MATHEMATICS CONTENT MODULES

Module 4: Number and Operations in Base Ten: Place Value and Fluency

Grades K–5

The goal of the initiative

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Improve the quality of instruction in math classrooms by developing deep mathematical content knowledge of teachers and connecting that content knowledge to the practical implementation of a quality curriculum.

Group norms

- Understand that those who work, learn.
- Look for solutions, not blame.
- Focus on systems, not people.
- Recognize that everyone has expertise.
- Be honest.
- Challenge ideas.
- Share talk time.
- Mistakes are expected, respected, and inspected.

Module 4 goals

Participants will

- Engage in a study of standards across grades K–5 related to building conceptual understanding of the base-ten system and its structure to see how this idea develops across the grades.
- Identify evidence of the key shifts in the standards and how these key shifts guide decisions about teaching and learning in conjunction with the EngageNY resources.
- Explore and define the process of procedural fluency and how it relates to the standard algorithm. Identify the purpose of the fluency section in the EngageNY curriculum.
- Investigate the impact of selecting student responses that highlight specific strategies or misconceptions and sequencing these responses to be presented in a way that helps students to make connections and deepen their mathematical understanding.
- Promote students' persistence and effective effort in the classroom and identify appropriate places in the EngageNY curriculum for students to apply persistence and effective effort strategies.

Math Content Module 4
Grades K–5

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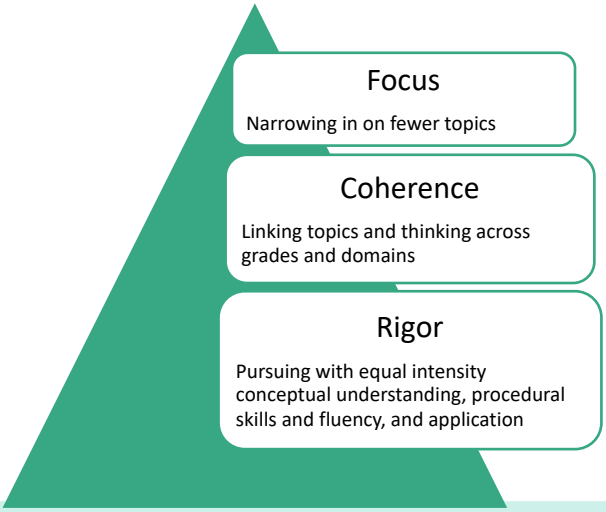
MATHEMATICS CONTENT MODULES

Module 4: Number and Operations in Base Ten: Place Value and Fluency
Session 1: Key Shifts in Action—Through an EngageNY Lesson
Grades K–5

Key shifts of the Louisiana Student Standards for Mathematics



Math Content Module 4, Session 1
Grades K–5

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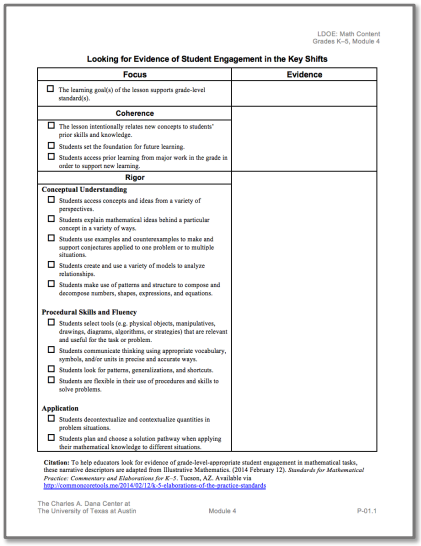
Evidence of student engagement in the key shifts

Use the handout to:

- Check off student behaviors/actions that you observed.
- Record any observations you made that serve as evidence.



LDOE: Math Content
Grades K–5, Module 4

Looking for Evidence of Student Engagement in the Key Shifts

Focus	Evidence
☐ The learning goal(s) of the lesson supports grade-level standard(s).	
Coherence	
☐ The lesson intentionally relates new concepts to students' prior skills and knowledge. ☐ Students set the foundation for future learning. ☐ Students access prior learning from major work in the grade in order to support new learning.	
Rigor	
Conceptual Understanding ☐ Students access concepts and ideas from a variety of perspectives. ☐ Students explain mathematical ideas behind a particular concept in a variety of ways. ☐ Students use examples and counterexamples to make and support conjectures applied to one problem or to multiple situations. ☐ Students create and use a variety of models to analyze relationships. ☐ Students make use of patterns and structure to compose and decompose numbers, shapes, expressions, and equations. **Procedural Skills and Fluency** ☐ Students select tools (e.g. physical objects, manipulatives, drawings, diagrams, algorithms, or strategies) that are relevant and useful for the task or problem. ☐ Students communicate thinking using appropriate vocabulary, symbols, and/or units in precise and accurate ways. ☐ Students look for patterns, generalizations, and shortcuts. ☐ Students are flexible in their use of procedures and skills to solve problems. **Application** ☐ Students decontextualize and contextualize quantities in problem situations. ☐ Students plan and choose a solution pathway when applying their mathematical knowledge to different situations.	

