

Mathematics Grade-Level Instructional Materials Evaluation Tool

Quality Review

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

I. “CCSS-M” clusters and standards along the “progression to algebra continuum” for grade one

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 one. 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., 1.OA.1-2) 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 one, 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 (►).

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).

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 one 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.

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
<p>1.OA.1–2. Materials represent and demonstrate solutions to problems involving addition and subtraction and how to:</p> <ul style="list-style-type: none">■ Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, tape diagrams, drawings, and equations with a symbol for the unknown number to represent the problem. (See appendix B.)<ul style="list-style-type: none">▶ Compare situations are introduced in grade one. (Note: one reason compare problems are more advanced than the other two major types is that in compare problems, one of the quantities (the difference) is not present in the situation physically, and must be conceptualized and constructed in a representation, by showing the “extra” that when added to the smaller unknown makes the total equal to the bigger unknown or by finding this quantity embedded within the bigger unknown.▶ Attend to the academic language development for addition and subtraction. The language of comparisons is also difficult. For example, “Julie has three more apples than Lucy” tells both that Julie has more apples and that the difference is three. Many students “hear” the part of the sentence about who has more, but do not initially hear the part about how many more; they need experience hearing and saying a separate sentence for each of the two parts in order to comprehend and say the one-sentence form. Similarly, another language issue is that the comparing sentence might be stated in either of two related ways, using “more” or “less.” Students need considerable experience with “less” to differentiate it from “more”; some children think that “less” means “more.” Finally, as well as the basic “How many more/less” question form, the comparing sentence might take an active, equalizing, and counterfactual form (e.g., “How many more apples does Lucy need to have as many as Julie?”) or might be stated in a static and factual way as a question about how many things are unmatched (e.g., “If there are 8 trucks and 5 drivers, how many trucks do not have a driver?”). Extensive experience with a variety of contexts is needed to master these linguistic and situational complexities.■ Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
<p>1.OA.1–2. Assignments ask students to represent and solve problems involving addition and subtraction by:</p> <ul style="list-style-type: none"> ■ Using addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. (See Appendix B). In particular, comparing two quantities to find “How many more” or “How many less.” <ul style="list-style-type: none"> ▶ Solving problems of all twelve sub-types (see Table 1 in appendix B) including both language variants of compare problems. (Note: Initially, the numbers in such problems are small enough that students can make math drawings showing all the objects in order to solve the problem). Students will represent problems with equations called situation equations. For example, a situation equation for a Take From problem with Result Unknown might read $14 - 8 = \square$. ▶ Reading to understand the problem situation, representing the situation and its quantitative relationships with expressions and equations, and then manipulating that representation if necessary, using properties of operations and/or relationships between operations. ▶ Linking equations to concrete materials, drawings, and other representations of problem situations. (Note: These will help students develop an algebraic perspective many years before they will use formal algebraic symbols and methods.) ■ Solving word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. <ul style="list-style-type: none"> ▶ Using the academic language of addition and subtraction, particularly language required to describe comparing situations. 	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
<p>1.OA.3–4. Materials show how the properties of operations apply in addition and subtraction and the relationship between the two operations by explaining and demonstrating how:</p> <ul style="list-style-type: none"> ■ To apply properties of operations as strategies to add and subtract, including strategies for decomposing an addend and composing it with the other addend to form an equivalent but easier problem. Examples: If $8 + 3 = 11$ is known, then $3 + 8 = 11$ is also known (<i>Commutative property of addition</i>). To add $2 + 6 + 4$, the second two numbers can be added to make a ten, so $2 + 6 + 4 = 2 + 10 = 12$ (<i>Associative property of addition</i>). ■ A subtraction problem can be considered as an unknown-addend problem, e.g., subtract $10 - 8$ by finding the number that makes 10 when added to 8. <ul style="list-style-type: none"> ▶ In grade one, students do not necessarily have to justify their representations or solution using properties, but they can begin to learn to recognize these properties in action and discuss their use after solving. 	
<p>1.OA.3–4. Assignments ask students to apply properties of operations to addition and subtraction problems and the relationship between addition and subtraction by:</p> <ul style="list-style-type: none"> ■ Using properties of operations as strategies to decompose an addend and compose it with the other addend to form an equivalent but easier problem. Examples: If $8 + 3 = 11$ is known, then $3 + 8 = 11$ is also known (<i>Commutative property of addition</i>). To add $2 + 6 + 4$, the second two numbers can be added to make a ten, so $2 + 6 + 4 = 2 + 10 = 12$ (<i>Associative property of addition</i>). ▶ Applying Level 3 strategies (decomposing an addend and composing it with the other addend to form an equivalent but easier problem, make-a-ten, or doubles ± 1 or ± 2 method: $(6 + 7 = 6 + (6 + 1) = (6 + 6) + 1 = 12 + 1 = 13)$) to extend addition and subtraction problem-solving beyond 10, to problems within 20.³ ■ Showing their understanding of subtraction as an unknown-addend problem. For example, students begin subtracting $10 - 8$ by finding the number that makes 10 when added to 8. 	

