimization. Graph coloring and chromatic number will be used.

VA DM.4 - The student will apply algorithms, such as Kruskal's, Prim's, or Dijkstra's, relating to trees, networks, and paths. Appropriate technology will be used to determine the number of possible solutions and generate solutions when a feasible number exists.

VA DM.5 - The student will use algorithms to schedule tasks in order to determine a minimum project time. The algorithms will include critical path analysis, the list-processing algorithm, and student-created algorithms.

VA DM.6 - The student will solve linear programming problems. Appropriate technology will be used to facilitate the use of matrices, graphing techniques, and the Simplex method of determining solutions.

Algebra	WP: Solve a linear programming problem [Algebra 2]
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VA DM.7 - The student will analyze and describe the issue of fair division (e.g., cake cutting, estate division). Algorithms for continuous and discrete cases will be applied.

VA DM.8 - The student will investigate and describe weighted voting and the results of various election methods. These may include approval and preference voting as well as plurality, majority, runoff, sequential run-off, Borda count, and Condorcet winners.

VA DM.9 - The student will identify apportionment inconsistencies that apply to issues such as salary caps in sports and allocation of representatives to Congress. Historical and current methods will be compared.

VA DM.10 - The student will use the recursive process and difference equations with the aid of appropriate technology to generate

VA DM.10.a - compound interest;

Numbers and Operations	Solve a problem involving annually compounded interest [Grade 8]
Algebra	WP: Interpret an interest rate, rate of change, initial amount, frequency of compounding and other parameters of an exponential function [Algebra 2] Core Skill

VA DM.10.b - sequences and series;

Algebra	Find a specific term of an arithmetic sequence [Algebra 2]
	Determine the recursive formula for an arithmetic sequence [Algebra 2]
	Determine the explicit formula for an arithmetic sequence [Algebra 2]

	Find the sum of a finite arithmetic series [Algebra 2]	
	WP: Solve a problem that can be represented by an arithmetic sequence [Algebra 2]	
	WP: Solve a problem that can be represented by a finite arithmetic series [Algebra 2]	
	Find a specific term of a geometric sequence [Algebra 2]	
	Determine the common ratio for a geometric sequence [Algebra 2]	
	Determine the recursive formula for a geometric sequence [Algebra 2]	
	Determine the explicit formula for a geometric sequence [Algebra 2]	
	Find the sum of a finite geometric series [Algebra 2]	Core Skill
	Find the sum of a finite geometric series given in summation notation [Algebra 2]	
	Find the sum of an infinite geometric series if it exists [Algebra 2]	
	Identify a given sequence as arithmetic, geometric, or neither [Algebra 2]	
	WP: Solve a problem that can be represented by a geometric sequence [Algebra 2]	Core Skill
	WP: Solve a problem that can be represented by a finite geometric series [Algebra 2]	Core Skill

VA DM.10.c - fractals;

Algebra	Raise i to a power [Algebra 2]
	Identify a complex number represented as a vector on a coordinate plane [Algebra 2]

VA DM.10.d - population growth models; and

Algebra	WP: Evaluate an exponential growth or an exponential decay function [Algebra 1]
	WP: Determine an exponential function that represents a situation such as exponential growth or decay [Algebra 2]

VA DM.10.e - the Fibonacci sequence.

Algebra	Determine the recursive formula for an arithmetic sequence [Algebra 2]
	Determine the recursive formula for a geometric sequence [Algebra 2]

VA DM.11 - The student will describe and apply sorting algorithms and coding algorithms used in sorting, processing, and communicating information. These will include

VA DM.11.a - bubble sort, merge sort, and network sort; and

VA DM.11.b - ISBN, UPC, zip, and banking codes.

VA DM.12 - The student will select, justify, and apply an appropriate technique to solve a logic problem. Techniques will include Venn diagrams, truth tables, and matrices.

