Summary of Analysis between Virginia Standards of Learning and 2026 NAEP Framework

Overall there is strong alignment between the Virginia Standards of Learning and the 2026 NAEP Framework. The areas outlined in the following pages are the areas where alignment may not be as strong so that stakeholders can consider how to approach these areas. The areas are divided into 'significant areas to consider' as well as 'minor areas to consider' for each NAEP testing grade.

Here are the areas that will be discussed:

4th Grade

Significant Area to Consider: Geometry Standards

The depth of the geometry standards in and leading up to the 4th grade Standards of Learning does not match the depth of the 2026 NAEP framework. The areas where this separation is most apparent are the Transformation of Shapes and Preservation of Properties and Relationship between Geometric Figures sub-categories.

NAEP 2026	Virginia (2023 SOL)
Transformation of Shapes and Preservation of Properties d) Recognize attributes (such as shape and area) that do not change when plane figures are subdivided and rearranged. **Relationships Between Geometric Figures** a) Analyze or describe patterns in polygons when the number of sides increases, or the size or orientation changes. b) Combine simple plane shapes to construct a given shape.	**3.MG.4 The student will identify, describe, classify, compare, combine, and subdivide polygons.** *Students will demonstrate the following Knowledge and Skills:* a) Describe a polygon as a closed plane figure composed of at least three line segments that do not cross. b) Classify figures as polygons or not polygons and justify reasoning. c) Identify and describe triangles, quadrilaterals, pentagons, hexagons, and octagons in various orientations, with and without contexts. d) Identify and name examples of polygons (triangles, quadrilaterals, pentagons, hexagons, octagons) in the environment. e) Classify and compare polygons (triangles, quadrilaterals, pentagons, hexagons, octagons). f) Combine no more than three polygons, where each has three or four sides, and name the resulting polygon (triangles, quadrilaterals, pentagons, hexagons, octagons). g) Subdivide a three-sided or four-sided polygon into no more than three parts and name the resulting polygons. **4.MG.3 The student will use multiple representations to develop and use formulas to solve problems, including those in context, involving area and perimeter limited to rectangles and squares (in both U.S. Customary and metric units).** *Students will demonstrate the following Knowledge and Skills:* a) Use concrete materials and pictorial models to develop a formula for the area and perimeter of a rectangle (including a square). b) Determine the area and perimeter of a rectangle when given the measure of two adjacent sides (in whole number units), with and without models. c) Determine the area and perimeter of a square when given the measure of one side (in whole number units), with and without models. d) Use concrete materials and pictorial models to explore the relationship between area and perimeter of rectangles. e) Identify and represent rectangles with the same perimeter and different areas or with the same area and different perimeters.

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	f) Solve contextual problems involving area and perimeter of rectangles and squares. **4.MG.4 The student will identify, describe, and draw points, rays, line segments, angles, and lines, including intersecting, parallel, and perpendicular lines.** *Students will demonstrate the following Knowledge and Skills:* a) Identify and describe points, lines, line segments, rays, and angles, including endpoints and vertices. b) Describe endpoints and vertices in relation to lines, line segments, rays, and angles. c) Draw representations of points, line segments, rays, angles, and lines, using a ruler or straightedge. d) Identify parallel, perpendicular, and intersecting lines and line segments in plane and solid figures, including those in context. e) Use symbolic notation to name points, lines, line segments, rays, angles, and to describe parallel and perpendicular lines. **4.MG.5 The student will classify and describe quadrilaterals (parallelograms, rectangles, squares, rhombi, and/or trapezoids) using specific properties and attributes.** *Students will demonstrate the following Knowledge and Skills:* a) Develop definitions for parallelograms, rectangles, squares, rhombi, and trapezoids through the exploration of properties and attributes. b) Identify and describe points, line segments, angles, and vertices in quadrilaterals. c) Identify and describe parallel, intersecting, perpendicular, and congruent sides in quadrilaterals. d) Compare, contrast, and classify quadrilaterals (parallelograms, rectangles, squares, rhombi, and/or trapezoids) based on the following properties and attributes: i) parallel sides; ii) perpendicular sides; iii) congruence of sides; and iv) number of right angles. e) Denote properties of quadrilaterals and identify parallel sides, congruent sides, and right angles by using geometric markings. f) Use symbolic notation to name line segments and angles in quadrilaterals.

