Mathematics Grade-Level Instructional Materials Evaluation Tool

Quality Review

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 two

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 two. 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., 2.NBT.1-4) 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 second grade, 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 *Operations and Algebraic Thinking*, *Number Base-Ten*, and *K-5 Geometric Measurement*. 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 two items: *The Progression to Algebra Continuum* and a table of *Common Addition and Subtraction Situations*.[2]

GIMET-QR does not attend to all the grade two 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 under review 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/

2 From pages 89-90 of the Common Core State Standards for Mathematics. Adapted from Box 2-4 of *Mathematics Learning in Early Childhood*, National Research Council (2009, pp. 32-33).

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
2.OA.1. Materials demonstrate how to solve problems involving addition and subtraction by showing and explaining how to: ■ Use addition and subtraction within 100 to solve one- and two-step word problems, using drawings and equations with a symbol for the unknown number to represent the problem, with the unknown in all positions involving situations of: ▶ ***Adding to (result unknown:*** *e.g.,* Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ☐; ***change unknown:*** *e.g.,* Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ☐ = 5; ***start unknown:*** *e.g.,* Some bunnies were sitting on the grass. Three more bunnies hopped over. Then there were five bunnies. How many bunnies were on the grass? ☐ + 3 = 5). ▶ ***Taking from (result unknown:*** *e.g.,* Five apples were on the table. I ate two apples. How many apples are on the table now? 5 - 2 = ☐; ***change unknown:*** e.g., Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 - ☐ = 3; ***start unknown:*** e.g., Some apples were on the table. I ate two apples and now three apples are on the table. How many apples were on the table before? ☐ - 2 = 3). ▶ ***Putting together/taking apart (total unknown:*** *e.g.,* Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ☐; ***addend unknown:*** *e.g.,* Five apples were on the table. Three are red and the rest are green. How many apples are green? 3 + ☐ = 5, 5 - 3 = ☐; ***both addends unknown:*** e.g., Grandma has five flowers. How many could she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0; 5 = 1 + 4, 5 = 4 + 1; 5 = 2 + 3, 5 = 3 + 2). ▶ ***Comparing (difference unknown: How many more version:*** *e.g.,* Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?; ***How many fewer version:*** *e.g.,* Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ☐ = 5, 5 - 2 = ☐ ; ***bigger unknown:*** *version with "more": e.g.,* Julie has three more apples than Lucy. Lucy has two apples. How many does Julie have?; *version with "fewer", e.g.,* Lucy has three fewer apples than Julie. Lucy has two apples. How many does Julie have? 2 + 3 = ☐, 3 + 2 = ☐; ***smaller unknown:*** *version with "more": e.g.,* Julie has three more apples than Lucy. Julie has five apples. How many does Lucy have?; *version with "fewer": e.g.,* Lucy has three fewer apples than Julie. Julie has five apples. How many does Lucy have? 5 - 3 = ☐, ☐ + 3 = 5). ▶ Understand the different meanings of addition and subtraction of whole numbers and the relationship between the two operations. ▶ Develop and support the academic language students will need to explain their reasoning about how they solve the types of problems described above (***result unknown, change unknown,*** and ***start unknown)*** and the relationship between the three.	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
2.OA.1. Assignments ask students to solve problems involving addition and subtraction by: ■ Producing solutions and answers involving addition and subtraction within 100 to solve one- and two-step word problems with the unknown in all positions involving situations of: ▶ ***Adding to (result unknown:*** Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ☐; ***change unknown***: Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ☐ = 5; ***start unknown:*** Some bunnies were sitting on the grass. Three more bunnies hopped over. Then there were five bunnies. How many bunnies were on the grass? ☐ +3 = 5). ▶ ***Taking from (result unknown:*** Five apples were on the table. I ate two apples. How many apples are on the table now? 5 - 2 = ☐; ***change unknown***: Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 - ☐ = 3; ***start unknown:*** Some apples were on the table. I ate two apples. How many apples are on the table before? ☐ - 2 =3). ▶ ***Putting together/taking apart (total unknown:*** Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ☐; ***addend unknown:*** Five apples were on the table. Three are red and the rest are green. How many apples are green? 