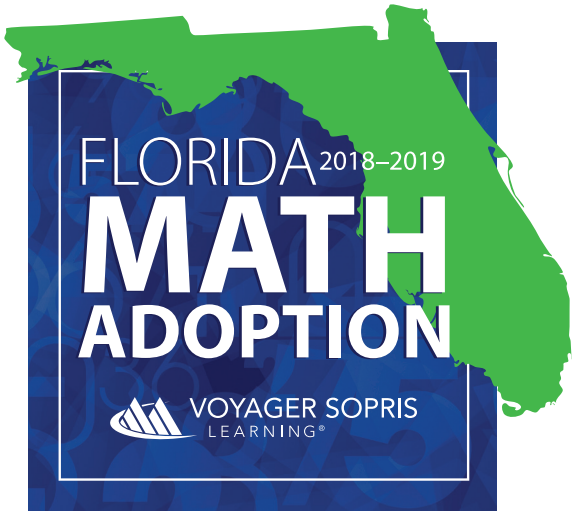

Vmath®

LEVELS G-I

STANDARDS

STANDARDS ALIGNMENT COURSE STANDARDS/BENCHMARKS (Form IM7)

SUBMISSION TITLE:	**Vmath, Level G**
GRADE LEVEL:	**6**
COURSE TITLE:	**Intensive Math**
COURSE CODE:	**1204000**

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.EE.1.1:	Write and evaluate numerical expressions involving whole-number exponents.	Prerequisite skills are addressed.
MAFS.6.EE.1.2:	Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as* $5 - y$. b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression* $2 (8 + 7)$ *as a product of two factors; view* $(8 + 7)$ *as both a single entity and a sum of two terms*. c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas* $V = s^3$ *and* $A = 6 s^2$ *to find the volume and surface area of a cube with sides of length* $s = 1/2$.	Level G Module 4: Lessons 2–5: 154–163

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.EE.1.3:	Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*	Level G Module 4: Lesson 5: 163
MAFS.6.EE.1.4:	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*	Level G Module 4: Lessons 2–5: 154–163
MAFS.6.EE.2.5:	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	Level G Module 4: Lessons 7–15: 166–201

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.EE.2.6:	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	Level G Module 4: Lessons 2–5: 154–163
MAFS.6.EE.2.7:	Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all non-negative rational numbers.	Level G Module 4: Lessons 6–8: 164–173
MAFS.6.EE.2.8:	Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.	Level G Module 4: Lessons 11–12: 182–189

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.EE.3.9:	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*	Prerequisite skills are addressed.
MAFS.6.G.1.1:	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	Level G Module 6: Lessons 1–5, 7: 260–279, 282–285

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.G.1.2:	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = B h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.	Level G Module 6: Lessons 8–9: 286–291
MAFS.6.G.1.3:	Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	Prerequisite skills are addressed.
MAFS.6.G.1.4:	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	Level G Module 6: Lesson 10: 292–295

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.NS.1.1:	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*	Level G Module 3: Lessons 9–10: 136–141
MAFS.6.NS.2.2:	Fluently divide multi-digit numbers using the standard algorithm.	Level G Module 1: Lessons 3–6: 10–25 Level G Module 3: Lesson 4: 116–119 The following is a prerequisite lesson for this standard: Level G Module 1: Lesson 7: 26–29
MAFS.6.NS.2.3:	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.	Level G Module 2: Lessons PL1–3: 44–63

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.NS.2.4:	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*	Level G Module 2: Lessons 4, 5, 6: 64–75
MAFS.6.NS.3.5:	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.	Level G Module 2: Lesson 7: 76–79

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.NS.3.6:	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	Level G Module 2: Lessons 8, 10: 80–83, 88–91

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.NS.3.7:	Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret -3 > -7 as a statement that -3 is located to the right of -7 on a number line oriented from left to right*. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write -3 ℃ > -7 ℃ to express the fact that -3 ℃ is warmer than -7 ℃*. c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of -30 dollars, write |-30| = 30 to describe the size of the debt in dollars*. d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.*	Level G Module 2: Lessons 9, 10: 84–91

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.NS.3.8:	Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.	Level G Module 7: Lesson 10: 340–343
MAFS.6.RP.1.1:	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*	Level G Module 5: Lesson 2: 216–219
MAFS.6.RP.1.2:	Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*	Level G Module 5: Lesson 3: 220–223