NAEP 2026	Virginia (2023 SOL)
	4.MG.6 The student will identify, describe, compare, and contrast plane and solid figures according to their characteristics (number of angles, vertices, edges, and the number and shape of faces), with and without models. *Students will demonstrate the following Knowledge and Skills:* a) Identify concrete models and pictorial representations of solid figures (cube, rectangular prism, square pyramid, sphere, cone, and cylinder). b) Identify and describe solid figures (cube, rectangular prism, square pyramid, and sphere) according to their characteristics (number of angles, vertices, edges, and by the number and shape of faces). c) Compare and contrast plane and solid figures (limited to circles, squares, triangles, rectangles, spheres, cubes, square pyramids, and rectangular prisms) according to their characteristics (number of sides, angles, vertices, edges, and the number and shape of faces).

Implications: As seen above, the Virginia Grade 3 and 4 geometry standards heavily emphasize understanding the attributes of shapes in order to identify, classify and appropriately label shapes. The NAEP standards ask students to decompose and rearrange shapes and examine which features change, to create given shapes from smaller shapes and to analyze patterns based on changes in attributes of shapes. The disparity in the depth of the standards may lead to confusion on the 4th grade NAEP. The lower-level grade 4 geometry standards reflect an issue that carries up through middle as well and will be discussed in the next section: properties of transformations are not well connected to the meanings of similarity and congruence and students are asked to execute procedures, but not necessarily to form and analyze ideas about properties of shapes to the depth of the NAEP standards.

Recommendations: Provide additional guidance for stakeholders, including textbook providers, to ask higher order thinking questions requiring students to manipulate geometric shapes and inspect how manipulation impacts their attributes.

Significant Area to Consider: Algebra Standards

There are some algebra standards featured on the 4th grade NAEP assessment which are not introduced until after 4th grade in Virginia. The NAEP standards that are featured after 4th grade in Virginia are listed below:

NAEP 2026	Virginia (2023 SOL)
Algebraic Representations a) Use letters and	**1.CE.1 The student will recall with automaticity addition and subtraction facts within 10 and represent, solve, and justify solutions to single-step problems, including those in context, using addition and subtraction with whole numbers within 20.**

NAEP 2026	Virginia (2023 SOL)
symbols to represent an unknown quantity in a simple mathematical expression. b) Express simple mathematical relationships using expressions, equations, or inequalities. **Equations and inequalities** a) Find the unknown(s) in a whole number sentence (e.g., in an equation or simple inequality like [_] + 3 > 7).	a) Write an equation that could be used to represent the solution to an oral, written, or picture problem. *Note- from here, students are often asked to represent context situations for whole numbers and fractions. Though the standards do not explicitly call for equations, they will likely be integrated through these other standards leading up to and including 4th grade.* **2.CE.1.G The student will recall with automaticity addition and subtraction facts within 20 and estimate, represent, solve, and justify solutions to single-step and multistep problems, including those in context, using addition and subtraction with whole numbers where addends or minuends do not exceed 100.** a) Determine the missing number in an equation (number sentence) through modeling and justification with addition and subtraction within 20 (e.g., 3 + = 5 or __ + 2 = 5; 5 – __ = 3 or 5 – 2 = __). *Note- there is not a corresponding 3rd grade standard for multiplication which might offer examples such as: 5 x ___ = 35. This type of reasoning could be used to explore some of the existing 3rd grade standards, though.* **4.CE.2 The student will estimate, represent, solve, and justify solutions to single-step and multistep problems, including those in context, using multiplication with whole numbers, and single-step problems, including those in context, using division with whole numbers; and recall with automaticity the multiplication facts through 12 × 12 and the corresponding division facts.** a) Create an equation using addition, subtraction, multiplication, and division to represent the relationship between equivalent mathematical expressions (e.g., 4 × 3 = 2 × 6; 10 + 8 = 36 ÷ 2; 12 × 4 = 60 — 12). b) Identify and use the appropriate symbol to distinguish between expressions that are equal and expressions that are not equal, using addition, subtraction, multiplication, and division (e.g., 4 × 12 = 8 × 6 and 64 ÷ 8 ≠ 8 × 8). **5.PFA.2 The student will investigate and use variables in contextual problems.** *Students will demonstrate the following Knowledge and Skills:* a) Describe the concept of a variable (presented as a box, letter, or other symbol) as a representation of an unknown quantity. b) Write an equation (with a single variable that represents an unknown quantity and one operation) from a contextual situation, using addition, subtraction, multiplication, or division.

