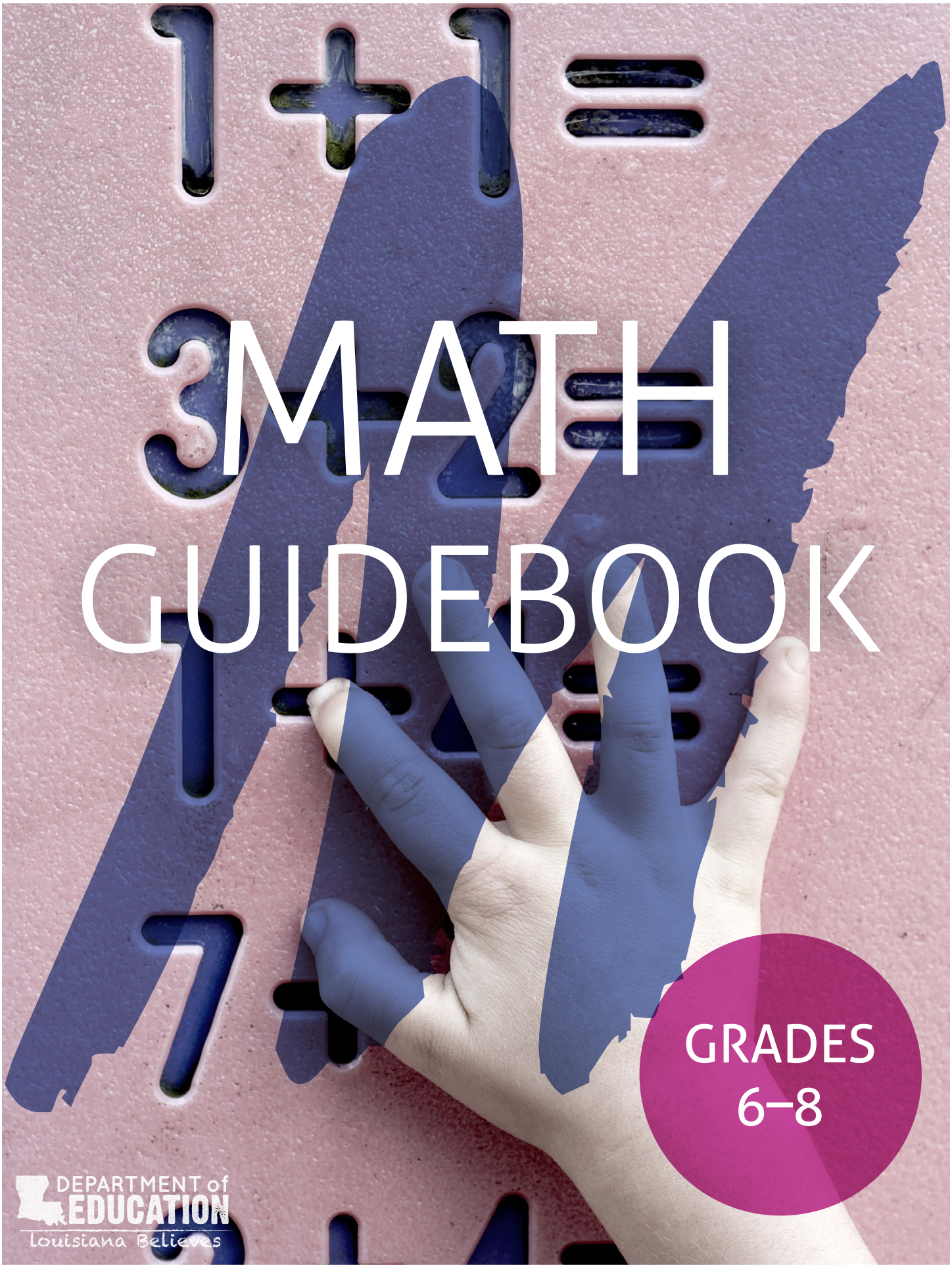

MATH GUIDEBOOK

GRADES 6–8

DEPARTMENT of EDUCATION
Louisiana Believes

ASSESSMENT AND INSTRUCTION

Instructionally, the most challenging shift comes with the focus on rigor. Rigor in a math classroom can be extremely difficult to nail down. So often, educators are tempted to practice procedures with students rather than help them master the mathematical concepts. This shift from simply practicing and assessing procedures with students to practicing and assessing concepts is challenging, but critical. Even more, with the increased expectations brought on with the shift in rigor, remediation becomes critical. Teachers must work to identify which students need remediation and on which standards remediation would be most beneficial for these students. Thus, rigor and the needed remediation associated with increased rigor are two of the most important shifts teachers must be aware of as they change their instruction and assessment.