Citation: To help educators look for evidence of grade-level-appropriate student engagement in mathematical tasks, these narrative descriptors are adapted from Illustrative Mathematics. (2014 February 12). *Standards for Mathematical Practice: Commentary and Elaborations for K–5*. Tucson, AZ. Available via http://commoncoretools.me/2014/02/12/k-5-elaborations-of-the-practice-standards

The Charles A. Dana Center at
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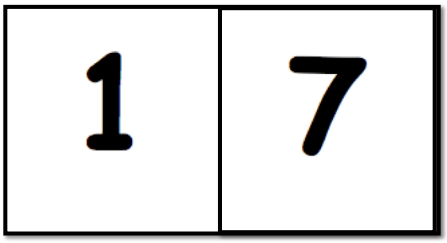
Building conceptual understanding of the base-ten system and its structure



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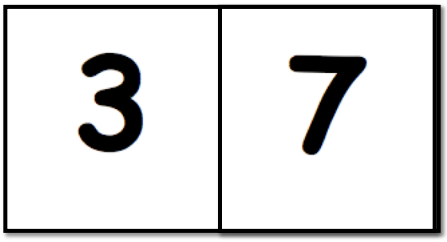

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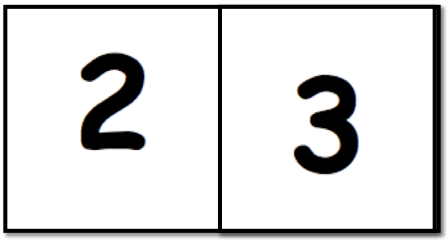

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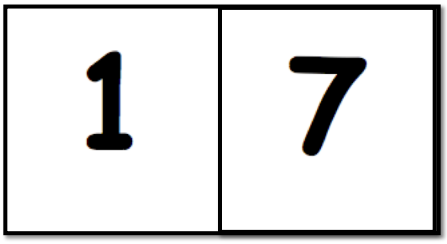


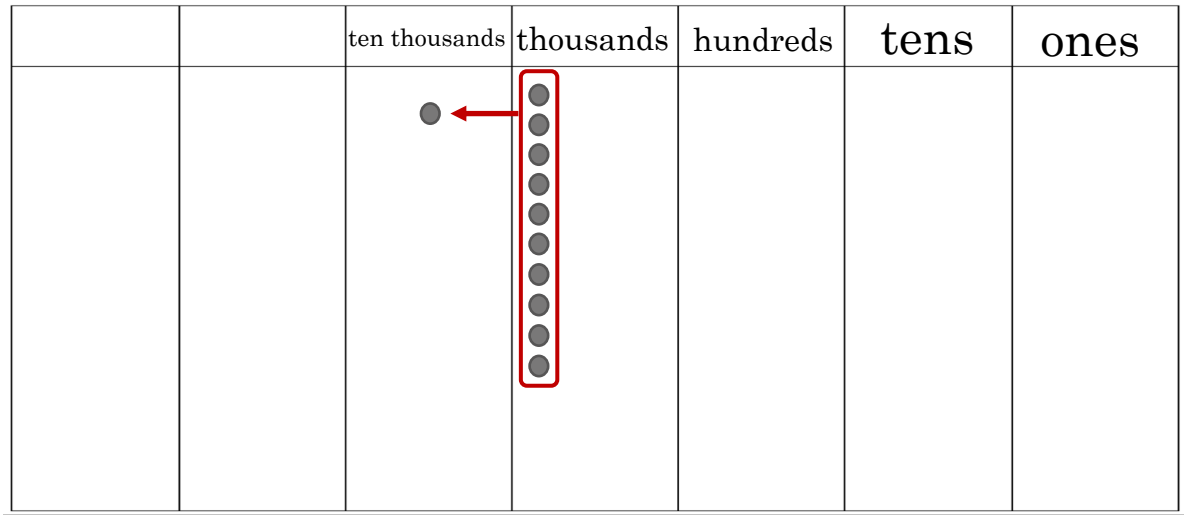
Building conceptual understanding of the base-ten system and its structure

Building conceptual understanding of the base-ten system and its structure

Discuss in your groups…

- What is the difference between modeling your numbers with blocks and modeling your numbers with place value disks?
- Why would you use one over the other?

Building conceptual understanding of the base-ten system and its structure



Evidence of student engagement in the key shifts

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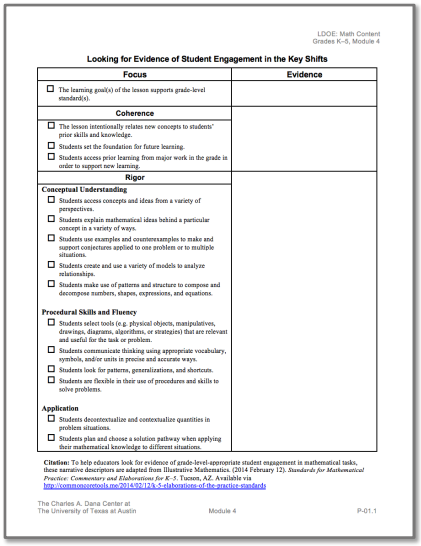

LDOE: Math Content
Grades K–5, Module 4

Looking for Evidence of Student Engagement in the Key Shifts

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Session 1 reflection

Points to ponder

- How do the grade-level standards connect?
- How do the lessons connect across grade levels?
- How does understanding *place value* connect to operations?