3 + ☐ = 5, 5 - 3 = ☐; ***both addends unknown:*** Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0; 5 = 1 + 4, 5 = 4 + 1; 5 = 2 + 3, 5 = 3 + 2). ▶ ***Comparing: (difference unknown: How many more version:*** Lucy had two apples. Julie had five apples. How many more apples does Julie have than Lucy? ***How many fewer version:*** Lucy had two apples. Julie had five apples. How many fewer apples does Lucy have than Julie? 2 + ☐ = 5, 5 - 2 = ☐; ***bigger unknown: version with "more":*** Julie had three more apples than Lucy. Lucy has two apples. How many does Julie have? ***version with "fewer":*** Lucy has three fewer apples than Julie. Lucy has two apples. How many does Julie have? 2 + 3 = ☐, 3 + 2 = ☐; ***smaller unknown: version with" more":*** Julie had three more apples than Lucy. Julie has five apples. How many does Lucy have?; ***version with "fewer"*** Lucy has three fewer apples than Julie. Julie has five apples. How many does Lucy have? 5 - 3 = ☐, ☐ + 3 = 5). ■ Representing the problem using drawings, diagrams, mathematical models, and equations with a symbol for the unknown number. ▶ Reading and writing equations with various placements of the unknown, e.g., 9 + 4 = ☐; 13 - 4 = ☐; ☐ + 4 = 13; ☐ - 4 = 9; 9 + ☐ = 13; 13 - ☐ = 4. ▶ Understanding the different meanings of addition and subtraction of whole numbers. ▶ Making and showing the connection between addition and subtraction equations, e.g., 87 - 38 = 49; 87 - 49 = 38; 38 + 49 = 87; 49 + 38 = 87. ▶ Developing the academic language students will need to explain their reasoning about ***result unknown, change unknown,*** and ***start unknown*** and the relationship between the three. ▶ Building upon students' grade one experiences where they represent and solve word problems of all three types ***(adding to, taking from, putting together/taking away)*** involving addition and subtraction within 20. By the end of grade two, students are proficient with all variations of ***add to, take from, put together/take apart,*** and ***compare*** problems as they represent and solve one- and two-step word problems within 100. This lays the foundation for grade three where they solve two-step word problems involving all four operations.	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
2.OA.2. Materials demonstrate how to add and subtract within 20 by showing and explaining how to: ■ Add and subtract within 20 using mental strategies.	
2.OA.2. Assignments ask students to add and subtract within 20 by: ■ Fluently adding and subtracting within 20 using mental strategies. ■ Knowing from memory all sums of two one-digit numbers with accuracy and reasonable speed by the end of grade two. ▶ Extending addition and subtraction problem solving beyond 10 (grade one) to problems within 20 in grade two.	
2.NBT.1-4. Materials demonstrate place value by showing and explaining how to: ■ Determine the value of each of the digits in a three-digit numeral. ■ Understand that the three digits represent amounts of hundreds, tens, and ones; *e.g. 706 equals 7 hundreds, 0 tens, and 6 ones.* ● Showing that 100 can be thought of as a bundle of ten tens—called a "hundred." ● Showing the numbers 100, 200, 300, 400, 500, 600, 700, 800, and 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones). ▶ Showing that 706 is the same as 70 tens, and 6 ones. ■ Count within 1000; skip count by fives, tens, and hundreds. ■ Read and write numbers to 1000, using base-ten numerals, number names, and expanded form. ■ Compare two three-digit numbers based on meaning of the hundreds, tens, and ones digit, using >, =, < symbols to record the results of the comparisons. ▶ Develop and support the academic language in representing three-digit numerals by their names and their value.	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
2.NBT.1-4. Assignments ask students to demonstrate their understanding of place value by: ■ Writing numerals using a base-ten model or picture, using numeration up to 1000. ■ Reading three-digit numbers when shown a numeral, a base-ten model of the number, or a pictorial representation of the number, using numeration up to 1000. ● Explain that 100 can be thought of as a bundle of ten tens – called a "hundred." ● The numbers 100, 200, 300, 400, 500, 600, 700, 800, and 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones). ▶ Indicating the place value (ones, tens, hundreds) of each digit in a three-digit numeral, using numeration up to 1000. ▶ Determining the value of each digit in a three-digit numeral (e.g., in 352, the 5 represents 5 tens and its value is 50). ▶ Making connections between representations such as manipulatives, math drawings, and layered three-digit place value cards and three-digit numbers, hundreds, tens, and ones. ▶ Connect number words and numbers written in base-ten numerals and as sums of their base-ten units with representations in drawings and place-value cards, and by saying numbers aloud in terms of their base-ten units. ■ Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. ▶ Extend understanding of place value from only tens and ones in grade one to hundreds in grade two to lay the foundation for understanding the structure of the base-ten system needed in grade three. ■ Skip count by fives, tens, and multiples of hundreds. ■ Show multiple ways to compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits using numbers, words, manipulatives, drawings, real objects, etc. ■ Compare the magnitude of three-digit numbers based on the meanings of the hundreds, tens, and ones digits, using >, = and < symbols to record the results of comparisons.	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