NAEP 2026	Virginia (2023 SOL)
	c) Use an expression with a variable to represent a given verbal expression involving one operation (e.g., "5 more than a number" can be represented by $y + 5$). d) Create and write a word problem to match a given equation with a single variable and one operation. **6.PFA.4 The student will represent a contextual situation using a linear inequality in one variable with symbols and graphs on a number line.** *Students will demonstrate the following Knowledge and Skills:* a) Given the graph of a linear inequality in one variable on a number line, represent the inequality in two equivalent ways (e.g., $x < -5$ or $-5 > x$) using symbols. Symbols include <, >, ≤, ≥. b) Write a linear inequality in one variable to represent a given constraint or condition in context or given a graph on a number line. c) Given a linear inequality in one variable, create a corresponding contextual situation or create a number line graph. d) Use substitution or a number line graph to justify whether a given number in a specified set makes a linear inequality in one variable true. e) Identify a numerical value(s) that is part of the solution set of a given inequality in one variable.

Implications: In 2nd grade students are asked to reason about finding the missing number in addition and subtraction sentences. Though not explicitly stated, that type of reasoning could be helpful in the 3rd and 4th grade explorations of multiplication and division.

Additionally, students will not have seen inequalities (other than using <. >, =, ≠ to compare numbers or the values of expressions) and will not have discussed variables or created algebraic expressions involving variables.

Recommendations: Leverage opportunities in the 3rd and 4th grade multiplication and division standards to provide additional practice with finding the value of an unknown in a number sentence such as ___ x 9 = 72. This will reinforce important connections between multiplication and division and support developing algebraic reasoning.

Stakeholders may decide to introduce the concept of variables and/or inequalities earlier than recommended.

Minor Area to Consider: Fraction Alignment

There is a small discrepancy in the type of fractions students operate with in the NAEP Framework versus the Virginia Standards of Learning. The NAEP framework has students multiplying whole numbers

by fractions while the Virginia Standards of Learning require multiplying whole numbers by unit fractions.

NAEP 2026	Virginia (2023 SOL)
Number Operations b) Multiply numbers using conventional or unconventional procedures (e.g., strategic decomposing and composing): • Multiplying a fraction by a whole number.	**4.CE.3 The student will estimate, represent, solve, and justify solutions to single-step problems, including those in context, using addition and subtraction of fractions (proper, improper, and mixed numbers with like denominators of 2, 3, 4, 5, 6, 8, 10, and 12), with and without models; and solve single-step contextual problems involving multiplication of a whole number (12 or less) and a unit fraction, with models.** *Students will demonstrate the following Knowledge and Skills:* a) Solve single-step contextual problems involving multiplication of a whole number, limited to 12 or less, and a unit fraction (e.g., $6 \times \frac{1}{3}$, $\frac{1}{5} \times 8$, $2 \times \frac{1}{10}$), with models.* b) Apply the inverse property of multiplication in models (e.g., use a visual fraction model to represent $\frac{4}{4}$ or 1 as the product of $4 \times \frac{1}{4}$).

Implications: There is a chance students might see a problem involving whole number by fraction multiplication. This is relatively minor and not worth rushing a procedure ahead of conceptual understanding.

Recommendations: When students have demonstrated a thorough conceptual understanding of repeatedly adding a unit fraction or multiplying a unit fraction by a whole number, then offer opportunities to extend these strategies to multiplying a whole number by a fraction. Focus on transferable strategies such as visual representations and repeated addition over teaching a procedure.

