Mathematics Grade-Level Instructional Materials Evaluation Tool

Quality Review

GRADE 8

Council of the Great City Schools

Textbooks and their digital counterparts are vital classroom tools but also a major expense, and it is worth taking time to find the best quality materials for students and teachers. While there is no perfect set of materials or textbooks, this Grade-Level Instructional Materials Evaluation Tool-Quality Review (GIMET-QR) is designed for use by professionals as a framework for evaluating the quality of instructional materials and choosing materials that are best suited to provide a coherent learning experience for students.

The district should begin its textbook adoption process by screening an entire publisher series with the Instructional Materials Evaluation Toolkit (IMET), developed by Student Achievement Partners, to see which ones are worthy of deeper consideration. The GIMET-QR can then be used to evaluate materials *for each individual grade*. But rather than providing an exhaustive list of grade-level standards, GIMET-QR starts with the progression to algebra continuum as the major area of focus, allowing for the in-depth review of a smaller set of mathematical concepts covered in the Common Core State Standards Mathematics (CCSS-M) at each grade level.

The GIMET-QR focuses on both the quality of the *content* and the instructional *design* of materials—with a specific focus on evaluating whether materials contain a balance of the three components of rigor (conceptual understanding, applications, and fluency) called for in CCSS-M. Unlike many tools that evaluate the presence or absence of required content, the GIMET-QR prompts reviewers to ask, "How *well* do the materials and assignments reflect and support the rigor of the CCSS-M?"

To answer this question, GIMET-QR contains Guiding Statements along with references to the CCSS for each statement. In response to each Guiding Statement, reviewers are asked to cite specific supporting evidence from the materials themselves, rather than relying on the table of contents or the topic headings. This supporting evidence can then be used to rate whether and to what degree the criteria have been met so that all students have access to a quality mathematics program.

It is important to keep in mind that quality is not defined as "compliance" or a mere checklist of topics. The GIMET-QR aims to help schools and districts choose materials that will provide the best overall learning experience for their students. The distinctive features of instructional materials, like style and appeal that contribute to engaging students in mathematics, should therefore be considered along with the mathematical content and cognitive demand.

The review process culminates with a summary in which reviewers cite strengths and weaknesses of the product, thus providing explicit details for the overall assessment. The summary may also indicate, prior to making a recommendation for purchase, any areas that district curriculum leaders may need to augment or supplement.

Please note: Acrobat Reader or Adobe Acrobat is required to complete this form electronically and save any data entered by users.

THE STRUCTURE OF GIMET-QR

The GIMET-QR for Mathematics is divided into four sections:

I. "CCSS-M" clusters and standards along the "progression to algebra continuum" for grade eight

This first section focuses on the content of the materials under review and on the quality of the explanations and connections that develop the concepts and skills for the algebra continuum in grade eight. This section features "guiding statements" that require reviewers to examine the quality of the materials, as well as the assignments that address the level of rigor in CCSS-M. The statements about materials and assignments are similar, but their focus is different. While the materials statements ask the reviewer to show evidence about the quality of how concepts and skills are attended to in the text or digital resource under review, the assignments statements ask the reviewer to cite evidence that students are given the opportunity to apply their understanding of those concepts and skills.

The statements in bold print in GIMET-QR refer to the CCSS-M clusters (i.e., 8.EE.1-3) for reviewers to use in considering the quality of materials and assignments. The reviewer may notice that the wording of the cluster heading is somewhat different than what is written in CCSS-M. This was done to address what materials and assignments could offer in support of the cluster standards. However, the essential wording of the cluster headings is maintained. The standards indicated within GIMET-QR are listed as written in CCSS-M. In grade eight, the "CCSS progression documents," from the Institute of Mathematics,[1] were used to provide additional specificity and clarity for the reviewers about what to look for in *6-7 Ratios and Proportional Relationships*, *6-8 Expressions and Equations*, and *Grade 8 and High School Functions*. This progression information within the document is indicated using an indentation and preceded by the symbol (▶).

II. Decision Recording Sheets: Quality Criteria for Conceptual Understanding, Applications, and Fluency with an accompanying rubric for high quality/exciting materials and assignments

The second section asks the reviewer to reflect on the findings from the first section to answer the question of how well the materials reflect and support the rigor of the CCSS-M. Reviewers are asked to consider how well the materials support teachers and engage students. Judgments are made after organizing the evidence around each of three dimensions of rigor—**conceptual understanding**, **applications**, and **fluency**. Reviewers assign one of three ratings: **High Quality/Exciting**, **Good Quality** or **Minimal Quality**. The section also includes a rubric which describes high quality/exciting materials and establishes the highest criteria for both materials and assignments.