MATHEMATICS CONTENT MODULES

Module 4: Number and Operations in Base Ten: Place Value and Fluency

Session 2: Exploring Coherence in the LSSM

Grades K–5

Investigating vertical alignment in the LSSM

As a group…

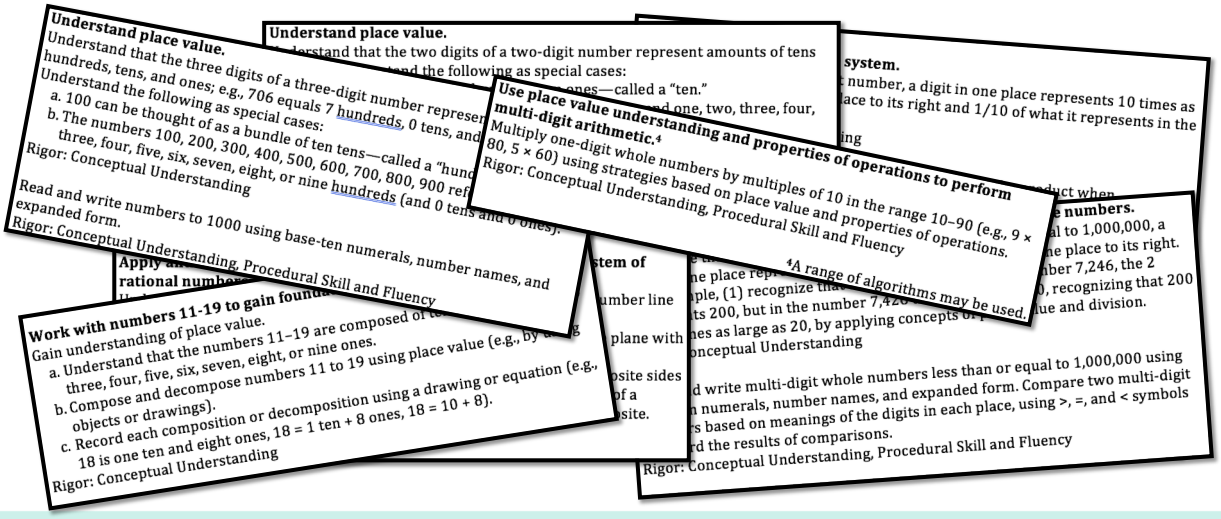
1. Select a big idea for your group to investigate.

   Building conceptual understanding of the base-ten system and its structure

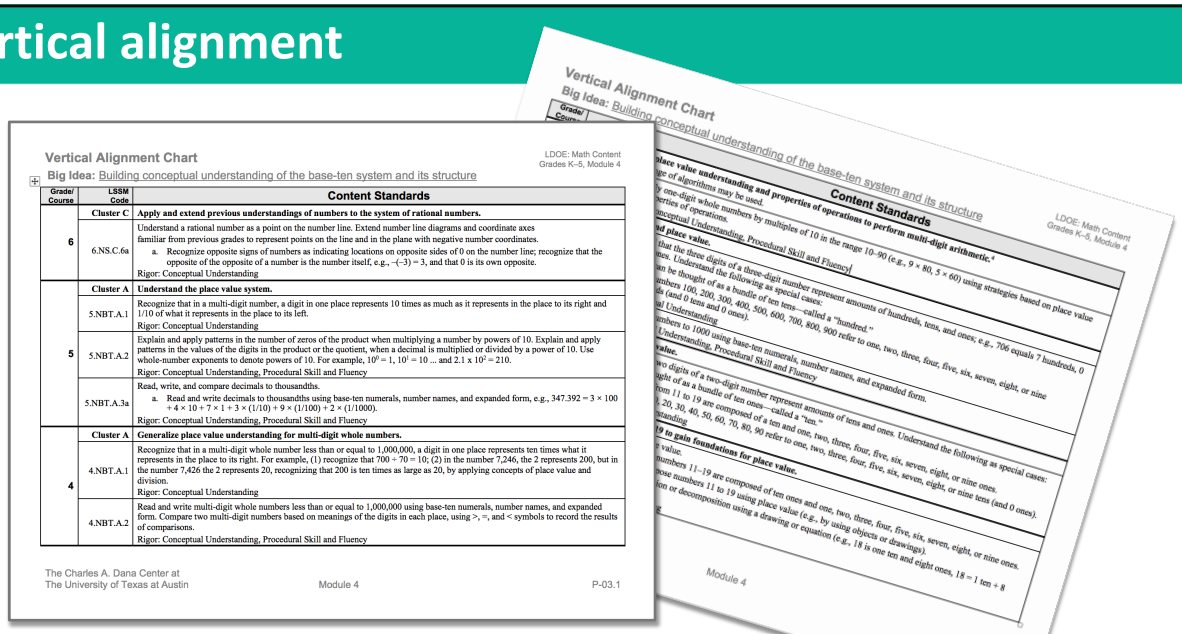
2. Determine what your big idea means.

Vertical alignment

Building conceptual understanding of the base-ten system and its structure



Vertical alignment



Vertical alignment discussion questions

- What content changes occur from grade to grade?
- Where are concepts introduced, developed, and finalized?
- Does an idea or skill get more complex, and if so, how?
- How are the components of *rigor* (conceptual understanding, procedural skills and fluency, and application) evident in the standards?
- How do the components of rigor change as the big idea is developed across the grades?

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Reflection

How does place value understanding develop across the grade levels?

How do the elements of rigor support the progression of place value understanding?