Rigor

While student fluency with math skills is critical, even more important is a student's ability to show mastery of a mathematical concept. State assessments will no longer demand that students simply perform based on memorized basic procedures. Rather, just as in real life, students are asked to solve complex problems based on their mathematical understanding.

So what does this really mean? Let's take a sample standard and consider what it would look like to teach and assess the procedure versus the concept.

Standard: **8.EE.C.8b**: Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*

- The following is an item that would be used to teach and assess the procedure:
  - » Use the substitution method to solve the linear system:
    $2x + 5y = 12$
    $2x + 5y = 4$
- The following is an item that would be used to teach and assess the concept:
  - » Olivia said she can solve the system $2x + 5y = 12$ and $2x + 5y = 4$ in her head without doing any written work. Explain what you think she did, what you think her solution was, and how you know you are right.

In both examples, students need to know the steps and procedures to actually solve the equation. But in the second, memorizing the procedure alone is not enough. For students to apply mathematical understanding in the future, in a variety of settings, they must know why they are using the procedures and how to adapt them to fit new settings.

The tasks included in this guidebook deliberately help students explore, practice, and show mastery of the mathematical concepts demanded in the standards. This includes students' fluent use of basic math skills but pushes them beyond simple memorization to deep understanding of the content.

Remediation

As the rigor increases for students, so do the potential gaps in their understanding. Often, the instinct is to say that if a student is not at grade level, a teacher must completely go back to previous grade levels and remediate everything before moving on. In math, like other content areas, students do need quality remediation. But that remediation must be focused just on the content needed to quickly get students to practice at grade level. By practicing content at grade level, students more quickly improve their skill and understanding.

Let's look at an example.

Let's say 6th grade students are working on standard **6.EE.A.3:** Apply the properties of operations to generate equivalent expressions.

If the students are struggling in 6th grade with this standard, there are a few isolated standards from previous grade levels and from within 6th grade that will prepare students for this standard.

Standards from previous grades that prepare students include:

- **1.OA.B.3:** Apply properties of operations as strategies to add and subtract.
- **3.OA.B.5:** Apply properties of operations as strategies to multiply and divide.
- **5.OA.A.2:** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.

Standards from 6th grade that should be taught in advance of the above standard include:

- **6.NS.B.4:** Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
- **6.EE.A.2:** Write, read, and evaluate expressions in which letters stand for numbers.

Standards from 6th grade that should be taught at the same time as the above standard include:

- **6.EE.A.4:** Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

The writers of the math standards created a tool[4] to help teachers more quickly determine the required previous content needed for each individual standard. This guide has taken that tool and created easy-to-access charts for teachers by grade level (in the "Tools for Teaching" section that follows). These charts will help teachers more quickly identify just the necessary remediation. This will allow students faster access to grade-level content, allowing them to grow and also practice basic skills in a more authentic setting.

Every task included in this guide includes the recommended remedial standards along with sample tasks to check on student readiness for the grade-level task. Below is an example of a chart included in every task included in this guide. The links provide sample practice problems to help teachers remediate with students in preparation for grade-level task.

Grade-Level Standard	The Following Standards Will Prepare Students:	Items to Check for Task Readiness:	Sample Remediation Items:
6.EE.A.3	• 1.OA.B.3 • 3.OA.B.5 • 5.OA.A.2 • 6.NS.B.4 • 6.EE.A.2	Use the distributive property to rewrite the expression 4(3y + 6x). 12y + 24x	http://www.illustrativemathematics.org/illustrations/139 http://www.illustrativemathematics.org/illustrations/255 http://learnzillion.com/lessonsets/567-apply-properties-of-operations-to-generate-equivalent-expressions http://learnzillion.com/lessonsets/480-apply-properties-of-operations-to-generate-equivalent-expressions http://learnzillion.com/lessonsets/237-apply-properties-of-operations-to-generate-equivalent-expressions

[4] http://www.edutron.com/0/Math/ccssmgraph.htm