2.NBT.5-9. Materials demonstrate how to use place value understanding and properties of operations to add and subtract by showing and explaining how to: ■ Add and subtract within 1000 using strategies based on place value properties, properties of operations, and/or the relationship between addition and subtraction. ■ Add up to four two-digit numbers using strategies based on place value and properties of operations. ■ Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relating the strategy to a written method. ● Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds. ■ Mentally add 10 or 100 to a given number 100–900 and mentally subtract 10 or 100 from a given number 100–900. ▶ Develop and support the academic language to explain why addition and subtraction strategies work using place value and the properties of operations.	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
2.NBT.5-9. Assignments ask students to use place value understanding and properties of operations to add and subtract by: ■ Adding and subtracting within 1000 using strategies based on place value properties, properties of operations, and/or the relationship between addition and subtraction. ■ Adding up to four two-digit numbers using strategies based on place value and properties of operations. ■ Adding and subtracting within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relating the strategy to a written method. ■ Understanding that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds. ▶ In grade two, composing and decomposing creates additional complexity beyond grade one. Students in grade two must understand that a hundred is a unit of 100 ones, but also composed of 10 tens. They must understand that there is also the possibility that both a ten and a hundred are composed or decomposed when adding or subtracting, and know when to do so and why. ■ Mentally adding 10 or 100 to a given number 100–900 and mentally subtracting 10 or 100 from a given number 100–900. ▶ Developing the academic language to explain why addition and subtraction strategies work using place value and the properties of operations.	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
2.MD.1-4. Materials demonstrate how to measure lengths in standard units by showing and explaining how to: ■ Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. ▶ Materials illustrate that "one" unit represents the space from the beginning of the ruler to the hash mark, not the hash mark itself. ■ Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen. ■ Estimate lengths using units of inches, feet, centimeters, and meters. ■ Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. ▶ Illustrate the concept of the inverse relationship between the size of the unit of length and the number of units required to cover a specific length or distance.	
2.MD.1-4. Assignments ask students to measure lengths in standard units by: ■ Measuring the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. ■ Measuring the length of an object twice, using length units of different lengths for the two measurements; describing how the two measurements relate to the size of the unit chosen. ■ Estimating lengths using units of inches, feet, centimeters, and meters. ■ Measuring and determining how much longer one object is than another expressing the length difference in terms of a standard length unit.	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
2.MD.5-6. Materials illustrate how addition and subtraction are related to length by showing and explaining how to: ■ Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same unit; e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the *unknown* number to represent the problem. ■ Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole number sums and differences within 100 on a number line diagram.	
2.MD.5-6. Assignments ask students to show the relationship between addition and subtraction and length by prompting them to: ■ Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same unit; e.g., using drawings (such as drawing of rulers) and equations with a symbol for the *unknown* number to represent the problem. ▶ Combining and comparing lengths using arithmetic operations within 100, (e.g., add two lengths to obtain the length of the whole and subtract one length from another to find the difference in lengths). ■ Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and representing whole number sums and differences within 100 on a number line diagram.	