Data Analysis, Statistics, and Probability	Answer a question using information from a Venn diagram [Grade 5]
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VA DM.13 - The student will apply the formulas of combinatorics in the areas of

VA DM.13.a - the Fundamental (Basic) Counting Principle;

VA DM.13.b - knapsack and bin-packing problems;

VA DM.13.c - permutations and combinations; and

Algebra	Evaluate an expression involving factorial, permutation, or combination notation [Algebra 2]
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Data Analysis, Statistics, and Probability	Determine the number of permutations possible in a given situation [Grade 8]
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	Determine the number of combinations possible in a given situation [Grade 8]
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VA DM.13.d - the pigeonhole principle.

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

Reasoning, Lines, and Transformations

VA G.1 - The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include

VA G.1.a - The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include identifying the converse, inverse, and contrapositive of a conditional statement;

VA G.1.b - The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include translating a short verbal argument into symbolic form;

Algebra	WP: Use a 2-step linear inequality in one variable to represent a situation [Grade 8]
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VA G.1.c - The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include using Venn diagrams to represent set relationships; and

Data Analysis, Statistics, and Probability	Answer a question using information from a Venn diagram [Grade 5]
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	Answer a question using information from a Venn diagram with three circles [Grade 8]
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	Use a Venn diagram to organize summarized data [Grade 8]
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VA G.1.d - The student will construct and judge the validity of a logical argument consisting of a set of premises and a conclusion. This will include using deductive reasoning.

VA G.2 - The student will use the relationships between angles formed by two lines cut by a transversal to

VA G.2.a - The student will use the relationships between angles formed by two lines cut by a transversal to determine whether two lines are parallel;

Geometry and Measurement	Identify parallel lines using angle relationships [Geometry]
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VA G.2.b - The student will 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

Geometry and Measurement	Determine if lines through points with given coordinates are parallel or perpendicular [Geometry]
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VA G.2.c - The student will 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.

Geometry and Measurement	Identify angle relationships formed by parallel lines cut by a transversal [Grade 8]
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	Determine the measure of an angle formed by parallel lines and one or more transversals [Geometry]	Core Skill
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VA G.3 - The student will use pictorial representations, including computer software, constructions, and coordinate methods, to solve problems involving symmetry and transformation. This will include

VA G.3.a - The student will 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

VA G.3.b - The student will 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 the slope of a line given two points on the line [Algebra 1]	Core Skill
Geometry and Measurement	Determine if lines through points with given coordinates are parallel or perpendicular [Geometry]	

VA G.3.c - The student will 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 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]
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VA G.3.d - The student will 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 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]

VA G.4 - The student will construct and justify the constructions of

VA G.4.a - The student will construct and justify the constructions of a line segment congruent to a given line segment;

VA G.4.b - The student will construct and justify the constructions of the perpendicular bisector of a line segment;

VA G.4.c - The student will construct and justify the constructions of a perpendicular to a given line from a point not on the line;

VA G.4.d - The student will construct and justify the constructions of a perpendicular to a given line at a given point on the line;

VA G.4.e - The student will construct and justify the constructions of the bisector of a given angle;

VA G.4.f - The student will construct and justify the constructions of an angle congruent to a given angle; and

VA G.4.g - The student will construct and justify the constructions of a line parallel to a given line through a point not on the given line.

Triangles

VA G.5 - These concepts will be considered in the context of real-world situations. The student, given information concerning the lengths of sides and/or measures of angles in triangles, will

VA G.5.a - These concepts will be considered in the context of real-world situations. The student, given information concerning the lengths of sides and/or measures of angles in triangles, will order the sides by length, given the angle measures;

Geometry and Measurement	Solve a problem using inequalities in a triangle [Geometry]	Core Skill
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VA G.5.b - These concepts will be considered in the context of real-world situations. The student, given information concerning the lengths of sides and/or measures of angles in triangles, will order the angles by degree measure, given the side lengths;

Geometry and Measurement	Solve a problem using inequalities in a triangle [Geometry]	Core Skill
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VA G.5.c - These concepts will be considered in the context of real-world situations. The student, given information concerning the lengths of sides and/or measures of angles in triangles, will determine whether a triangle exists; and

VA G.5.d - These concepts will be considered in the context of real-world situations. The student, given information concerning the lengths of sides and/or measures of angles in triangles, will determine the range in which the length of the third side must lie.