III. Adoption Committee Recommendation Form

The third section, to be completed after reviewing multiple submissions for adoption, is an *Adoption Committee Recommendation Form*. This provides reviewers with an opportunity to list their top three choices and cite specific strengths and weaknesses for all of the materials being reviewed.

IV. Appendix

The fourth section is an Appendix that includes *The Progression to Algebra Continuum.*

GIMET-QR does not attend to all the grade eight standards but rather only those listed within the progression to algebra continuum. GIMET-QR does not attend to coherence across grade levels but does look for coherence within a grade when considering the quality of materials and assignments. Similar to CCSS-M, GIMET-QR operates at a very fine grain size, while individual lessons and units might work across clusters. GIMET-QR is not a checklist that would fragment the CCSS-M, rather the "fine grain size" deliberately focuses on how well the materials reflect the intent of the CCSS-M.

1 University of Arizona Institute of Mathematics, http://ime.math.arizona.edu/progressions/

GETTING STARTED

Completing the GIMET-QR entails a five-step process. Reviewers are expected to read through each of the steps and their explanations, and locate all the pertinent tables and pages before starting. Then complete each step.

Step one – Individual reviewers will evaluate how well the materials and their accompanying assignments develop the algebra continuum content for each grade level. Use the tables that start on page four to capture the evidence of how and where the materials do this. The purpose for noting specific examples as evidence is to contribute to discussions with other reviewers in steps two through four. Cite specific examples of the explanations, diagrams, and pictorial representations in the materials and assignments that prompt students to show their understanding. Additionally, reviewers should consider the interaction of students with the materials in two areas: 1) students as receptive learners (interactions with the explanations and illustrations in the materials) and 2) students producing and showing their understanding (interacting and completing the assignments in the materials).

Step two – Discuss your findings and evidence with other reviewers. Reviewers should discuss the evidence cited and use it to confirm or assist you (individually) in reviewing and revising your findings.

Step three – Next, reviewers need to consider the interaction of students and teachers with the content of the materials along three dimensions of rigor—**conceptual understanding**, **applications**, and **fluency**—to assign a judgment of quality to each dimension. Reviewers should answer the question: How well do the materials reflect and support the rigor of the CCSS-Mathematics overall? Reviewers will use the guiding questions found in the **Decision Recording Sheet** together with the rubric describing **high quality** to assign ratings. Consider the totality of the collected evidence along the dimensions of rigor, and record your rating at the bottom of each table.

The highest level of quality is described using the words "**High Quality/ Exciting**." We use these words to indicate a high degree of excitement about the materials and the assignments. As the reviewer considers the descriptors, keep in mind that these criteria apply to each dimension of rigor for both the materials and the assignments they present to students. To earn this rating, the evidence must demonstrate grade-level rigor of the CCSS-M in an engaging way.

The other levels represent varying degrees of quality. For example, "**Good Quality**" indicates that the materials and assignments are workable or sufficient. "**Minimal Quality,**" meanwhile, indicates that the materials are sufficient on their own, but would not be conducive to motivating students.

These descriptions will be used for rating the overall quality of the program.

Step four – Discuss your findings and conclusions with other reviewers. Include the following questions as a part of the discussion:

- What are the top three strengths of the texts?
- What areas need improvement?
- What additional supports would be needed to implement the textbook series or digital materials?

Step five – After discussion, reach consensus and make final recommendations on the **Adoption Committee Recommendation Form.**

I. CCSS-M CLUSTERS AND STANDARDS

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
8.EE.1-4. Materials demonstrate how to work with radicals and integer exponents by showing and explaining how to: ■ Apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \bullet 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. ▶ *Requiring the rule $10^a \bullet 10^b = 10^{a+b}$ to hold when a and b are integers leads to the definition of the meaning of powers with 0 and negative exponents. For example, we define $10^0 = 1$ because we want $10^a \times 10^0 = 10^{a+0} = 10^a$, so 10^0 must equal 1. Students extend these rules to other bases, and learn other properties of exponents. This lays the foundation for students to learn the properties of rational exponents in high school.* ■ Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$ and explain why $\sqrt{2}$ is irrational. ▶ *Since $\sqrt{p}$ is defined as the positive solution to the equation $x^2=p$ (when it exists), it is not correct to say (as is common) that $\sqrt{64} = \pm 8$. On the other hand, in describing the solutions to $x^2= 64$, students can write $x = \pm\sqrt{64} = \pm 8$.* ■ Use numbers expressed in the form of a single digit times a whole-number 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, they 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.* ■ Perform operations with, estimate, and interpret numbers expressed in scientific notation, using appropriate size for measurements of very large or very small quantities.	■ Lesson 1-2: Explore Activities, pp. 13, 16 and Digital Student Center; Learn Resources and Examples 1-7, pp. 14-20 Lesson 1-3: Explore Activity, p. 25 and Digital Student Center; Learn Resources and Examples 1-4, pp. 25-28 Lesson 1-4: Explore Activities, pp. 33, 35 and Digital Student Center; Learn Resources and Examples 1-5, pp. 33-38 ■ Lesson 2-2: Learn Resources and Examples 1, 5, 8, pp. 80, 83, 86 Lesson 2-3: Learn Resource, pp. 91-92 ■ Lesson 1-5: Explore Activity, p. 43 and Digital Student Center; Learn Resource and Examples 4-5, pp. 47-48 Lesson 1-6: Example 2, pp. 56-57 ■ Lesson 1-5: Learn Resource and Examples 1-3, 6-7, pp. 43-46, 49-50 Lesson 1-6: Learn Resources and Examples 1-3, pp. 55-58