Math Content Module 4, Session 2
Grades K–5

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MATHEMATICS CONTENT MODULES

Module 4: Number and Operations in Base Ten: Place Value and Fluency
Session 3: Deepening Mathematical Content Knowledge for Effective Instruction

Grades K–5

Helping students develop fluency

"Procedural fluency is a critical component of mathematical proficiency. Procedural fluency is the ability to apply procedures accurately, efficiently, and flexibly; to transfer procedures to different problems and contexts; to build or modify procedures from other procedures; and to recognize when one strategy or procedure is more appropriate to apply than another."

— National Council of Teachers of Mathematics. (2014 July). Procedural fluency in mathematics. A position of the National Council of Teachers of Mathematics.
http://www.nctm.org/Standards-and-Positions/Position-Statements/Procedural-Fluency-in-Mathematics

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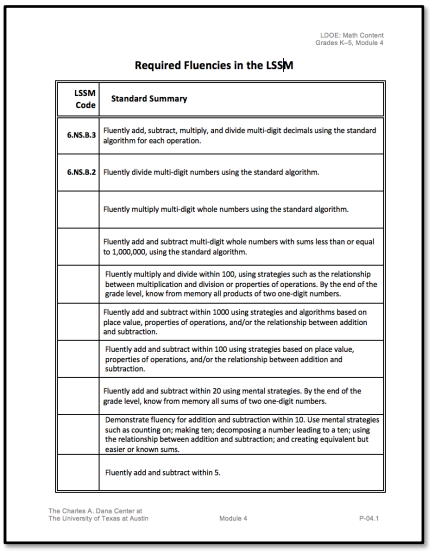
Required fluencies in the standards

Where is fluency required in the LSSM?

- Using your set of standards, work in pairs or triads to determine the grade level at which each fluency (in the list) is required.
- Record the LSSM standard number for each required fluency.
- When you have identified the grade-level standards that align to each of the required fluencies, check your work with the Answer Key.



LDOE: Math Content
Grades K–5, Module 4

Required Fluencies in the LSSM

LSSM Code	Standard Summary
6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
6.NS.B.2	Fluently divide multi-digit numbers using the standard algorithm.
	Fluently multiply multi-digit whole numbers using the standard algorithm.
	Fluently add and subtract multi-digit whole numbers with sums less than or equal to 1,000,000, using the standard algorithm.
	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations. By the end of the grade level, know from memory all products of two one-digit numbers.
	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
	Fluently add and subtract within 20 using mental strategies. By the end of the grade level, know from memory all sums of two one-digit numbers.
	Demonstrate fluency for addition and subtraction within 10. Use mental strategies such as counting on; making ten; decomposing a number leading to a ten; using the relationship between addition and subtraction; and creating equivalent but easier or known sums.
	Fluently add and subtract within 5.

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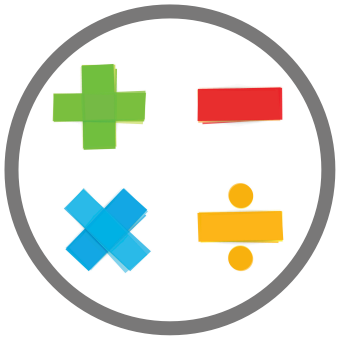
Required fluencies in the standards



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Using the required fluencies, describe the sequence in which fluency is developed across grades K through 6.

Use the following questions to guide your discussion:

- At what grade level(s) is fluency developed?
- What area of content is the focus for developing fluency at the primary grades?
- At what grade level does this change? What content area becomes a focus for developing fluency in later grades?

Required fluencies in the standards

Now, let's look more closely at the K–6 standards...

- At what grade level(s) in the LSSM is a standard algorithm required?
- What do you notice about required fluencies and standard algorithms?
- At what grade level is the mathematical concept associated with each standard algorithm introduced?

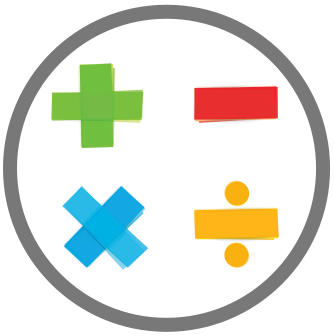

Image credit: kraphix / iStock / Thinkstock | Item # 519582328

How do we help students develop fluency?

Developing fluency involves three steps or stages:

- Direct modeling
- Invented strategies
- Standard algorithms

Direct modeling

Direct modeling is a developmental step that involves students using manipulatives or drawings along with counting to directly represent the meaning of an operation or story problem.

To encourage the move from direct modeling:

- Record students' verbal explanations in ways that they and others can follow.
- Ask students to make a written numeric record of how they solved the problem with physical models. Then have students try to use the same written method on a new problem—without using the physical models.
- Ask students who have just solved a problem with manipulatives to see whether they can do the problem mentally.

— Page 184 in Van de Walle, J. A., Karp, K. S., Lovin, L. H., & Bay-Williams, J. M. (2017). *Teaching student-centered mathematics: Developmentally appropriate instruction for grades 3–5* (volume II). Third Edition. NY, NY: Pearson.

Encouraging the move from direct modeling

As you watch the video clip from EngageNY, think about the following:

- How is the teacher in this classroom helping students to move from direct modeling of three-digit subtraction?
- What evidence indicates that students have already moved past direct modeling with other math concepts? Explain your thinking.