Geometry and Measurement	Solve a problem using inequalities in a triangle [Geometry]	Core Skill
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VA G.6 - The student, given information in the form of a figure or statement, will 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
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	Identify congruent triangles using triangle congruence postulates or theorems [Geometry]	Core Skill
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VA G.7 - The student, given information in the form of a figure or statement, will 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
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VA G.8 - The student will 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	WP: Use the Pythagorean theorem to find a length or a distance [Grade 8]	Core Skill
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	Solve for the length of a side of a triangle using the Pythagorean theorem [Geometry]	
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	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]	

Polygons and Circles

VA G.9 - The student will 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 G.10 - The student will solve real-world problems involving angles of polygons.

Geometry and Measurement	Determine a length or an angle measure in a complex figure using properties of polygons [Geometry]	
	WP: Solve a problem using the properties of angles and/or sides of polygons [Geometry]	Core Skill

VA G.11 - The student will use angles, arcs, chords, tangents, and secants to

VA G.11.a - The student will use angles, arcs, chords, tangents, and secants to investigate, verify, and apply properties of circles;

Geometry and Measurement	Determine the measure of an arc or a central angle using the relationship between the arc and the central angle [Geometry]	Core Skill
	Solve a problem involving the length of an arc [Geometry]	Core Skill
	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 a length or an arc measure using the properties of congruent chords [Geometry]	

	Determine a length using a perpendicular bisector of a chord [Geometry]	
	Determine the measure of an arc or an angle using the relationship between an inscribed angle and its intercepted arc [Geometry]	Core Skill
	Determine the area of a sector of a circle [Geometry]	Core Skill
	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

VA G.11.b - The student will 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 G.11.c - The student will use angles, arcs, chords, tangents, and secants to find arc lengths and areas of sectors in circles.

Geometry and Measurement	Solve a problem involving the length of an arc [Geometry]	Core Skill
	Determine the measure of an arc or an angle using the relationship between an inscribed angle and its intercepted arc [Geometry]	Core Skill
	Determine the measure of an arc or an angle using properties of an inscribed triangle or quadrilateral [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 the area of a sector of a circle [Geometry]	Core Skill
	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

VA G.12 - The student, given the coordinates of the center of a circle and a point on the circle, will write the equation of the circle.

Geometry and Measurement	Determine an equation of a circle [Geometry]	
	Determine the radius, center, or diameter of a circle given an equation [Geometry]	

Three-Dimensional Figures

VA G.13 - The student will use formulas for surface area and volume of three-dimensional objects to solve real-world problems.

Geometry and Measurement	WP: Solve a problem involving the volume of a geometric solid [Grade 7]	Core Skill
	WP: Determine the surface area of a geometric solid [Grade 7]	Core Skill
	Solve a problem involving the volume of a right pyramid or a right cone [Geometry]	Core Skill
	WP: Solve a problem involving the surface area of a sphere [Geometry]	
	Determine the volume of a sphere or hemisphere [Geometry]	Core Skill
	WP: Solve a problem involving the volume of a complex solid figure [Geometry]	
	Solve a problem involving two solid figures that have the same surface area or volume [Geometry]	
	WP: Solve a problem involving two solid figures that have the same surface area or volume [Geometry]	

VA G.14 - The student will use similar geometric objects in two- or three-dimensions to**VA G.14.a - The student will use similar geometric objects in two- or three-dimensions to compare ratios between side lengths, perimeters, areas, and volumes;**

Geometry and Measurement	Determine the scale factor relating two similar polygons [Geometry]	
	Determine the length of a side in one of two similar polygons [Geometry]	
	Determine the length of a side or the measure of an angle in similar triangles [Geometry]	
	Solve a problem involving the surface areas of similar solid figures [Geometry]	
	Solve a problem involving the volumes of similar solid figures [Geometry]	

VA G.14.b - The student will 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 G.14.c - The student will 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**VA G.14.d - The student will use similar geometric objects in two- or three-dimensions to solve real-world problems about similar geometric objects.**

Geometry and Measurement	WP: Solve a problem involving similar shapes [Grade 7]	Core Skill
	WP: Determine a length using similarity [Geometry]	Core Skill

Probability and Statistics

VA PS.1 - The student will 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. Appropriate technology will be used to create graphical displays.