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
8.EE.1-4. Assignments ask students to work with radicals and integer exponents by:	
■ Evaluating square roots of small perfect squares and cube roots of small perfect cubes.	■ Lesson 2-2: pp. 89-90, Exercises 1-4, 6-7, 9, 11-12
■ Knowing and describing why $\sqrt{2}$ is irrational.	■ Lesson 2-3: p. 100, Exercise 17
■ Evaluating and generating equivalent numerical expressions by applying properties of integer exponents.	■ Lesson 1-2: pp. 23-24, Exercises 1-11 Lesson 1-3: pp. 31-32, Exercises 1-12 Lesson 1-4: pp. 41-42, Exercises 5-14
■ Solving equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number.	■ Lesson 2-2: p. 89, Exercises 5, 8, 10
■ Estimating quantities using scientific notation and determining how many times as large one number is in relation to another. 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.	■ Lesson 1-5: p. 53, Exercises 5, 6, 8, 9 Lesson 1-6: pp. 61-62, Exercises 2, 5
■ Performing operations with, estimating, and interpreting numbers expressed in scientific notation, using appropriate size for measurements of very large or very small quantities. ▶ *For example, given that we breathe about 6 liters of air per minute, they estimate that there are $60 \times 24 = 6 \times 2.4 \times 10^2 \approx 1.5 \times 10^3$ minutes in a day, and that we therefore breathe about $6 \times 1.5 \times 10 \approx 10^4$ liters in a day. In a lifetime of 75 years there are about $365 \times 75 \approx 3 \times 10^4$ days, and so we breathe about $3 \times 10^4 \times 10^4 = 3 \times 10^8$ liters of air in a lifetime.*	■ Lesson 1-5, pp. 53-54, Exercises 1-4, 7, 10-12, 14-15 Lesson 1-6, pp. 61-62, Exercises 1-8

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
8.EE.5-6. Materials illustrate connections between proportional relationships, lines, and linear equations by showing and explaining how to: ■ Graph proportional relationships, interpret the unit rate as the slope of the graph of a proportional relationship, and apply these concepts to solve real-world problems. ■ Compare two different proportional relationships represented in different ways. ▶ *In grade eight, proportional relationships should prompt students to begin connecting a number of notions that have been developing over grades six and seven: 1) an expression in one variable defines a general calculation in which the variable can represent a range of numbers with the variable representing the input and the expression calculating the output; 2) choosing a variable to represent the output leads to an equation in two variables describing the relationship between two quantities; 3) tabulating values of the expression is the same as tabulating solution pairs of the corresponding equation; and 4) plotting points on the coordinate plane affords a visual representation of the relationship between two quantities. For example, a table shows 300 miles in 5 hours, whereas the graph could show more than 300 miles in the same time. Or, one can compare a distance-time graph to a distance-time equation to determine which of the two moving objects has greater speed.* ■ Use similar triangles to show that the slope is the same between any two distinct points on a non-vertical line in the coordinate plane. ■ Show that whether a line has a well-defined slope—that the ratio between the rise and run for any two points on the line is always the same—depends on similar triangles. ▶ The connection between the unit rate in a proportional relationship and the slope of its graph depends on a connection with the geometry of similar triangles. ■ 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.	■ Lesson 4-1: Explore Activity, p. 175 and Digital Student Center; Learn Resources and Examples 1-3, pp. 175-181 ■ Lesson 4-1: Learn Activity and Examples 4-5, pp. 182-186 ■ Lesson 4-3: Explore Activity, p. 205 and Digital Student Center; Learn Resources and Example 1, pp. 205-208 ■ Lesson 4-3: Learn Resource and Example 2, pp. 206-207, 209-210 ■ Lesson 4-4: Explore Activity, p. 213 and Digital Student Center; Learn Resource and Examples 1-3, pp. 213-220 Lesson 4-5: Explore Activity, p. 225 and Digital Student Center; Learn Resources and Examples 2-5, pp. 225-232