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.RP.1.3:	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. e. Understand the concept of Pi as the ratio of the circumference of a circle to its diameter.	Level G Module 5: Lessons 2–3, 6: 216–223, 232–235

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.SP.1.1:	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*	Level G Module 7: Lessons PL1–10: 302–343
MAFS.6.SP.1.2:	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	Level G Module 7: Lessons 1–3, 6–7: 308–317, 326–331
MAFS.6.SP.1.3:	Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	Level G Module 7: Lessons 1–3, 6–7: 308–317, 326–331
MAFS.6.SP.2.4:	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	Level G Module 7: Lessons 4–5, 8–9: 318–325, 332–339

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.6.SP.2.5:	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	Level G Module 7: Lesson PL1, 1–3, 6–7: 302–305, 308–317, 326–331
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them.	Vmath students learn the procedures of a strategy and are given tools to help them remember the procedures as they use them to build conceptual understanding. Struggling math students need reinforcement as they learn to remember these procedures. The How To box provides students with two different examples so they can repeat the procedure.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively.	Visual models are used to introduce new concepts or skills in Vmath. Teachers provide a cognitive think aloud or modeling of reasons and ideas used. Students are able to witness how the visual model provides a representation that has meaning throughout the lesson. Hands-On and Gizmos Lessons provide students opportunities to make connections with manipulatives. Students explore different options and outcomes as they learn more about the concept through the use of manipulatives.
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others.	Strong Vmath teachers use the components of Vmath to have students work in pairs to evaluate thinking. Write Math, Explain It, and Algebraic Thinking are perfect tools to help students begin to construct arguments and work together to compare. Vmath teachers use Critical Thinking questions to help students think more deeply about lesson skills and concepts. Critical Thinking questions focus on thinking skills such as deductive reasoning, decision making, and identifying and explaining errors.
MAFS.K12.MP.4.1:	Model with mathematics.	As the Vmath student begins to make connections between the concepts of math and the skills needed for success, problem solving is introduced strategically throughout each Vmath module. These problem-solving components help students begin to learn how to formulate a plan.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.K12.MP.5.1:	Use appropriate tools strategically.	Vmath is built on the philosophy that students need help in learning how to use the manipulatives and tools introduced in core math programs. Therefore, Vmath directly teaches how to use the tool taught in the lesson. Once students become proficient in how to use the tools, they are better able to transfer the application.
MAFS.K12.MP.6.1:	Attend to precision.	Math Flash lessons and VmathLive provide students with practice to attend to precision and accuracy. In addition, each Vmath lesson also includes an Extra Practice component that can be used.
MAFS.K12.MP.7.1:	Look for and make use of structure.	Vmath Hands-On lessons and Gizmos lessons integrated at point of use help teachers present important math concepts using either common manipulatives or Gizmos, online virtual manipulatives developed by Explore Learning. Additionally, in the daily Vmath lessons, the Build the Concept box uses visual models and pictorial representations to help students develop conceptual understanding.
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning.	Vmath teachers use Critical Thinking questions to help students think more deeply about lesson skills and concepts. Critical Thinking questions focus on thinking skills such as deductive reasoning, decision making, and identifying and explaining errors.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
LAFS.6.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed. c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion. d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.	Each lesson begins with a collaborative conversation reviewing preskills. These reviews provide opportunities to discuss grade 6 topics.
LAFS.6.SL.1.2:	Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.	Gizmos provide students with a format to discover deeper connections to concepts and skills taught in Vmath using engaging digital simulations. Students can manipulate the data to affect the visual model as they also see the mathematical formula created.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
LAFS.6.SL.1.3:	Delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.	The Vmath Teacher Edition highlights times for discussion using the Algebraic Thinking, Write Math, and Explain It components of the lesson.
LAFS.6.SL.2.4:	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.	The Vmath Teacher Edition highlights times for discussion using the Algebraic Thinking, Write Math, and Explain It components of the lesson.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	The How To Box and Problem-Solving Box in Vmath help guide students through the procedural aspects of Vmath.
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.	Vmath includes an animated glossary as well as vocabulary words highlighted at the beginning of lessons when new concepts are taught.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	Explain It components of Vmath lessons encourage students to express thinking, reasoning, and understanding of concepts and skills.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
LAFS.68.WHST.1.1:	Write arguments focused on discipline-specific content. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.	The Write Math of Vmath lessons encourage students to organize their thoughts, reasoning in solving problems, and demonstrate their understanding of concepts and skills.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.	With the explicit and systematic instructional design of Vmath, English language learners are provided consistency in terminology, concepts, and procedures of mathematics. Lessons in the Teacher Edition include differentiation techniques for English language learners, presenting ideas that ensure that each student receives the support needed to build ideas, concepts, and communicate their understanding.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	The Go Learn component of VmathLive ensures students have the practice they need to be successful with grade-level mathematics, while the GoPlay component allows students to participate in math competitions with peers.