Data Analysis, Statistics, and Probability	Answer a question using information from a stem-and-leaf plot [Grade 6]	
	Use a histogram to represent data [Grade 7]	Core Skill
	Answer a question using information from a histogram [Grade 7]	Core Skill
	Use a box-and-whisker plot to organize data [Grade 8]	
	Answer a question using information from a box-and-whisker plot [Grade 8]	

VA PS.2 - The student will analyze numerical characteristics of univariate data sets to describe patterns and departures from patterns, using mean, median, mode, variance, standard deviation, interquartile range, range, and outliers.

Data Analysis, Statistics, and Probability	Determine the mean of a set of data [Grade 7]	
	Determine the mode(s) of a set of data [Grade 7]	
	Determine the median of a set of data [Grade 7]	
	WP: Use the mean of a data set to solve a problem [Grade 7]	
	Determine the quartiles of a data set [Grade 8]	
	Read a box-and-whisker plot [Grade 8]	
	Analyze the effect that changing elements in a data set has on the mean, the median, or the range [Grade 8]	

VA PS.3 - The student will 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	Answer a question using information from two box-and-whisker plots [Grade 8]	
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VA PS.4 - The student will analyze scatterplots to identify and describe the relationship between two variables, using shape; strength of relationship; clusters; positive, negative, or no association; outliers; and influential points.

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 PS.5 - The student will find and interpret linear correlation, use the method of least squares regression to model the linear relationship between two variables, and use the residual plots to assess linearity.

Data Analysis, Statistics, and Probability	Approximate a trend line for a scatter plot [Grade 8]	
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VA PS.6 - The student will make logarithmic and power transformations to achieve linearity.

Algebra	Evaluate a logarithmic expression using the properties of logarithms [Algebra 2]
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VA PS.7 - The student, using two-way tables, will analyze categorical data to describe patterns and departure from patterns and to find marginal frequency and relative frequencies, including conditional frequencies.

VA PS.8 - The student will describe the methods of data collection in a census, sample survey, experiment, and observational study and identify an appropriate method of solution for a given problem setting.

Data Analysis, Statistics, and Probability	Determine if a sample is likely to be representative of the larger population [Grade 8]
	Determine if a question is likely to produce a biased survey result [Grade 8]

VA PS.9 - The student will plan and conduct a survey. The plan will address sampling techniques (e.g., simple random, stratified) and methods to reduce bias.

VA PS.10 - The student will plan and conduct an experiment. The plan will address control, randomization, and measurement of experimental error.

VA PS.11 - The student will identify and describe two or more events as complementary, dependent, independent, and/or mutually exclusive.

Data Analysis, Statistics, and Probability	Answer a question using information from a Venn diagram with three circles [Grade 8]
	Use a Venn diagram to organize summarized data [Grade 8]

VA PS.12 - The student will find probabilities (relative frequency and theoretical), including conditional probabilities for events that are either dependent or independent, by applying the Law of Large Numbers concept, the addition rule, and the multiplication rule.

Data Analysis, Statistics, and Probability	Determine the probability of three or more independent events [Grade 8]
	Determine the probability of three or more dependent events [Grade 8]
	Determine the probability of an event consisting of mutually exclusive events [Grade 8]
	Make a prediction involving the probability of compound events [Grade 8]

VA PS.13 - The student will develop, interpret, and apply the binomial probability distribution for discrete random variables, including computing the mean and standard deviation for the binomial variable.

VA PS.14 - The student will simulate probability distributions, including binomial and geometric.

VA PS.15 - The student will identify random variables as independent or dependent and find the mean and standard deviations for sums and differences of independent random variables.

VA PS.16 - The student will identify properties of a normal distribution and apply the normal distribution to determine probabilities, using a table or graphing calculator.

VA PS.17 - The student, given data from a large sample, will find and interpret point estimates and confidence intervals for parameters. The parameters will include proportion and mean, difference between two proportions, and difference between two means (independent and paired).

VA PS.18 - The student will apply and interpret the logic of a hypothesis-testing procedure. Tests will include large sample tests for proportion, mean, difference between two proportions, and difference between two means (independent and paired) and Chi-squared tests for goodness of fit, homogeneity of proportions, and independence.

