

Rigor in the Standards- Application

Handout, Grades 3-5

Rigor in the Standards

The *K–8 Publishers’ Criteria* gives a high level description of rigor for grades K through 8, and while it is not exhaustive, it is meant to frame your thinking around rigor for this grade band. This “Rigor in the Standards” handout, and the examples contained within, should be used to discuss the meaning, intent, and themes of the major work for this grade band. Use this document as a resource during planning or professional learning opportunities to frame conversations around rigor within this grade band and to reflect on the instructional practices necessary to appropriately attend to rigor in content standards.

“To help students meet the expectations of the Standards, educators will need to pursue, with equal intensity, three aspects of rigor in the major work of each grade: conceptual understanding, procedural skill and fluency, and applications. The word *understand* is used in the Standards to set explicit expectations for conceptual understanding, the word “*fluently*” is used to set explicit expectations for fluency, and the phrase “*real-world problems*” and the star symbol (*) is used to set expectations and flag opportunities for applications and modeling (which is a Standard for Mathematical Practice as well as a content category in High School).” —*K–8 Publishers’ Criteria for the Common Core State Standards for Mathematics*

At UnboundEd, we’ve studied the state standards, spent time in classrooms, and looked at work done by other organizations to form an understanding of these three aspects of rigor that we think is most useful for educators to understand the standards and shift their practice. So while the words *understand*, *fluently*, and *real-world problems* do indicate the three aspects of rigor, they are not comprehensive. We’ve come to associate conceptual understanding with higher order thinking skills, working with multiple representations, and teaching more than just computational procedures. Procedural skills are about students accurately performing core functions required for grade-level mathematics; fluency is explicitly called for in certain standards and implies efficiency. Application can be thought of generally as problem solving, in real-world or mathematical contexts. For example, the words *recognize or compare* can be used to indicate conceptual understanding, *count* can indicate procedural skill and fluency, and *solve addition and subtraction word problems* can be used to indicate application. Nevertheless, the example standards here that indicate an aspect of rigor should be used as examples and are not meant to be a checklist or keyword indicators.

Additional Aspects of the Rigor and Balance Criterion from the *K–8 Publishers’ Criteria*:

- (1) The three aspects of rigor are not always separate in materials. (Conceptual understanding needs to underpin fluency work; fluency can be practiced in the context of applications; and applications can build conceptual understanding.)
- (2) Nor are the three aspects of rigor always together in materials. (Fluency requires dedicated practice to that end. Rich applications cannot always be shoehorned into the mathematical topic of the day. And conceptual understanding will not come along for free but must be explicitly taught.)

Application

“Allowing teachers and students using the materials as designed to spend sufficient time working with engaging applications, without losing focus on the major work of each grade. Materials in grades K–8 include an ample number of single-step and multi-step contextual problems that develop the mathematics of the grade, afford opportunities for practice, and engage students in problem solving. Materials for grades 6–8 also include problems in which students must make their own assumptions or simplifications in order to model a situation mathematically. Applications take the form of problems to be worked on individually as well as classroom activities centered on application scenarios. Materials attend thoroughly to those places in the content standards where expectations for multi-step and real-world problems are explicit. Applications in the materials draw only on content knowledge and skills specified in the content standards, with particular stress on applying major work and a preference for the more fundamental techniques from additional and supporting work. Modeling builds slowly across K–8, and applications are relatively simple in earlier grades. Problems and activities are grade-level appropriate, with a sensible tradeoff between the sophistication of the problem and the difficulty or newness of the content knowledge the student is expected to bring to bear.” —*K–8 Publishers’ Criteria for the Common Core State Standards for Mathematics*

The *K–8 Publishers’ Criteria* sets expectations for materials to reflect the appropriate aspect of rigor called for in the Standards. In order to ensure instruction reflects the appropriate aspect of rigor, first, we must unpack what rigor looks like in the standards and how instruction might reflect this aspect of rigor. The table below identifies the main goal and effective instructional strategies for application.

Application	
Main goals:	Effective instructional strategies:
<ul style="list-style-type: none"> Apply skills and understandings to new situations, other subject areas, real-world and 	<ul style="list-style-type: none"> Problem-solving opportunities: Provide time for student to work on tasks independently, with a partner, or in small groups with consistent teacher feedback. Share multiple solution methods: Facilitate classroom discussions where students share, explain, and justify a variety of problem solving strategies and/or solutions. Intentionally integrate content: Provide learning opportunities for students to apply their knowledge of multiple standards, clusters, or domains.

problem-solving situations.	
Source: Achievement Network https://static1.squarespace.com/static/5321dc4ae4b0c72ad0ceedfe/t/59c4179537c5811bd8d9000c/1506023318140/Instructional+Approaches+for+Math+Rigor.pdf Retrieved Nov. 9, 2018	

The examples below are standards within grades 3–5 that indicate application. Each example provided highlights language in the standard that indicates the aspect of rigor, rationale for why this standard indicates the aspect of rigor, other standards that similarly reflect the aspect of rigor, and additional information that helps to articulate the nuance of the Standards and helps to paint a more complete picture of rigor for this grade band. Language in the standard that reflects a different aspect of rigor than the one being highlighted has been *grayed*.

Language of the standards that indicates application:	
3.OA.A.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	
Rationale:	Addresses the application aspect of rigor because students have to be able to apply what they know about multiplication and division to solve problems. This application is rooted in students' understanding of multiplication and division, and is called out in the standard by the use of drawings and equations with a symbol for the unknown to represent the problems. Note that 3.OA.A.3 includes explicit reference to its roots in conceptual understanding because mention of work with multiple representations is included; students use drawings and equations with a symbol for the unknown to represent the problem.
Standards:	3. OA.D.8, 4.OA.A.2, 4.OA.A.3, 4.NF.B.4.C, 5.NF.B.6, 5.NF.B.7.C
Additional info:	3. OA.D.8 indicates application. The language in the standard that indicates the application aspect of rigor: <ul style="list-style-type: none"> 3:OA.D.8: Solve two-step word problems using the four operations. <i>Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation</i>

strategies including rounding.

3.OA.D.8 and 4.OA.A.3 indicate the application aspect of rigor because students solve multi-step word problems using the four operations. These applications are rooted in students' understanding of the four operations, and is called out in the standard by representing these problems with a letter for the unknown, and assessing the reasonableness of answers using mental computation and estimation strategies including rounding.

It is imperative that students have experiences with the appropriate kinds of word problems for their grade level. [Table 2 of the Glossary of the Standards](#) describes the types of multiplication and division word problems that students must engage with, as described in standards 3.OA.A.3 and 4.OA.A.2.

- *3.OA.A.3: Use multiplication and division within 100 to **solve word problems** in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.*
- *4.OA.A.2: Multiply or divide to **solve word problems** involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.*