STANDARDS ALIGNMENT COURSE STANDARDS/BENCHMARKS (Form IM7)

SUBMISSION TITLE:	**Vmath, Level H**
GRADE LEVEL:	**7**
COURSE TITLE:	**Intensive Math**
COURSE CODE:	**1204000**

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.EE.1.1:	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	Level H Module 4: Lessons PL1–2: 130–137
MAFS.7.EE.1.2:	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*	Level H Module 4: Lessons PL1–2: 130–137
MAFS.7.EE.2.3:	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	Covered throughout; exemplified with Problem–Solving lessons Level H Module 5: Lesson 5: 194 Level H Module 6: Lesson 15: 273

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.EE.2.4:	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* b. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	Level H Module 4: Lessons 3–10: 148–171
MAFS.7.G.1.1:	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	Level H Module 5: Lessons 2–5: 188–194

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.G.1.2:	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	Prerequisite skills are addressed.
MAFS.7.G.1.3:	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	Level H Module 6: Lesson 13: 271
MAFS.7.G.2.4:	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	Level H Module 6: Lessons 1–3: 224–235
MAFS.7.G.2.5:	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	Level H Module 6: Lesson 14: 272
MAFS.7.G.2.6:	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	Level H Module 6: Lessons PL1–PL2, 4–11: 216–223, 236–262

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.NS.1.1:	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged*. b. Understand p + q as the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p – q = p + (–q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers.	Level H Module 1: Lessons 1–8: 2–29 Level H Module 2: Lessons 3–10: 56–81

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.NS.1.2:	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	Level H Module 3: Lessons 1–10: 92–127

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.NS.1.3:	Solve real-world and mathematical problems involving the four operations with rational numbers.	This standard is addressed throughout the entire program. The following are some examples: Level G Module 2: Lessons PL1–PL2: 44–51 Level G Module 3: Lesson 2: 108–111 Level H Module 1: Lessons PL1–8: 2–29 Level H Module 2: Lessons 3–10: 56–81 Level I Module 1: Lessons 3–6, 13–14: 10–25, 47–48 Level G Module 1: Lessons 1–10: 2–39 Level G Module 2: Lessons 2–3: 56–63 Level G Module 3: Lessons 3–10: 112–141 Level G Module 5: Lesson PL2: 210–213 Level H Module 3: Lessons 1–10: 92–127 Level I Module 1: Lessons 7–11, 15: 26–45, 49
MAFS.7.RP.1.1:	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.*	Level H Module 5: Lessons PL1–PL2: 176–183

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.RP.1.2:	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.* d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	Level H Module 5: Lessons 1, 3–6, 10: 184–187, 192–195, 208–211
MAFS.7.RP.1.3:	Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*	Level H Module 5: Lessons PL1–PL2: 176–183 Level H Module 5: Lessons 7–9: 196–207

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.SP.1.1:	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	Level H Module 7: Lessons 2, 10: 290–293, 320–323
MAFS.7.SP.1.2:	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*	Level H Module 7: Lessons 1, 3, 10: 286–289, 294–297, 320–323

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.SP.2.3:	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*	Level H Module 7: Lessons 1, 3, 10: 286–289, 294–297, 320–323
MAFS.7.SP.2.4:	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*	Level H Module 7: Lessons 1, 3, 10: 286–289, 294–297, 320–323

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.SP.3.5:	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	Level H Module 7: Lessons 5–9: 302–319
MAFS.7.SP.3.6:	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*	Level H Module 7: Lessons 5–9: 302–319