— EngageNY. (2013 May 14). Video Library: Grade 2 Math: Use Modeling and Tools to Solve Three Digit Subtraction Problems 2.NBT.7. https://www.engageny.org/resource/common-core-instruction-use-modeling-and-tools-to-solve-three-digit-subtraction-problems

Invented strategies

Invented strategies are strategies that:

- Do not involve the use of physical materials;
- Do not involve counting by ones; and
- Are not the standard algorithm.

— Carpenter, T. P., Franke, M. L., Jacobs, V. R., Fennema, E., & Empson, S. B. (1998). A longitudinal study of invention and understanding in children's multi-digit addition and subtraction. *Journal for Research on Mathematics Education, 29*(1), 3–20.

Invented strategies

Consider the following problem:

The school auditorium has 24 rows of seats. There are 39 seats in each row. How many students can be seated in the auditorium?

Try solving the problem using some method other than the algorithm you were taught in school.

- Can you solve the problem mentally by thinking of the place values of the numbers?
- What is another way you can solve the problem?

— Page 183 in Van de Walle, J. A., Karp, K. S., Lovin, L. H., & Bay-Williams, J. M. (2017). *Teaching student-centered mathematics: Developmentally appropriate instruction for grades 3–5* (volume II). Third Edition. NY, NY: Pearson.

Invented strategies

Try this one:

342 + 153 + 481

For this addition task, try the following method: Begin by adding the hundreds, saying the totals as you go—3 hundred, 4 hundred, 8 hundred. Then add on to this the tens in a successive manner—and, finally, the ones.

- How comfortable were you using this method?
- Is this a mental strategy that you currently use?

— Page 183 in Van de Walle, J. A., Karp, K. S., Lovin, L. H., & Bay-Williams, J. M. (2017). *Teaching student-centered mathematics: Developmentally appropriate instruction for grades 3–5* (volume II). Third Edition. NY, NY: Pearson.

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Invented strategies

Quickly examine the following standards.

What kinds of strategies should students use as they develop fluency with addition, subtraction, multiplication, and division?

- 1.NBT.C.4
- 2.NBT.B.5; 2.NBT.B.7
- 3.NBT.A.2; 3.NBT.A.3
- 4.NBT.C.5
- 5.NBT.B.6; 5.NBT.B.7

Math Content Module 4, Session 3
Grades K–5

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Standard algorithms

In teaching standard algorithms, the focus should not be on memorizing a series of steps, but on making sense of the procedure as a process.

Understanding how algorithms work and when they are the best choice over an invented approach is central to development of procedural fluency.

— Page 187 in Van de Walle, J. A., Karp, K. S., Lovin, L. H., & Bay-Williams, J. M. (2017). *Teaching student-centered mathematics: Developmentally appropriate instruction for grades 3–5* (volume II). Third Edition. NY, NY: Pearson.

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Standard algorithms

Keep the following in mind:

- Spend a ***significant*** amount of time with invented strategies BEFORE introducing standard algorithms.
- As with ANY strategy, if a student uses it, they must understand why it works and be able to explain it.
- The standard algorithm, once understood, is one more strategy added to a student's toolbox of strategies.
- What we call the "standard algorithm" may not be the "standard" or customary algorithm in other countries.

— Page 188 in Van de Walle, J. A., Karp, K. S., Lovin, L. H., & Bay-Williams, J. M. (2017). *Teaching student-centered mathematics: Developmentally appropriate instruction for grades 3–5* (volume II). Third Edition. NY, NY: Pearson.

Fluency development in EngageNY

In EngageNY, fluency is developed at each grade level.

- A focus on fluency is the first section in every lesson.
- The EngageNY lessons are designed to promote fluency using both invented strategies found in the standards and the standard algorithms.
- Includes one or more of the following:
  - Sprints
  - Math Finger Flash
  - Number Disk Dash
  - Games
  - Personal White Board Activities

Fluency development in EngageNY

With a partner:

- Select a few of the EngageNY lessons in the table.
- Explore the fluency activities found in the selected lessons.
- Use the questions on the next slide to guide your work.

Grade Level	EngageNY Lesson
Kindergarten	Module 4 Topic F Lesson 31 Module 4 Topic H Lesson 37
Grade 1	Module 1 Topic B Lesson 5 Module 1 Topic C Lesson 9
Grade 2	Module 3 Topic C Lesson 6 Module 3 Topic C Lesson 5
Grade 3	Module 2 Topic E Lesson 18 Module 6 Topic B Lesson 9
Grade 4	Module 4 Topic A Lesson 1 Module 7 Topic A Lesson 2
Grade 5	Module 2 Topic A Lesson 2 Module 2 Topic B Lesson 3

Fluency development in EngageNY

As you explore the fluency activities from EngageNY, think about the following questions, and be prepared to share your thinking:

- Is there evidence of the steps or stages in developing fluency? (Give examples, if applicable.)
  - Direct modeling
  - Invented strategies
  - Standard algorithms
- Do the fluency activities focus on only the required fluency standard(s) for each grade level? Explain your thinking.

Math Content Module 4, Session 3
Grades K–5

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Fluency

When students can compute multidigit addition, subtraction, multiplication, and division problems in a variety of ways, complete written records of their work, explain their thinking, and discuss merits of one strategy over another, they are developing as independent learners.

— Page 183 in Van de Walle, J. A., Karp, K. S., Lovin, L. H., & Bay-Williams, J. M. (2017). *Teaching student-centered mathematics: Developmentally appropriate instruction for grades 3–5* (volume II). Third Edition. NY, NY: Pearson.