8th Grade

Significant Area to Consider: Geometry Standards

This target area picks up from the earlier discussion of the geometry standards in and leading up to 4th grade. Here is the discussion of the Geometry strand from p. 28 of the 2026 NAEP Framework:

> By grade 8, understanding of these shapes deepens, with study of cross sections of solids and the beginnings of an analytical understanding of properties of plane figures, especially parallelism, perpendicularity, and angle relations in polygons. Reflections, translations, and rotations (mathematical models of the physical phenomena of reflecting, sliding, and turning) are introduced as distance-preserving transformations that map a figure onto a congruent image. Dilations (expansions and contractions) map figures onto similar images. Properties of congruent and similar figures involve angle measures and lengths, so geometry becomes more and more mixed with measurement in later grades. Placing figures on a coordinate plane provides the beginnings of the connections among algebra, geometry, and analytic geometry.

The NAEP framework ties rigid transformations to congruence and dilations to similarity. They explore the impact of reflections, rotations, translations and dilations on angle measures and lengths and use these to explain congruence and similarity.

NAEP 2026	Virginia (2023 SOL)
Transformation of Shapes and Preservation of Properties c) Recognize or informally describe the effect of a transformation (reflection, rotation, translation, or dilation) on two-dimensional figures. d) Predict results of combining, subdividing, and recombining shapes of plane figures and solids (e.g., paper folding, tiling,subdividing and rearranging the	**6.MG.4 The student will determine congruence of segments, angles, and polygons.** *Students will demonstrate the following Knowledge and Skills:* a) Identify regular polygons. b) Draw lines of symmetry to divide regular polygons into two congruent parts. c) Determine the congruence of segments, angles, and polygons given their properties. d) Determine whether polygons are congruent or noncongruent according to the measures of their sides and angles. **7.MG.2 The student will solve problems and justify relationships of similarity using proportional reasoning.** *Students will demonstrate the following Knowledge and Skills:* a) Identify corresponding congruent angles of similar quadrilaterals and triangles, through the use of geometric markings. b) Identify corresponding sides of similar quadrilaterals and triangles. c) Given two similar quadrilaterals or triangles, write similarity statements using symbols.

NAEP 2026	Virginia (2023 SOL)
pieces). e) Justify relationships of congruence and similarity and apply these relationships using scaling and proportional reasoning.	d) Write proportions to express the relationships between the lengths of corresponding sides of similar quadrilaterals and triangles. e) Recognize and justify if two quadrilaterals or triangles are similar using the ratios of corresponding side lengths. f) Solve a proportion to determine a missing side length of similar quadrilaterals or triangles. g) Given angle measures in a quadrilateral or triangle, determine unknown angle measures in a similar quadrilateral or triangle. h) Apply proportional reasoning to solve problems in context including scale drawings. Scale factors shall have denominators no greater than 12 and decimals no less than tenths. **7.MG.4 The student will apply dilations of polygons in the coordinate plane.** *Students will demonstrate the following Knowledge and Skills:* a) Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been dilated. Scale factors are limited to $\frac{1}{4}$, $\frac{1}{2}$, 2, 3, or 4. The center of the dilation will be the origin. b) Sketch the image of a dilation of a polygon limited to a scale factor of $\frac{1}{4}$, $\frac{1}{2}$, 2, 3, or 4. The center of the dilation will be the origin. c) Identify and describe dilations in context including, but not limited to, scale drawings and graphic design. **8.MG.3 The student will apply translations and reflections to polygons in the coordinate plane.** *Students will demonstrate the following Knowledge and Skills:* a) Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been translated vertically, horizontally, or a combination of both. b) Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been reflected over the x- or *y*-axis c) Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been translated and reflected over the x- or *y*-axis or reflected over the *x*- or *y*-axis and then translated. d) Sketch the image of a polygon that has been translated vertically, horizontally, or a combination of both. e) Sketch the image of a polygon that has been reflected over the *x*- or *y*-axis. f) Sketch the image of a polygon that has been translated and reflected over the *x*- or *y*-axis, or reflected over the *x*- or *y*-axis and then translated.