3 University of Arizona Institute of Mathematics, Counting and Cardinality, <http://ime.math.arizona.edu/progressions/>

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
<p>1.OA.5–6. Materials show adding and subtracting within 20 and how to:</p> <ul style="list-style-type: none"> ■ Relate counting to addition and subtraction (e.g., by counting on 2 to add 2). ■ Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$). 	
<p>1.OA.5–6. Assignments ask students to add and subtract within 20 by:</p> <ul style="list-style-type: none"> ■ Relating counting to addition and subtraction (e.g., by counting on 2 to add 2). ■ Using different strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$) to add and subtract within 20. 	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
<p>1.OA.7. Materials show a variety of addition and subtraction equations. They illustrate how to:</p> <ul style="list-style-type: none"> ■ Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. <i>For example, which of the following equations are true and which are false? $6 = 6$, $7 = 8 - 1$, $5 + 2 = 2 + 5$, $4 + 1 = 5 + 2$.</i> ■ Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations $8 + \square = 11$, $5 = \square - 3$, $6 + 6 = \square$.</i> 	
<p>1.OA.7. Assignments ask students to create and write a variety of addition and subtraction equations by:</p> <ul style="list-style-type: none"> ■ Showing their understanding of the equal sign, and explaining whether equations involving addition and subtraction are true or false. <i>For example, which of the following equations are true and which are false, $6 = 6$, $7 = 8 - 1$, $5 + 2 = 2 + 5$, $4 + 1 = 5 + 2$?</i> ■ Determining the unknown whole number in an addition or subtraction equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations $8 + \square = 11$, $5 = \square - 3$, $6 + 6 = \square$.</i> 	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
<p>1.NBT.1. Materials illustrate extending the counting sequence and explain how to:</p> <ul style="list-style-type: none"> ■ Count to 120, starting at any number less than 120. ■ Read and write numerals less than 120, and represent a number of objects with a written numeral. 	
<p>1.NBT.1. Assignments require that students extend the counting sequence by:</p> <ul style="list-style-type: none"> ■ Asking them to count to 120 starting at any number less than 120. <ul style="list-style-type: none"> ▶ Connect the spoken numbers with their corresponding written form. ■ Asking them to read and write numerals less than 120 and represent a number of objects with a written numeral. 	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
<p>1.NBT.2–3. Materials provide explanations that help students develop an understanding of place value by explaining how:</p> <ul style="list-style-type: none"> ■ The two digits of a two-digit number represent amounts of tens and ones. In particular in the following as special cases: <ul style="list-style-type: none"> ● 10 can be thought of as a bundle of ten ones—called a “ten.” ● The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. ● The numbers 10, 20, 30, 40, 50, 60 70, 80, and 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). ■ To compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$. <ul style="list-style-type: none"> ▶ Materials show students how to use their base-ten understanding to recognize that the digit in the tens place is more important for determining the size of a two-digit number. 	
<p>1.NBT.2–3. Assignments ask students to apply their understanding of place value by:</p> <ul style="list-style-type: none"> ■ Explaining how the two digits of a two-digit number represent amounts of tens and ones. In particular, the assignments ask students to work with the following special cases: <ul style="list-style-type: none"> ● 10 can be thought of as a bundle of ten ones, called a “ten.” ● The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. ● The numbers 10, 20, 30, 40, 50, 60 70, 80, and 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). ■ Comparing two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$. <ul style="list-style-type: none"> ▶ Explaining that the digit in the tens place is more important for determining the size of a two-digit number. 	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
<p>1.NBT.4-6. Materials demonstrate how to use place value and properties of operations to add and subtract and explain how:</p> <ul style="list-style-type: none"> ■ To add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of ten, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; and to relate the strategy to a written method and explain the reasoning used. To understand that in adding two-digit numbers, one adds tens and tens, ones and ones, and sometimes it is necessary to compose a ten. ■ Given a two-digit number, mentally find 10 more or 10 less than the number without having to count; and explain the reasoning used. ■ Subtract multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; and to relate the strategy to a written method and explain the reasoning used. 	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
<p>1.NBT.4-6. Assignments ask students to use place value and properties of operations to add and subtract by:</p> <ul style="list-style-type: none"> ■ Computing sums within 100 with understanding, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of ten, using concrete models, cards, 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 and explaining the reasoning used. Also, by demonstrating understanding that when adding two-digit numbers, one adds tens and tens, ones and ones, and sometimes it is necessary to compose a ten. ■ Finding 10 more or 10 less than the number mentally, without having to count; explaining the reasoning used. <ul style="list-style-type: none"> ▶ Students explain their reasoning, using drawings and layered cards, by saying that they have one more or one less ten than before. ■ Subtracting multiples of 10 in the range 10–90 from multiples of 10 in the range 10–90 (positive or zero differences), 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 and explaining their reasoning. <ul style="list-style-type: none"> ▶ Assignments prompt students to explain strategies for finding differences of multiples of 10, such as $70 - 40$ that can be viewed as 7 tens minus 4 tens and represented with concrete models such as objects bundled in tens or drawings. ▶ Assignments require that students connect different strategies, e.g., understanding the relationship between subtraction and addition by viewing $80 - 70$ as <i>an unknown addend problem</i> $70 + \square = 80$, and explaining that 1 ten must be added to 70 to make it 80, so $80 - 70 = 10$. 	