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.SP.3.7:	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected*. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*	Level H Module 7: Lessons 5–9: 302–319

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.7.SP.3.8:	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*	Level H Module 7: Lesson 8: 312–315
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them.	Students learn the procedures of a strategy and are given tools to help them remember the procedures as they use them to build conceptual understanding. Struggling math students need reinforcement as they learn to remember these procedures. The How To box provides students with two different examples so they can repeat the procedure.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively.	Visual models are used to introduce new concepts or skills in Vmath. Teachers provide a cognitive think aloud or modeling of reasons and ideas used. Students are able to witness how the visual model provides a representation that has meaning throughout the lesson. Hands-On and Gizmos Lessons provide students opportunities to make connections with manipulatives. Students explore different options and outcomes as they learn more about the concept through the use of manipulatives.
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others.	Strong Vmath teachers use the components of Vmath to have students work in pairs to evaluate thinking. Write Math, Explain It, and Algebraic Thinking are perfect tools to help students begin to construct arguments and work together to compare. Vmath teachers use Critical Thinking questions to help students think more deeply about lesson skills and concepts. Critical Thinking questions focus on thinking skills such as deductive reasoning, decision making, and identifying and explaining errors.
MAFS.K12.MP.4.1:	Model with mathematics.	As the Vmath student begins to make connections between the concepts of math and the skills needed for success, problem solving is introduced strategically throughout each Vmath module. These problem-solving components help students begin to learn how to formulate a plan.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.K12.MP.5.1:	Use appropriate tools strategically.	Vmath is built on the philosophy that students need help in learning how to use the manipulatives and tools introduced in core math programs. Therefore, Vmath directly teaches how to use the tool taught in the lesson. Once students become proficient in how to use the tools, they are better able to transfer the application.
MAFS.K12.MP.6.1:	Attend to precision.	Math Flash lessons and VmathLive provide students with practice to attend to precision and accuracy. In addition, each Vmath lesson also includes an Extra Practice component that can be used.
MAFS.K12.MP.7.1:	Look for and make use of structure.	Vmath Hands-On lessons and Gizmos lessons integrated at point of use help teachers present important math concepts using either common manipulatives or Gizmos, online virtual manipulatives developed by Explore Learning. Additionally, in the daily Vmath lessons, the Build the Concept box uses visual models and pictorial representations to help students develop conceptual understanding.
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning.	Vmath teachers use Critical Thinking questions to help students think more deeply about lesson skills and concepts. Critical Thinking questions focus on thinking skills such as deductive reasoning, decision making, and identifying and explaining errors.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	The How To Box and Problem-Solving Box in Vmath help guide students through the procedural aspects of Vmath.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.	Vmath includes an animated glossary as well as vocabulary words highlighted at the beginning of lessons when new concepts are taught.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	Explain It components of Vmath lessons encourage students to express thinking, reasoning, and understanding of concepts and skills.
LAFS.68.WHST.1.1:	Write arguments focused on discipline-specific content. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.	The Write Math of Vmath lessons encourage students to organize their thoughts, reasoning in solving problems, and demonstrate their understanding of concepts and skills.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
LAFS.7.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed. d. Acknowledge new information expressed by others and, when warranted, modify their own views.	Each lesson begins with a collaborative conversation reviewing preskills. These reviews provide opportunities to discuss grade 7 topics.
LAFS.7.SL.1.2:	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.	Gizmos provide students with a format to discover deeper connections to concepts and skills taught in Vmath using engaging digital simulations. Students can manipulate the data to affect the visual model as they also see the mathematical formula created.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
LAFS.7.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.	The Vmath Teacher Edition highlights times for discussion using the Algebraic Thinking, Write Math, and Explain It components of the lesson.
LAFS.7.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.	Write Math, Algebraic Thinking, and Explain It components of Vmath help students organize their thoughts to present their solutions to problems.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.	With the explicit and systematic instructional design of Vmath, English language learners are provided consistency in terminology, concepts, and procedures of mathematics. Lessons in the Teacher Edition include differentiation techniques for English language learners, presenting ideas that ensure that each student receives the support needed to build ideas, concepts, and communicate their understanding.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	The Go Learn component of VmathLive ensures students have the practice they need to be successful with grade-level mathematics, while the GoPlay component allows students to participate in math competitions with peers.