II. DECISION RECORDING SHEET

Completed by: _____ Date: _____

Use the evidence that you collected for grade two 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 conceptual understanding or applications 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 two, there are specific fluency requirements for students (fluently add and subtract within 20 using mental strategies, know from memory all sums of two one-digit numbers, and add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction) and standards addressing 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

CONCEPTUAL UNDERSTANDING: **CONNECTIONS**	
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)?	**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?

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.

4 University of Arizona Institute of Mathematics, *K-3 Categorical Data; Grades 2-5 Measurement Data*, http://ime.math.arizona.edu/progressions/

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?

APPLICATIONS: CRITERIA FOR MEETING THE RATING OF **"HIGH QUALITY/EXCITING"**		
	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.*	**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.*
Student	*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.	*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.
Teacher	*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.	*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.

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

FLUENCY	
Materials: ■ How well do the materials focus on developing critical procedural skills and fluency for adding and subtracting within 20 by the end of grade two? ● Materials show how procedural skills and the standard for fluency for this grade level (adding and subtracting within 20 and adding and subtracting within 100) work and provide consistent opportunities for students to practice using the algorithm or procedure.	**Assignments:** ■ How well does the set of assignments focus on developing critical procedural skills and fluency? ● The set of assignments prompts students to develop and demonstrate fluency by recalling with accuracy and reasonable speed addition and subtraction within 20. ● The set of assignments prompts students to develop and demonstrate procedural skill and fluency when adding and subtracting within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

FLUENCY: CRITERIA FOR MEETING THE RATING OF **"HIGH QUALITY/EXCITING"**		
	Materials *Materials show how the standard for fluency (add and subtract within 20 and add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction) works and provide opportunities for students to practice using the algorithm or procedure.*	**Assignments** *The set of assignments prompts students to develop and demonstrate fluency by recalling with accuracy and reasonable speed addition and subtraction within 20 and adding and subtracting within 100 using strategies based on place value, properties of operations and/or the relationship between addition and subtracting by the end of grade two.*
Student	*Using high quality/exciting materials, my students will:* ■ have a variety of different ways to practice using an algorithm or procedure to develop fluency. ■ self-assess areas of weakness and strengths for adding and subtracting to 20 and receive feedback on which area(s) to improve. ■ self-assess areas of weakness and strengths when adding and subtracting within 100.	*Using high quality/exciting assignments, my students will:* ■ build skill in adding and subtracting to 20 flexibly, accurately, efficiently, and appropriately. ■ develop skill in adding and subtracting within 100 using strategies based on place value, properties of operations, and the relationship between addition and subtraction. ■ gain confidence that their efforts to learn will pay off.

Teacher	*Using high quality/exciting materials will help me:* ■ see and understand how the work on procedural fluency supports the mathematical goal of the lesson/unit. ■ be confident that I can focus students' efforts on building fluency, and help students understand and correct their mistakes. ■ be confident students will be motivated to learn.	*Using high quality/exciting assignments will help me:* ■ want to learn more from interacting with students. ■ use students' responses to focus their efforts on building fluency and give them feedback on how to do better. ■ see how to help students understand and correct their mistakes. ■ be confident students will be motivated to learn.

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

III. ADOPTION COMMITTEE RECOMMENDATION FORM

Based on the substantial evidence collected, please rank all the grade two 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 A: 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

APPENDIX B: COMMON ADDITION AND SUBTRACTION[1]

	RESULT UNKNOWN	CHANGE UNKNOWN	START UNKNOWN
ADD TO	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? **2 + 3 = ?**	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? **2 + ? = 5**	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? **? + 3 =5**
TAKE FROM	Five apples were on the table. I ate two apples. How many apples are on the table now? **5 – 2 = ?**	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? **5 – ? = 3**	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? **? – 2 = 3**
	TOTAL UNKNOWN	**ADDEND UNKNOWN**	**BOTH ADDENDS UNKNOWN[2]**
PUT TOGETHER / TAKE APART[3]	Three red apples and two green apples are on the table. How many apples are on the table? **3 + 2 = ?**	Five apples are on the table. Three are red and the rest are green. How many apples are green? **3 + ? = 5, 5 – 3 = ?**	Grandma has five flowers. How many can she put in the red vase and how many in her blue vase? **5 = 0 + 5, 5 + 0 5 = 1 + 4, 5 = 4 +1, 5 = 2 + 3, 5 = 3 + 2**
	DIFFERENCE UKNOWN	**BIGGER UNKNOWN**	**SMALLER UNKNOWN**
COMPARE	(“How many more?” version):Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?	(Version with “more”): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?	(Version with “more”):Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?
	(“How many fewer?” version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have then Julie? **2 + ? = 5, 5 – 2 = ?**	(Version with “fewer”): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? **5 – 3 = ?, ? + 3 = 5**	(Version with “fewer”): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? **5 – 3 = ?, ? + 3 = 5**

Source: http://www.corestandards.org/Math/Content/mathematics-glossary/Table-1/

1 Adapted from Box 2-4 of Mathmatics Learning in Early Childhood, National Research Council (2009, pp. 32, 33).

2 These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean, makes or results in but always does mean is the same number as.

3 Either addend can be uknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of the basic situation, especially for small numbers less than or equal to 10.

4 For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operations (the version using more for the Bigger Unknown and using less for the Smaller Unknown). The other versions are more difficult.