VA PS.19 - The student will identify the meaning of sampling distribution with reference to random variable, sampling statistic, and parameter and explain the Central Limit Theorem. This will include sampling distribution of a sample proportion, a sample mean, a difference between two sample proportions, and a difference between two sample means.

VA PS.20 - The student will identify properties of a t-distribution and apply t-distributions to single-sample and two-sample (independent and matched pairs) t-procedures, using tables or graphing calculators.

Trigonometry

VA T.1 - The student, given a point other than the origin on the terminal side of an angle, will use the definitions of the six trigonometric functions to find the sine, cosine, tangent, cotangent, secant, and cosecant of the angle in standard position. Trigonometric functions defined on the unit circle will be related to trigonometric functions defined in right triangles.

Geometry and Measurement	Determine a sine, cosine, or tangent ratio in a right triangle [Geometry]
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	Relate a trigonometric function to the sides of a right triangle [Algebra 2]
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VA T.2 - The student, given the value of one trigonometric function, will find the values of the other trigonometric functions, using the definitions and properties of the trigonometric functions.

Algebra	Solve a problem involving the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ [Algebra 2]
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VA T.3 - The student will 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 will include converting angle measures from radians to degrees and vice versa.

Algebra	Convert between degree measure and radian measure [Algebra 2]
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	Determine the exact value of a sine, cosine or tangent function given an angle in degrees or radians [Algebra 2]
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Geometry and Measurement	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 T.4 - The student will find, with the aid of a calculator, the value of any trigonometric function and inverse trigonometric function.

Algebra	Determine the sine, cosine or tangent of an angle given in degrees or radians [Algebra 2]
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	Determine the value of an inverse sine, cosine, or tangent expression [Algebra 2]
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VA T.5 - The student will verify basic trigonometric identities and make substitutions, using the basic identities.

Algebra	Solve a problem involving the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ [Algebra 2]
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Geometry and Measurement	Relate a trigonometric function to the sides of a right triangle [Algebra 2]
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VA T.6 - The student, given one of the six trigonometric functions in standard form, will

VA T.6.a - state the domain and the range of the function;

Algebra	Determine the domain or range of a function [Algebra 1]
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VA T.6.b - determine the amplitude, period, phase shift, vertical shift, and asymptotes;

Algebra	Determine the amplitude, frequency, period, or phase shift of a sine or a cosine function [Algebra 2]
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VA T.6.c - sketch the graph of the function by using transformations for at least a two-period interval; and

Algebra	Determine the graph of a sine, cosine or tangent function [Algebra 2]	Core Skill
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VA T.6.d - investigate the effect of changing the parameters in a trigonometric function on the graph of the function.

VA T.7 - The student will identify the domain and range of the inverse trigonometric functions and recognize the graphs of these functions. Restrictions on the domains of the inverse trigonometric functions will be included.

Algebra	WP: Determine a reasonable domain or range for a function in a given situation [Algebra 1]	Core Skill
	Determine the graph of an inverse sine, cosine, or tangent function [Algebra 2]	

VA T.8 - The student will solve trigonometric equations that include both infinite solutions and restricted domain solutions and solve basic trigonometric inequalities.

Algebra	WP: Determine a reasonable domain or range for a function in a given situation [Algebra 1]	Core Skill
	Determine an angle coterminal with a given angle [Algebra 2]	

VA T.9 - The student will identify, create, and solve real-world problems involving triangles. Techniques will include using the trigonometric functions, the Pythagorean Theorem, the Law of Sines, and the Law of Cosines.

Algebra	Solve a problem involving the law of sines [Algebra 2]	
Geometry and Measurement	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 the area of a triangle using Heron's formula [Geometry]	
	Approximate the area of a right triangle using trigonometry [Geometry]	
	Approximate the area of a regular polygon using trigonometry [Geometry]	
	Determine the area of a triangle using the formula $A = 1/2absin(c)$ [Algebra 2]	
	Solve a problem involving the law of cosines [Algebra 2]	
	WP: Solve a problem involving the law of sines or the law of cosines [Algebra 2]	