STANDARDS ALIGNMENT COURSE STANDARDS/BENCHMARKS (Form IM7)

SUBMISSION TITLE:	**Vmath, Level I**
GRADE LEVEL:	**8**
COURSE TITLE:	**Intensive Math**
COURSE CODE:	**1204000**

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.EE.1.1:	Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$	Level I Module 2: Lessons 1–4: 62–77
MAFS.8.EE.1.2:	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	Level I Module 2: Lessons 7–10: 84–95 Level I Module 7: Lesson PL2: 302–305
MAFS.8.EE.1.3:	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.*	Level I Module 2: Lesson 5: 78–82

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.EE.1.4:	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	Level I Module 2: Lesson 5: 78–82
MAFS.8.EE.2.5:	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*	Level I Module 5: Lessons 5–6: 224–231
MAFS.8.EE.2.6:	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.	Level I Module 4: Lessons 12–14: 186–193 Level I Module 5: Lessons 3, 7: 219, 232

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.EE.3.7:	Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	Level I Module 3: Lessons 1–10: 108–141

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.EE.3.8:	Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*	Level I Module 5: Lessons 9–10: 234–239
MAFS.8.F.1.1:	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	Level I Module 4: Lessons 4, 7–11: 166–185 Level I Module 5: Lessons 1–3: 212–219

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.F.1.2:	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*	The following are prerequisite lessons for this standard: Level I Module 4: Lessons 11–12: 182–187
MAFS.8.F.1.3:	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	Level I Module 5: Lessons 2, 7–8: 214–215, 232–233
MAFS.8.F.2.4:	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	Level I Module 4: Lessons 4, 7–11: 163, 166–185 Level I Module 5: Lessons 1–3: 212–219

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.F.2.5:	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	Level I Module 4: Lessons 4, 7–11: 163, 166–185 Level I Module 5: Lessons 1–3: 212–219
MAFS.8.G.1.1:	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.	Level I Module 6: Lessons 8–10: 280–291 The following are prerequisite lessons for this standard: Level I Module 6: Lessons 5–7: 268–279 The following is an extension of this standard: Level I Module 6: Lesson 1: 252–255
MAFS.8.G.1.2:	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	Level I Module 6: Lessons 5–7: 268–279, 288–291
MAFS.8.G.1.3:	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	Level I Module 6: Lessons 7–10: 276–291

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.G.1.4:	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	Level I Module 6: Lessons 1–3, 9: 252–263, 284–287
MAFS.8.G.1.5:	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*	Level I Module 6: Lessons PL2, 3–4: 248–251, 260–267
MAFS.8.G.2.6:	Explain a proof of the Pythagorean Theorem and its converse.	Level I Module 7: Lessons 8–9: 334–339
MAFS.8.G.2.7:	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	Level I Module 7: Lessons 8–9: 334–339
MAFS.8.G.2.8:	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	Level I Module 7: Lessons 8–10: 334–343

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.G.3.9:	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	Level I Module 7: Lessons 6–7: 326–333
MAFS.8.NS.1.1:	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	The following is a prerequisite lesson for this standard: Level I Module 2: Lesson 9: 92–94
MAFS.8.NS.1.2:	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	Level I Module 2: Lesson 9: 92–94
MAFS.8.SP.1.1:	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	Level I Module 4: Lesson 2: 158–161

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.SP.1.2:	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	Level I Module 4: Lesson 2: 158–161
MAFS.8.SP.1.3:	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*	Level I Module 4: Lesson 2: 158–161