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Reflecting on what we have learned

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Rigor is...

...pursuing, with equal intensity, conceptual understanding, procedural skills and fluency, and application

Think about what you have learned about fluency.

- How does the development of fluency in the standards reflect the key shift of *rigor*?
- How does this shift impact teaching and learning of mathematics in our classrooms?

Math Content Module 4, Session 3
Grades K–5

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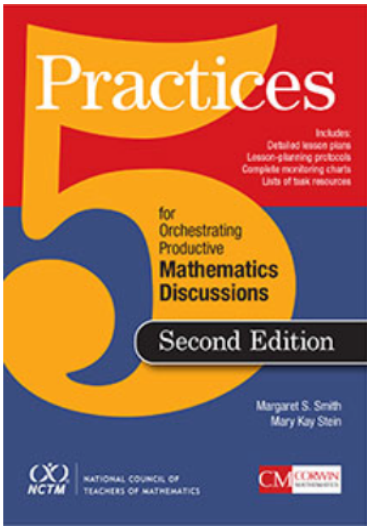
MATHEMATICS CONTENT MODULES

Module 4: Number and Operations in Base Ten: Place Value and Fluency
Session 4: Instructional Strategies

Grades K–5

The National Council of Teachers of Mathematics book:

5 Practices for Orchestrating Productive Mathematics Discussions



— Smith, M. S., & Stein, M. K. (2018, second edition). *5 practices for orchestrating productive mathematics discussions.* Reston, VA: National Council of Teachers of Mathematics. Available at https://www.nctm.org/Store/Products/5-Practices-for-Orchestrating-Productive-Mathematics-Discussion,-2nd-Edition

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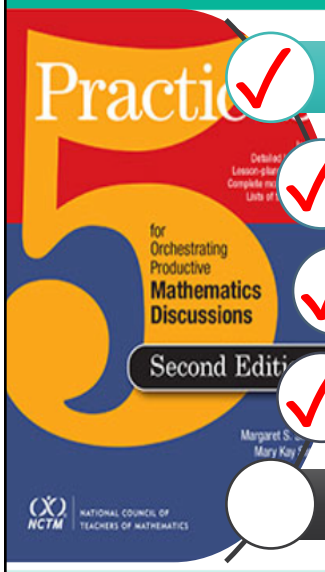
5 Practices for Orchestrating Productive Mathematics Discussions



- ✓ *Anticipating* student responses prior to the lesson
- ✓ *Monitoring* students' work on, and engagement with, the tasks
- ✓ *Selecting* particular students to present their mathematical work
- ✓ *Sequencing* students' responses in a specific order for discourse
- *Connecting* different students' responses, and connecting the responses to key mathematical ideas

Math Content Module 4, Session 4
Grades K–5

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Orchestrating productive mathematics discussions

Selecting **particular students, or groups of students, to present their mathematical work**

What does this involve?	How is this supported?
• Choosing students to present because of the mathematics in their responses • Making sure that over time all students are seen as authors of mathematical ideas and have the opportunity to demonstrate competence • Gaining some control over the content of the discussion	• *Anticipating* and *monitoring* • Planning in advance which types of responses to select, perhaps considering an incorrect solution to illustrate a typical misconception • Being ready to consider unanticipated solutions

— Adapted from Smith, M. S., & Stein, M. K. (2018, second edition). *5 practices for orchestrating productive mathematics discussions.* Reston, VA: National Council of Teachers of Mathematics. Available at https://www.nctm.org/Store/Products/5-Practices-for-Orchestrating-Productive-Mathematics-Discussion,-2nd-Edition

Orchestrating productive mathematics discussions

Sequencing **students' responses in a specific order for discussion**

What does this involve?	How is this supported?
• Purposefully ordering presentations so the mathematics is accessible to all students • Building a mathematically coherent storyline from prior knowledge to current grade-level standards	• *Anticipating*, *monitoring*, and *selecting* • During anticipation of work, considering how possible student responses are mathematically related

— Adapted from Smith, M. S., & Stein, M. K. (2018, second edition). *5 practices for orchestrating productive mathematics discussions.* Reston, VA: National Council of Teachers of Mathematics. Available at https://www.nctm.org/Store/Products/5-Practices-for-Orchestrating-Productive-Mathematics-Discussion,-2nd-Edition

Orchestrating productive mathematics discussions

Ways to *Sequence*

- Begin with the strategy used by the majority of students before moving to those strategies that only a few students used.
- Begin with a strategy that is more concrete, then move to strategies that are more abstract.
- Present strategies that address common misconceptions.
- Have related or contrasting strategies presented one right after the other.

Orchestrating productive mathematics discussions

With your group, analyze the student work samples for strategies and misconceptions and compare to the strategies you anticipated, then...

- ***Select*** student work that would best represent the strategies that would help build understanding of the math.
- ***Sequence*** the selected student work in the order that your group determines would best help the students make sense of the math.
- Create a chart that illustrates your selected strategies in the sequence you would have them presented in your class to help students make sense of the math.

Orchestrating productive mathematics discussions

Take a few minutes to reflect on the following questions:

- What strategy or approach did your group take in order to select specific student work samples for mathematical discourse?
- Did you select any work with incorrect or incomplete reasoning? How will you use this work to strengthen the learning of all students?
- Based on your experience in planning for mathematical discourse for this task, what strategies might you use to ensure that your classroom is a safe and positive learning environment for students? Why is such an environment important?