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
8.EE.5-6. Assignments ask students to illustrate connections between proportional relationships, lines, and linear equations by:	
▪ Graphing proportional relationships, interpreting the unit rate as the slope of the graph of a proportional relationship, and applying these concepts to solve real-world problems.	▪ Lesson 4-1: pp. 189-190, Exercises 2-3, 7
▪ Comparing 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.*	▪ Lesson 4-1: pp. 189-190, Exercises 1, 4-6, 10
▪ Using similar triangles to show that the slope 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.	▪ Lesson 4-3: pp. 211-212, Exercises 1-7, 11 Lesson 4-4: pp. 223-224, Exercises 1-7 Lesson 4-5: pp. 235-236, Exercises 3-9, 11-12

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
8.EE.7-8. Materials demonstrate how to analyze and solve linear equations and pairs of simultaneous linear equations by showing and explaining how to: ■ Transform equations into simple forms, providing 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). ■ Solve mathematical and real-world linear equations in one variable, with rational number coefficients, including those that require use of the distributive property or combining like terms. ■ Analyze and solve pairs of simultaneous linear equations. ● 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. ● Solve systems of two linear equations in two variables algebraically, estimate solutions by graphing the equations, and 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.* ● Solve mathematical and real-world 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.*	■ Lesson 3-5: Explore Activity, p. 159 and Digital Student Center; Learn Resources and Examples 1-4, pp. 159-164 ■ Lesson 3-1: Explore Activity, p. 129 and Digital Student Center; Learn Resource and Examples 1-3, pp. 129-134 Lesson 3-2: Explore Activity, p. 137 and Digital Student Center; Learn Resource and Examples 1-2, pp. 137-140 Lesson 3-3: Learn Resource and Examples 1-3, pp. 145-148 Lesson 3-4: Explore Activity, p. 151 and Digital Student Center; Learn Resource and Examples 1-2, pp. 151-154. ■ Lesson 6-1: Explore Activity, p. 319 and Digital Student Center; Learn Resources and Examples 1-4, pp. 319-326 Lesson 6-2: Explore Activity, p. 331, and Digital Student Center; Learn Resource and Examples 1-4, pp. 331-336 Lesson 6-3: Explore Activity, p. 341, and Digital Student Center; Learn Resources and Examples 1-5, pp. 341-346 Lesson 6-4: Explore Activity, p. 351, and Digital Student Center; Learn Resources and Examples 1-4, pp. 351-358 Lesson 6-5: Learn Resource and Examples 1-4, pp. 363-370 • Lesson 6-1: Explore Activity, p. 319 and Digital Student Center; Learn Resource and Examples 1-4, pp. 319-326 • Lesson 6-1: Explore Activity, p. 319 and Digital Student Center; Learn Resource and Examples 1-4, pp. 319-326 Lesson 6-2: Explore Activity, p. 331, and Digital Student Center; Learn Resource and Examples 1-4, pp. 331-336 Lesson 6-3: Explore Activity, p. 341, and Digital Student Center; Learn Resources and Examples 1-5, pp. 341-346 Lesson 6-4: Explore Activity, p. 351, and Digital Student Center; Learn Resources and Examples 1-4, pp. 351-358 • Lesson 6-2: Example 4, pp. 335-336 Lesson 6-5: Learn Resource and Examples 1-4, pp. 363-370