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.8.SP.1.4:	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*	Level I Module 4: Lessons 2–3: 158–162
MAFS.K12.MP.1.1:	Make sense of problems and persevere in solving them.	Students learn the procedures of a strategy and are given tools to help them remember the procedures as they use them to build conceptual understanding. Struggling math students need reinforcement as they learn to remember these procedures. The How To box provides students with two different examples so they can repeat the procedure.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.K12.MP.2.1:	Reason abstractly and quantitatively.	Visual models are used to introduce new concepts or skills in Vmath. Teachers provide a cognitive think aloud or modeling of reasons and ideas used. Students are able to witness how the visual model provides a representation that has meaning throughout the lesson. Hands-On and Gizmos Lessons provide students opportunities to make connections with manipulatives. Students explore different options and outcomes as they learn more about the concept through the use of manipulatives.
MAFS.K12.MP.3.1:	Construct viable arguments and critique the reasoning of others.	Strong Vmath teachers use the components of Vmath to have students work in pairs to evaluate thinking. Write Math, Explain It, and Algebraic Thinking are perfect tools to help students begin to construct arguments and work together to compare. Vmath teachers use Critical Thinking questions to help students think more deeply about lesson skills and concepts. Critical Thinking questions focus on thinking skills such as deductive reasoning, decision making, and identifying and explaining errors.
MAFS.K12.MP.4.1:	Model with mathematics.	As the Vmath student begins to make connections between the concepts of math and the skills needed for success, problem solving is introduced strategically throughout each Vmath module. These problem-solving components help students begin to learn how to formulate a plan.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
MAFS.K12.MP.5.1:	Use appropriate tools strategically.	Vmath is built on the philosophy that students need help in learning how to use the manipulatives and tools introduced in core math programs. Therefore, Vmath directly teaches how to use the tool taught in the lesson. Once students become proficient in how to use the tools, they are better able to transfer the application.
MAFS.K12.MP.6.1:	Attend to precision.	Math Flash lessons and VmathLive provide students with practice to attend to precision and accuracy. In addition, each Vmath lesson also includes an Extra Practice component that can be used.
MAFS.K12.MP.7.1:	Look for and make use of structure.	Vmath Hands-On lessons and Gizmos lessons integrated at point of use help teachers present important math concepts using either common manipulatives or Gizmos, online virtual manipulatives developed by Explore Learning. Additionally, in the daily Vmath lessons, the Build the Concept box uses visual models and pictorial representations to help students develop conceptual understanding.
MAFS.K12.MP.8.1:	Look for and express regularity in repeated reasoning.	Vmath teachers use Critical Thinking questions to help students think more deeply about lesson skills and concepts. Critical Thinking questions focus on thinking skills such as deductive reasoning, decision making, and identifying and explaining errors.
LAFS.68.RST.1.3:	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	The How To Box and Problem-Solving Box in Vmath help guide students through the procedural aspects of Vmath.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
LAFS.68.RST.2.4:	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.	Vmath includes an animated glossary as well as vocabulary words highlighted at the beginning of lessons when new concepts are taught.
LAFS.68.RST.3.7:	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	Explain It components of Vmath lessons encourage students to express thinking, reasoning, and understanding of concepts and skills.
LAFS.68.WHST.1.1:	Write arguments focused on discipline-specific content. a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.	The Write Math of Vmath lessons encourage students to organize their thoughts, reasoning in solving problems, and demonstrate their understanding of concepts and skills.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
LAFS.8.SL.1.1:	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b. Follow rules for collegial discussions and decision-making, track progress toward specific goals and deadlines, and define individual roles as needed. c. Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas. d. Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.	Each lesson begins with a collaborative conversation reviewing preskills. These reviews provide opportunities to discuss grade 8 topics.
LAFS.8.SL.1.2:	Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.	Gizmos provide students with a format to discover deeper connections to concepts and skills taught in Vmath using engaging digital simulations. Students can manipulate the data to affect the visual model as they also see the mathematical formula created.

Benchmark Code	Benchmark	Lessons Where Standard/Benchmark Is Directly Addressed In Major Tool (Most In–Depth Coverage Listed First)
LAFS.8.SL.1.3:	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.	The Vmath Teacher Edition highlights times for discussion using the Algebraic Thinking, Write Math, and Explain It components of the lesson.
LAFS.8.SL.2.4:	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.	Write Math, Algebraic Thinking, and Explain It components of Vmath help students organize their thoughts to present their solutions to problems.
ELD.K12.ELL.MA.1:	English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics.	With the explicit and systematic instructional design of Vmath, English language learners are provided consistency in terminology, concepts, and procedures of mathematics. Lessons in the Teacher Edition include differentiation techniques for English language learners, presenting ideas that ensure that each student receives the support needed to build ideas, concepts, and communicate their understanding.
ELD.K12.ELL.SI.1:	English language learners communicate for social and instructional purposes within the school setting.	The Go Learn component of VmathLive ensures students have the practice they need to be successful with grade-level mathematics, while the GoPlay component allows students to participate in math competitions with peers.