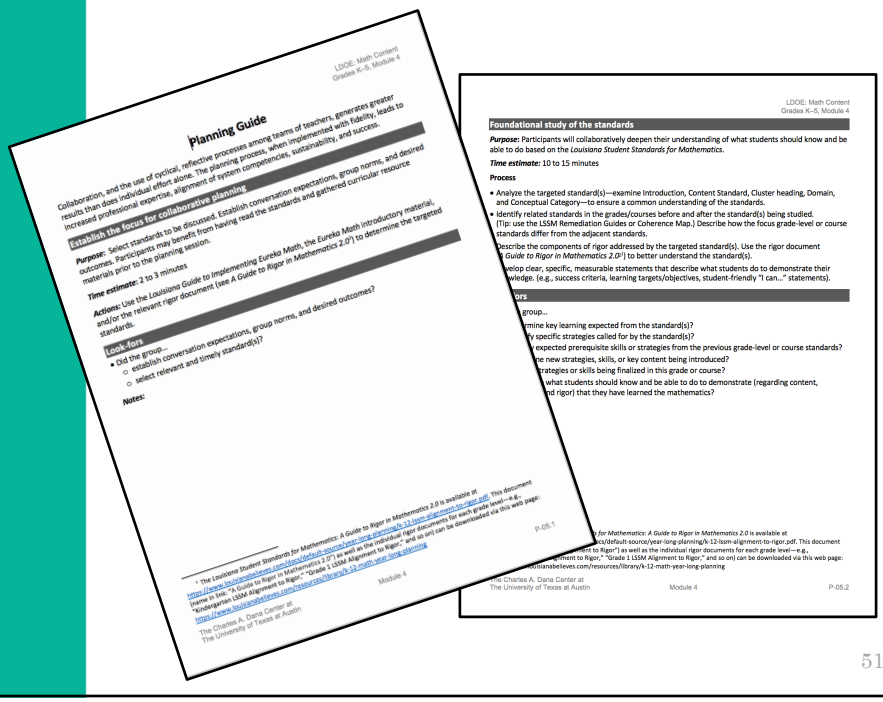
MATHEMATICS CONTENT MODULES

Module 4: Number and Operations in Base Ten: Place Value and Fluency
Session 5: Purposeful Planning of the EngageNY Curriculum

Grades K–5

Tool that promotes effective collaborative planning:

The Planning Guide



LDOE: Math Content
Grades K–5, Module 4

Planning Guide

Collaboration, and the use of cyclical, reflective processes among teams of teachers, generates greater results than does individual effort alone. The planning process, when implemented with fidelity, leads to increased professional expertise, alignment of system competencies, sustainability, and success.

Establish the focus for collaborative planning

Purpose: Select standards to be discussed. Establish conversation expectations, group norms, and desired outcomes. Participants may benefit from having read the standards and gathered curricular resource materials prior to the planning session.

Time estimate: 2 to 3 minutes

Actions: Use the *Louisiana Guide to Implementing Eureka Math*, the *Eureka Math* introductory material, and/or the relevant rigor document (see *A Guide to Rigor in Mathematics 2.0*[1]) to determine the targeted standards.

Look-fors

- Did the group…
  - establish conversation expectations, group norms, and desired outcomes?
  - select relevant and timely standard(s)?

Notes:

[1] The *Louisiana Student Standards for Mathematics: A Guide to Rigor in Mathematics 2.0* is available at https://www.louisianabelieves.com/docs/default-source/year-long-planning/k-12-lssm-alignment-to-rigor.pdf. This document (name in link: "A Guide to Rigor in Mathematics 2.0") as well as the individual rigor documents for each grade level—e.g., "Kindergarten LSSM Alignment to Rigor," "Grade 1 LSSM Alignment to Rigor," and so on) can be downloaded via this web page: http://www.louisianabelieves.com/resources/library/k-12-math-year-long-planning

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LDOE: Math Content
Grades K–5, Module 4

Foundational study of the standards

Purpose: Participants will collaboratively deepen their understanding of what students should know and be able to do based on the *Louisiana Student Standards for Mathematics*.

Time estimate: 10 to 15 minutes

Process

- Analyze the targeted standard(s)—examine Introduction, Content Standard, Cluster heading, Domain, and Conceptual Category—to ensure a common understanding of the standards.
- Identify related standards in the grades/courses before and after the standard(s) being studied. (Tip: use the LSSM Remediation Guides or Coherence Map.) Describe how the focus grade-level or course standards differ from the adjacent standards.
- Describe the components of rigor addressed by the targeted standard(s). Use the rigor document (*A Guide to Rigor in Mathematics 2.0*[1]) to better understand the standard(s).
- Develop clear, specific, measurable statements that describe what students do to demonstrate their knowledge. (e.g., success criteria, learning targets/objectives, student-friendly "I can…" statements).

Look-fors

- Did the group…
  - determine key learning expected from the standard(s)?
  - identify specific strategies called for by the standard(s)?
  - identify expected prerequisite skills or strategies from the previous grade-level or course standards?
  - identify new strategies, skills, or key content being introduced?
  - identify strategies or skills being finalized in this grade or course?
  - identify what students should know and be able to do to demonstrate (regarding content, and rigor) that they have learned the mathematics?