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
8.EE.7-8. Assignments ask students to analyze and solve linear equations by: ■ Solving mathematical and real-world linear equations in one variable, with rational number coefficients, including those that require use of the distributive property or combining of like terms. ■ Analyzing and solving mathematical and real-world problems leading to two linear equations in two variables graphically, algebraically, and by inspection. ▶ *Linear equations arise when two linear functions are compared. For example, Henry and Jose are gaining weight for football. Henry weighs 205 pounds and is gaining 2 pounds per week. Jose weighs 195 pounds and is gaining 3 pounds per week. When will they weigh the same?* ▶ *Solve problems leading to simultaneous equations. For example, tickets for the class show are $3 for students and $10 for adults. The auditorium holds 450 people. The show was sold out and the class raised $2750 in ticket sales. How many students bought tickets?*	■ Lesson 3-1: pp. 135-136, Exercises 1-10 Lesson 3-2: pp. 143-144, Execises 1-7 Lesson 3-3: pp. 149-150, Exercises 1-9 Lesson 3-4: pp. 157-158, Exercises 1-4 Lesson 3-5, p. 167, Exercses 1-4 ■ Lesson 6-1: pp. 329-330, Exercises 1-7 Lesson 6-2: pp. 339-340, Exercises 1-12 Lesson 6-3: pp. 349-450, Exercises 1-13 Lesson 6-4: pp. 361-362, Exercises 1-13 Lesson 6-5: pp. 373-374, Exercises 1-7
8.F.1-3. Materials demonstrate how to define, evaluate, and compare functions by: ■ Showing and explaining 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 (function notation is not required in grade eight). ■ Explaining and showing how to compare properties of two functions in multiple ways (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.* ■ Showing and explaining how to interpret the equation $y = mx + b$ as a linear function, whose graph is a straight line. ■ Providing 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.*	■ Lesson 5-1: Explore Activity, p. 253 and Digital Student Center; Learn Resources and Examples 1-4, pp. 253-260 Lesson 5-2: Learn Resource and Example 3, pp. 266-268 ■ Lesson 5-4: Explore Activity, p. 285 and Digital Student Center; Learn Resource and Examples 1-2, pp. 285-288 ■ Lesson 5-3: Learn Resources and Examples 1-3, pp. 273-280 ■ Lesson 5-5: Explore Activity, p. 293 and Digital Student Center; Learn Resources and Examples 1-4, pp. 293-300

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
8.F.1-3. Assignments ask students to define, evaluate, and compare functions by: ■ Determining whether a graph, table, or algebraic representation is a function. ● This extends prior experiences with graphs and tables as students explore functional relationships algebraically, graphically, numerically in tables, and through verbal descriptions. They explain correspondences between verbal descriptions, tables, and graphs. Repeated reasoning about entries in tables or points on graphs results in equations for functional relationships. ■ Classifying, comparing, and describing properties of two functions represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). ■ Interpreting the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; giving examples of functions that are not linear.	■ Lesson 5-1: pp. 261-262, Exercises 1-6 • Lesson 5-3: p. 283, Exercises 1-4 ■ Lesson 5-4: pp. 291-292, Exercises 1-6 ■ Lesson 5-5: pp. 303-304, Exercises 1-10
8.F.4-5. Materials demonstrate how to use functions to model relationships between quantities by showing and explaining how to: ■ Use a function to model a linear relationship between two quantities. ■ Determine the rate of change and initial value of a 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. ■ Identify 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.	■ Lesson 5-3: Learn Resources and Examples 1-3, pp. 273-280 ■ Lesson 5-3: Learn Resources and Examples 1-3, pp. 273-280 Lesson 5-4: Learn Resource and Examples 1-2, pp. 285-288 ■ Lesson 5-3: Learn Resources and Examples 1-3, pp. 273-280 Lesson 5-4: Learn Resource and Examples 1-2, pp. 285-288 ■ Lesson 5-6: Explore Activity, p. 305 and Digital Student Center; Learn Resource and Example 1, pp. 305-306 ■ Lesson 5-6: Learn Resource and Examples 2-3, pp. 307-309

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
8.F.4-5. Assignments ask students to use functions to model relationships between quantities by: ■ Constructing a function to model a linear relationship between two quantities described with or without a context. ▶ When using functions to model a linear relationship between two quantities, students need to learn to determine the rate of change of the function, which is the slope of the line that is its graph. They can read (or compute or approximate) the rate of change from a table or a graph. ■ Determining and interpreting 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. ■ Describing qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketching a graph that exhibits the qualitative features of a function that has been described verbally. ▶ To understand relationships between quantities, it is often helpful to describe the relationships qualitatively, paying attention to the general shape of the graph without concern for specific numerical values. The standard approach proceeds from left to right, describing what happens to the output as the input value increases.	■ Lesson 5-3: pp. 283-284, Exercises 1-6 Lesson 4-2: pp. 203-204, Exercises 1-6, 8 ■ Lesson 5-3: pp. 283-284, Exercises 1-6 Lesson 5-4: pp. 291-292, Exercises 1-4 ■ Lesson 5-6: pp. 311-312, Exercises 1-7

II. DECISION RECORDING SHEET

Completed by: ____ Date: ___________________________

Use the evidence that you collected for grade eight to begin judging the overall quality of the program. Begin by answering the overarching question: ***How well do the materials reflect and support the rigor of the CCSS-M?*** *Use the accompanying rubric which describes the criteria for high quality/exciting materials and assignments that engage both students and teachers.*

Rigor requirement (balance): A program that emphasizes only fluency is not rigorous. Likewise, a program that only focuses on applications or conceptual understanding is not rigorous. For a program to be rigorous, there must be a balance of all three (conceptual understanding, applications, and fluency) as indicated in the grade level standards. By the end of grade eight, students strategically choose and efficiently implement procedures to solve linear equations in one variable. They understand that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions for the original equation. These specific requirements address procedural skill (procedural skill refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing procedures flexibly, accurately, and efficiently).