GUIDING STATEMENTS	SPECIFIC EVIDENCE FROM THE TEXT/MATERIALS
<p>1.MD.1–2. Materials show how to measure lengths indirectly and by iterating length units, and explain how to:</p> <ul style="list-style-type: none"> ■ Order three objects by length; compare the lengths of two objects indirectly by using a third object and the idea of transitivity: If A is longer than B and B is longer than C, then A must be longer than C as well. <ul style="list-style-type: none"> ▶ Apply the general reasoning processes of seriation (ordering a series of objects by length), conservation (of length and number), and classification (see K-3 categorical data progression⁴). ■ Express the length of an object as a whole number of length units by laying multiple copies of a shorter object (the length unit) end to end; helping students understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. <i>Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.</i> 	
<p>1.MD.1–2. Assignments ask students to measure lengths indirectly and by iterating length units by:</p> <ul style="list-style-type: none"> ■ Ordering three objects by length; comparing the lengths of two objects indirectly by using a third object. <ul style="list-style-type: none"> ▶ Working on transitive reasoning tasks and comparison tasks, such as comparing several items to a single item (finding all the objects in the classroom the same length as, or longer than/shorter than their forearm). ▶ Applying and explaining the transitivity idea: If A is longer than B and B is longer than C, then A must be longer than C as well. ▶ Applying the general reasoning processes of seriation (ordering a series of objects by length), conservation (of length and number), and classification (see K–3 categorical data progression⁴). ■ Expressing the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; and explaining that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. <i>Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.</i> 	

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

II. DECISION RECORDING SHEET

Completed by: _____

Date: _____

*Use the evidence that you collected for grade one 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). By the end of grade one, there are specific fluency requirements for students (adding and subtracting within ten), 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 <i>The materials present and describe explicit connections to prior knowledge, connections among mathematical ideas, and connections among different mathematical representations, using appropriate academic language.</i>	Assignments <i>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.</i>
Student	<p><i>Using high quality/exciting materials, my students will:</i></p> <ul style="list-style-type: none"> ■ 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. 	<p><i>Using high quality/exciting assignments, my students will:</i></p> <ul style="list-style-type: none"> ■ 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	<p><i>Using high quality/exciting materials will help me:</i></p> <ul style="list-style-type: none"> ■ 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. 	<p><i>Using high quality/exciting assignments will help me:</i></p> <ul style="list-style-type: none"> ■ 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	<p><i>Using high quality/exciting materials will help me:</i></p> <ul style="list-style-type: none"> ■ 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. 	<p><i>Using high quality/exciting materials will help me:</i></p> <ul style="list-style-type: none"> ■ 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.
<p>RATING – Compared to the criteria listed above, the materials I have just reviewed would be considered:</p> <p>3) High Quality/Exciting 2) Good Quality 1) Minimal Quality</p>		

APPLICATIONS

<p>Materials</p> <p>How well do the materials develop students' expertise in the application of concepts appropriate for this grade level?</p> <ul style="list-style-type: none"> ● 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? 	<p>Assignments</p> <p>How well do the assignments develop the application of grade-level concepts?</p> <ul style="list-style-type: none"> ● 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?
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APPLICATIONS: CRITERIA FOR MEETING THE RATING OF “HIGH QUALITY/EXCITING”