NAEP 2026	Virginia (2023 SOL)
	g) Identify and describe transformations in context (e.g., tiling, fabric, wallpaper designs, art). **8.MG.5 The student will solve area and perimeter problems involving composite plane figures, including those in context.** *Students will demonstrate the following Knowledge and Skills:* a) Subdivide a plane figure into triangles, rectangles, squares, trapezoids, parallelograms, circles, and semicircles. Determine the area of subdivisions and combine to determine the area of the composite plane figure. b) Subdivide a plane figure into triangles, rectangles, squares, trapezoids, parallelograms, and semicircles. Use the attributes of the subdivisions to determine the perimeter of the composite plane figure. c) Apply perimeter, circumference, and area formulas to solve contextual problems involving composite plane figures.

Implications: A Grade 8 student in Virginia may be able to reflect an image across a line on the coordinate plane and then translate it, but may not understand that the mapping of one image onto another via a series of rigid transformations means that these two images are congruent. Students will certainly have opportunities to translate figures, perform dilations, etc but may not have the opportunities to explore movement and change, make predictions about how transformations impact shapes (similar to 4th grade) or to make precise mathematical arguments about what it means to be congruent as called for by the NAEP framework.

Recommendations: Ensure definitions of congruence and similarity are grounded in similar terminology to NAEP. Look for opportunities to have students explore and generalize noticings related to length measures and angle measures.

Likewise, ensure students have the opportunity to decompose and compose shapes and explore the impact of these changes on area, perimeter, etc. Encourage students to make generalizations, if possible, beyond just finding the resulting area.

Minor Area to Consider: Cube Roots

The NAEP may ask students to estimate cube roots whereas the Virginia Standards of Learning for Grade 8 only require square roots.

NAEP 2026	Virginia (2023 SOL)
Estimation d) Estimate square or cube roots of numbers	**8.NS.1 The student will compare and order real numbers and determine the relationships between real numbers.** *Students will demonstrate the following Knowledge and Skills:*

NAEP 2026	Virginia (2023 SOL)
less than 150 between two whole numbers.	a) Estimate and identify the two consecutive natural numbers between which the positive square root of a given number lies and justify which natural number is the better approximation. Numbers are limited to natural numbers from 1 to 400. b) Use rational approximations (to the nearest hundredth) of irrational numbers to compare, order, and locate values on a number line. Radicals may include both positive and negative square roots of values from 0 to 400 yielding an irrational number. c) Use multiple strategies (e.g., benchmarks, number line, equivalency) to compare and order no more than five real numbers expressed as integers, fractions (proper or improper), decimals, mixed numbers, percents, numbers written in scientific notation, radicals, and π. Radicals may include both positive and negative square roots of values from 0 to 400. Ordering may be in ascending or descending order. Justify solutions orally, in writing or with a model. **A.EO.4 The student will simplify and determine equivalent radical expressions involving square roots of whole numbers and cube roots of integers.** *Students will demonstrate the following Knowledge and Skills:* a) Simplify and determine equivalent radical expressions involving the square root of a whole number in simplest form. b) Simplify and determine equivalent radical expressions involving the cube root of an integer. c) Add, subtract, and multiply radicals, limited to numeric square and cube root expressions. d) Generate equivalent numerical expressions and justify their equivalency for radicals using rational exponents, limited to rational exponents of e) $\frac{1}{2}$ and $\frac{1}{3}$ (e.g., $\sqrt{5} = 5^{\frac{1}{2}}$; $\sqrt[3]{8} = 8^{\frac{1}{3}} = \left(2^3\right)^{\frac{1}{3}} = 2$).

Implications: This discrepancy is very low-stakes, especially given that some students taking the Grade 8 NAEP will already be taking Algebra I in Grade 8.

Recommendations: Given that students will be working with exponents already, it may be worth encouraging questions like 'what values of n make $n^{\ 3} = 27$ true?' This reasoning is within the bounds of the Virginia Standards of Learning and can be connected to cube roots and extended to estimation if needed.