Criteria for Rigor and Quality in Conceptual Understanding, Applications, and Fluency

<table>
<tr><th colspan="2">CONCEPTUAL UNDERSTANDING: CONNECTIONS</th></tr>
<tr>
<td>Materials:
■ How well do the materials develop conceptual understanding of operations and algebraic thinking as defined in the CCSS-M and in the Progression to Algebra (Appendix A)?
■ How well do the materials connect to and extend prior knowledge?
• The materials present and describe explicit connections to prior knowledge, connections among mathematical ideas, and connections among different mathematical representations, using appropriate academic language.
■ How well do the materials develop academic language (including words, phrases, and sentences using symbols, graphs, and diagrams)?</td>
<td>Assignments:
How well do the assignments prompt students to produce explanations and viable arguments?
• The set of assignments challenge students to use their mathematical knowledge, academic language, and skills to solve problems and formulate mathematical models in a variety of contexts.
■ How well do the assignments ask students to make explicit connections to prior knowledge, connections among mathematical ideas, and connections among different mathematical representations?</td>
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CONNECTIONS: CRITERIA FOR MEETING THE RATING OF "**HIGH QUALITY/EXCITING**"		
	Materials *The materials present and describe explicit connections to prior knowledge, connections among mathematical ideas, and connections among different mathematical representations, using appropriate academic language.*	**Assignments** *The assignments in the materials encourage and challenge students to use their mathematical knowledge, academic language, and skills to solve problems and formulate mathematical models in a variety of contexts.*
Student	*Using high quality/exciting materials, my students will:* ▪ comprehend the concepts and connections in the materials. ▪ make sense of the mathematics. ▪ be excited to try the problems and learn from working on them. ▪ want to learn the mathematical concepts and gain confidence that effort to learn will pay off.	*Using high quality/exciting assignments, my students will:* ▪ engage in the challenge of comprehension and discussion. ▪ make sense of the mathematics. ▪ be excited to try the problems and learn from working on them. ▪ want to learn the mathematical concepts and gain confidence that their effort to learn will pay off.
Teacher	*Using high quality/exciting materials will help me:* ▪ see and understand the mathematical goals of the lesson/unit. ▪ understand better the mathematics that I am teaching, learn more mathematics from the materials, and want to learn more from interacting with students. ▪ be excited about teaching the lessons and see how students respond to the connections in the lesson/unit. ▪ focus students' efforts on the mathematical connections and give them feedback on how to do better. ▪ anticipate typical misconceptions, missing connections, and which struggles will be most productive for students. ▪ be confident students will be motivated to learn from and connect the mathematics, as well as gain confidence that their efforts to learn will pay off.	*Using high quality/exciting assignments will help me:* ▪ want to learn more from interacting with students, analyzing their work on assignments, and re-engaging them in the concepts related to the assignments. ▪ use students' responses to focus their efforts on the mathematical connections and give them feedback on how to do better. ▪ anticipate typical misconceptions, missing connections, and which struggles will be most productive for students. ▪ know students will be motivated to learn from and connect the mathematics as well as gain confidence that their efforts to learn will pay off.

RATING – Compared to the criteria listed above, the materials I have just reviewed would be considered:

◯ 3) High Quality/Exciting ◯ 2) Good Quality ◯ 1) Minimal Quality

CONCEPTUAL UNDERSTANDING: **EXPLANATIONS**	
Materials: ■ How well do the materials provide example explanations connecting different representations to show why a statement or steps in an argument or solution is true and under what conditions it is true? ● The materials provide example explanations, using appropriate concepts and academic language for the grade level, to show how a way of thinking about a problem makes sense using several representations and explicitly identifying correspondences across representations. ■ How well do the materials use abstractions and generalizations to communicate the mathematical structure that organizes seemingly scattered individual events or results?	**Assignments:** How well do the assignments require that student provide explanations using appropriate content and grade-level academic language? ● The set of assignments requires students to use appropriate content and grade-level academic language to explain why reasons and justifications for steps in a solution or an argument are valid and how the mathematical structure represents generalizations about a problem situation (context) mathematically to their peers and the teacher. ■ How well do the assignments ask students to use the mathematical structure to organize individual, seemingly scattered statements or results to represent generalizations mathematically to their peers and the teacher?