	<p>Materials</p> <p><i>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.</i></p>	<p>Assignments</p> <p><i>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.</i></p>
Student	<p><i>Using high quality/exciting materials, my students will:</i></p> <ul style="list-style-type: none"> ■ 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. 	<p><i>Using high quality/exciting assignments, my students will:</i></p> <ul style="list-style-type: none"> ■ 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	<p><i>Using high quality/exciting materials will help me:</i></p> <ul style="list-style-type: none"> ■ 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. 	<p><i>Using high quality/exciting assignments will help me:</i></p> <ul style="list-style-type: none"> ■ 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 ten by the end of grade one?
 - Materials show how procedural skills and the standard for fluency for this grade level (addition and subtraction within 10) 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 10.

FLUENCY: CRITERIA FOR MEETING THE RATING OF “HIGH QUALITY/EXCITING”

	Materials	Assignments
	<i>Materials show how the standard for fluency (adding and subtracting within ten) works and provide opportunities for students to practice using the algorithm, procedure, or formula.</i>	<i>The set of assignments prompts students to develop and demonstrate fluency by recalling with accuracy and reasonable speed addition and subtraction within ten.</i>
Student	<p><i>Using high quality/exciting materials, my students will:</i></p> <ul style="list-style-type: none"> ■ 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 within ten and receive feedback on which area(s) to improve. 	<p><i>Using high quality/exciting assignments, my students will:</i></p> <ul style="list-style-type: none"> ■ build skills in adding and subtracting to ten flexibly, accurately, efficiently, and appropriately. ■ gain confidence that their efforts to learn will pay off.
Teacher	<p><i>Using high quality/exciting materials will help me:</i></p> <ul style="list-style-type: none"> ■ 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. 	<p><i>Using high quality/exciting assignments will help me:</i></p> <ul style="list-style-type: none"> ■ 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 one 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		Represent and solve problems involving addition and subtraction		Represent & solve problems involving multiplication and division					
Count to tell the number of objects		Understand and apply properties of operations and the relationship between addition and subtraction	Represent and solve problems involving addition and subtraction	Understand properties of multiplication and the relationship between multiplication and division	Use the four operations with whole numbers to solve problems	Understand the place value system	Apply and extend previous understandings of multiplication and division to divide fractions by fractions		
Compare numbers		Add and subtract within 20	Add and subtract within 20	Multiply & divide within 100	Generalize place value understanding for multi-digit whole numbers	Perform operations with multi-digit whole numbers and decimals to hundredths	Apply and extend previous understandings of numbers to the system of rational numbers	Apply and extend previous understanding of operations with fractions to add, subtract, multiply, and divide rational numbers	Work with radical and integer exponents
Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from		Work with addition and subtraction equations	Understand place value	Solve problems involving the four operations, and identify & explain patterns in arithmetic	Use place value understanding and properties of operations to perform multi-digit arithmetic	Use equivalent fractions as a strategy to add and subtract fractions	Understand ratio concepts and use ratio reasoning to solve problems	Analyze proportional relationships and use them to solve real-world and mathematical problems	Understand the connections between proportional relationships, lines, and linear equations
Work with numbers 11-19 to gain foundations for place value		Extend the counting sequence	Use place value understanding and properties of operations to add and subtract	Develop understanding of fractions as numbers	Extend understanding of fraction equivalence and ordering	Apply and extend previous understandings of multiplication and division to multiply and divide fractions	Understand ratio concepts and use ratio reasoning to solve problems	Analyze and solve linear equations and pairs of simultaneous linear equations	
		Understand place value	Measure and estimate lengths in standard units	Solve problems involving measurement and estimation of intervals of time, liquid volumes, & masses of objects	Build fractions from unit fractions by applying and extending previous understandings of operations	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition	Apply and extend previous understandings of arithmetic to algebraic expressions	Define, evaluate, and compare functions	
		Use place value understanding and properties of operations to add and subtract	Relate addition and subtraction to length	Geometric measurement: understand concepts of area and relate area to multiplication and to addition	Understand decimal notation for fractions, and compare decimal fractions	Graph points in the coordinate plane to solve real-world and mathematical problems*	Reason about and solve one-variable equations and inequalities	Solve real-life and mathematical problems using numerical and algebraic expressions and equations	Use functions to model relationships between quantities*
		Measure lengths indirectly and by iterating length units					Represent and analyze quantitative relationships between dependent and independent variables		

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

APPENDIX B: COMMON ADDITION AND SUBTRACTION¹

	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 APART³	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 UNKNOWN	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 than 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 Mathematics 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 unknown, 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.