EXPLANATIONS: CRITERIA FOR MEETING THE RATING OF "**HIGH QUALITY/EXCITING**"		
	Materials *The materials provide example explanations, using appropriate concepts and academic language for the grade level, to show how a way of thinking about a problem makes sense using several representations and explicitly identifying correspondences across representations.*	**Assignments** *The assignments require students to use appropriate grade-level concepts and academic language to explain why reasons and justifications for steps in a solution or an argument are valid and how the mathematical structure represents generalizations about a problem situation (context) mathematically to their peers and the teacher.*
Student	*Using high quality/exciting materials, my students will:* ■ comprehend the explanations presented in the materials. ■ make sense of the mathematics of the lesson/unit. ■ be excited to try the problems and learn from working on them. ■ want to learn the related mathematical concepts and gain confidence that their effort to learn will pay off.	*Using high quality/exciting materials, my students will:* ■ engage in the challenge of comprehension and explanation with their peers and with me. ■ make sense of the mathematics of the lesson/unit. ■ be excited to try the problems and learn from working on them. ■ want to learn the related mathematical concepts and gain confidence that their effort to learn will pay off.

Teacher	*Using high quality/exciting materials will help me:* ■ see and understand the mathematical goals of the lesson/unit. ■ understand better the mathematics that I am teaching, learn more mathematics from the materials, and want to learn more from interacting with students. ■ be excited about teaching the lessons and see how students respond to the explanations in the lesson/unit. ■ focus students' efforts on the mathematical explanations and give them feedback on how to do better. ■ anticipate typical misconceptions, struggles that are most productive for students, and ways to help students to revise their explanation.	*Using high quality/exciting materials will help me:* ■ want to learn more from interacting with students, analyzing their work on assignments, and re-engaging them on the concepts related to the assignments. ■ use students' responses to focus their efforts on the mathematical connections and give them feedback on how to do better. ■ anticipate typical misconceptions, struggles that are most productive for students, and ways to help students revise their explanations. ■ know students will be motivated to learn from and connect the mathematics as well as gain confidence that their efforts to learn will pay off. ■ prompt students to make their mathematical explanations clear in a way that others can understand and critique them.

RATING – Compared to the criteria listed above, the materials I have just reviewed would be considered:

◯ 3) High Quality/Exciting ◯ 2) Good Quality ◯ 1) Minimal Quality

APPLICATIONS

Materials

How well do the materials develop students' expertise in the application of concepts appropriate for this grade level?

- The materials show how to use mathematics to analyze problem situations, appropriate for the grade level, and provide examples of deploying the Standards for Mathematical Practice to make sense of problems.

■ How well do the materials support students' understanding of how to analyze problem situations, showing how to use mathematics to help make sense of problems?

Assignments

How well do the assignments develop the application of grade-level concepts?

- The assignments prompt students to use mathematics and the Standards for Mathematical Practice to help them make sense of a variety of problems and formulate mathematical models of real-world phenomena appropriate for this grade level.

■ How well do the assignments support students' understanding of how to formulate mathematical models of real-world phenomena, including explaining assumptions and explaining why the model serves its purpose in a reasonable way?

<table>
<tr><th colspan="3">APPLICATIONS: CRITERIA FOR MEETING THE RATING OF “HIGH QUALITY/EXCITING”</th></tr>
<tr><td></td><td>Materials
The materials show how to use mathematics to analyze problem situations appropriate for the grade level and provide examples of deploying the Standards for Mathematical Practice to make sense of problems.</td><td>Assignments
The assignments prompt students to use mathematics and the mathematical practice standards to help them make sense of a variety of problems, appropriate for this grade level, by asking students to formulate mathematical models.</td></tr>
<tr><td>Student</td><td>Using high quality/exciting materials, my students will:
▪ apply the concepts and connect them to each other and their different representations.
▪ make sense of the mathematics of the lesson/unit.
▪ be excited to try the problems and learn from working on them.
▪ understand how to formulate and model problem situations mathematically.
▪ gain confidence that their effort to learn will pay off.</td><td>Using high quality/exciting assignments, my students will:
▪ be challenged to use their mathematics to comprehend, analyze, and make sense of the problem situation.
▪ make sense of quantities and their relationship in the math problem.
▪ represent the problem concretely and pictorially and represent it as an equation and explain how the two representations relate to each other.
▪ identify important quantities in a practical situation and map their relationships using such tools as concrete models, diagrams, and equations.
▪ formulate and model problem situations mathematically.
▪ engage in discussions with their peers and the teacher to make sense of the problem and learn from them.
▪ be excited to try the problems and learn from working on them.
▪ gain confidence that their effort to learn will pay off.</td></tr>
<tr><td>Teacher</td><td>Using high quality/exciting materials will help me:
▪ see and understand the mathematical goal of the lesson/unit.
▪ understand better the mathematics that I am teaching, learn more mathematics from the materials, and want to learn more from interacting with students.
▪ be excited about teaching the lessons and see how students respond to the problems/tasks in the lesson/unit.
▪ be confident I can focus students’ efforts on the mathematical tasks/problems and give them feedback on how to do better.
▪ anticipate typical misconceptions, missing connections, and which struggles will be most productive for students.
▪ be confident students will be motivated to learn.</td><td>Using high quality/exciting assignments will help me:
▪ prompt students to make their mathematical thinking clear in a way that others can understand and critique it.
▪ want to learn more from interacting with students, analyzing their work on problems/tasks, and re-engaging them on making use of concepts related to them.
▪ use the student’s responses to focus their efforts on strategic thinking and give them feedback on generalizing to other related applications.
▪ anticipate typical misconceptions, missing strategies, and which productive struggles will be most beneficial for students.
▪ gain confidence that their efforts to learn will pay off.</td></tr>
<tr><td colspan="3">RATING – Compared to the criteria listed above, the materials I have just reviewed would be considered:
○ 3) High Quality/Exciting ○ 2) Good Quality ○ 1) Minimal Quality</td></tr>
</table>

III. ADOPTION COMMITTEE RECOMMENDATION FORM

Based on the substantial evidence collected, please rank all the grade eight materials you reviewed in the order in which you would recommend them for adoption. The program or materials with your highest recommendation should be listed as number one below. Please provide any comments you deem pertinent. Include answers to the following questions based on the evidence cited in your materials review:

- **What are the top three strengths of this text?**
- **What areas need improvement?**
- **What additional supports would be needed to implement the textbook series or digital materials?**

RECOMMENDED		
PROGRAM NAME/EDITION:		COMMENTS:
1		
2		
3		

continued >

NOT RECOMMENDED		
PROGRAM NAME/EDITION:		COMMENTS:
1		
2		
3		

Completed by: ____________________ Date: ____________________

IV. APPENDIX: PROGRESS TO ALGEBRA IN GRADES K–8

K	1	2	3	4	5	6	7	8
Know number names and the count sequence Count to tell the number of objects Compare numbers Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from Work with numbers 11-19 to gain foundations for place value	Represent and solve problems involving addition and subtraction Understand and apply properties of operations and the relationship between addition and subtraction Add and subtract within 20 Work with addition and subtraction equations Extend the counting sequence Understand place value Use place value understanding and properties of operations to add and subtract Measure lengths indirectly and by iterating length units	Represent and solve problems involving addition and subtraction Add and subtract within 20 Understand place value Use place value understanding and properties of operations to add and subtract Measure and estimate lengths in standard units Relate addition and subtraction to length	Represent & solve problems involving multiplication and division Understand properties of multiplication and the relationship between multiplication and division Multiply & divide within 100 Solve problems involving the four operations, and identify & explain patterns in arithmetic Develop understanding of fractions as numbers Solve problems involving measurement and estimation of intervals of time, liquid volumes, & masses of objects Geometric measurement: understand concepts of area and relate area to multiplication and to addition	Use the four operations with whole numbers to solve problems Generalize place value understanding for multi-digit whole numbers Use place value understanding and properties of operations to perform multi-digit arithmetic Extend understanding of fraction equivalence and ordering Build fractions from unit fractions by applying and extending previous understandings of operations Understand decimal notation for fractions, and compare decimal fractions	Understand the place value system Perform operations with multi-digit whole numbers and decimals to hundredths Use equivalent fractions as a strategy to add and subtract fractions Apply and extend previous understandings of multiplication and division to multiply and divide fractions Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition Graph points in the coordinate plane to solve real-world and mathematical problems*	Apply and extend previous understandings of multiplication and division to divide fractions by fractions Apply and extend previous understandings of numbers to the system of rational numbers Understand ratio concepts and use ratio reasoning to solve problems Apply and extend previous understandings of arithmetic to algebraic expressions Reason about and solve one-variable equations and inequalities Represent and analyze quantitative relationships between dependent and independent variables	Apply and extend previous understanding of operations with fractions to add, subtract, multiply, and divide rational numbers Analyze proportional relationships and use them to solve real-world and mathematical problems Use properties of operations to generate equivalent expressions Solve real-life and mathematical problems using numerical and algebraic expressions and equations	Work with radical and integer exponents Understand the connections between proportional relationships, lines, and linear equations Analyze and solve linear equations and pairs of simultaneous linear equations Define, evaluate, and compare functions Use functions to model relationships between quantities*

From the K, Counting and Cardinality; K–5, Operations and Algebraic Thinking Progression p. 9