[1] The *Louisiana Student Standards for Mathematics: A Guide to Rigor in Mathematics 2.0* is available at https://www.louisianabelieves.com/docs/default-source/year-long-planning/k-12-lssm-alignment-to-rigor.pdf. This document (name in link: "A Guide to Rigor in Mathematics 2.0") as well as the individual rigor documents for each grade level—e.g., "Kindergarten LSSM Alignment to Rigor," "Grade 1 LSSM Alignment to Rigor," and so on) can be downloaded via this web page: http://www.louisianabelieves.com/resources/library/k-12-math-year-long-planning

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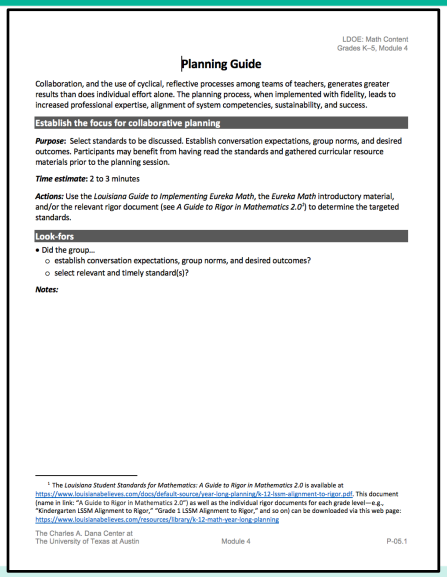
Collaborative planning conversation

Focus standards: Build conceptual understanding of the base-ten system and its structure

- Kindergarten: K.NBT.A.1
- Grade 1: 1.NBT.B.2
- Grade 2: 2.NBT.A.1, 2.NBT.A.3
- Grade 3: 3.NBT.A.3
- Grade 4: 4.NBT.A.1, 4.NBT.A.2
- Grade 5: 5.NBT.A.1, 5.NBT.A.2, 5.NBT.A.3a



LDOE: Math Content
Grades K–5, Module 4

Planning Guide

Collaboration, and the use of cyclical, reflective processes among teams of teachers, generates greater results than does individual effort alone. The planning process, when implemented with fidelity, leads to increased professional expertise, alignment of system competencies, sustainability, and success.

Establish the focus for collaborative planning

Purpose: Select standards to be discussed. Establish conversation expectations, group norms, and desired outcomes. Participants may benefit from having read the standards and gathered curricular resource materials prior to the planning session.

Time estimate: 2 to 3 minutes

Actions: Use the *Louisiana Guide to Implementing Eureka Math*, the *Eureka Math* introductory material, and/or the relevant rigor document (see *A Guide to Rigor in Mathematics 2.0*[1]) to determine the targeted standards.

Look-fors

- Did the group…
  - establish conversation expectations, group norms, and desired outcomes?
  - select relevant and timely standard(s)?

Notes:

[1] The *Louisiana Student Standards for Mathematics: A Guide to Rigor in Mathematics 2.0* is available at https://www.louisianabelieves.com/docs/default-source/year-long-planning/k-12-lssm-alignment-to-rigor.pdf. This document (name in link: "A Guide to Rigor in Mathematics 2.0") as well as the individual rigor documents for each grade level—e.g., "Kindergarten LSSM Alignment to Rigor," "Grade 1 LSSM Alignment to Rigor," and so on) can be downloaded via this web page: https://www.louisianabelieves.com/resources/library/k-12-math-year-long-planning

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Math Content Module 4, Session 5
Grades K–5

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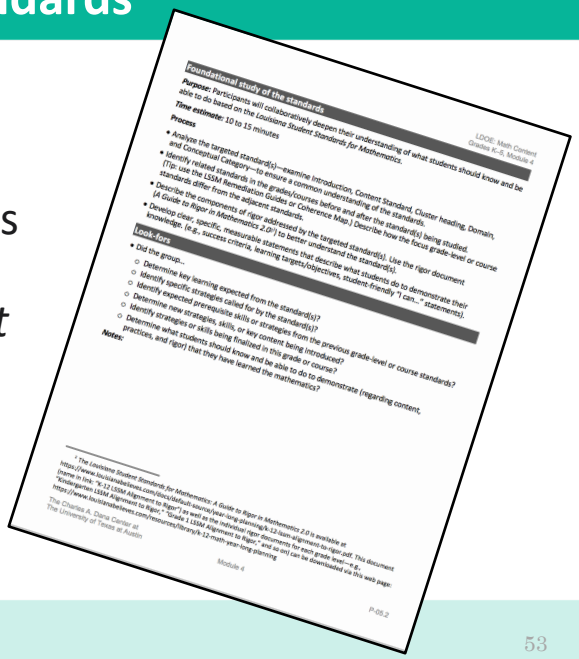
Foundational study of the standards

- ***Purpose:*** Participants will collaboratively deepen their understanding of what students should know and be able to do based on the *Louisiana Student Standards for Mathematics*.
- ***Time estimate:*** 10 to 15 minutes



Math Content Module 4, Session 5
Grades K–5

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Bridge to lesson planning

- ***Purpose:*** Participants will connect their understanding of the standards to EngageNY resource materials so they can make instructional decisions that best meet the intent of the standards and the needs of all students.
- ***Time estimate:*** 20 to 30 minutes

Math Content Module 4, Session 5
Grades K–5

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Collaborative planning

Work with your grade-level group to …

- Study your grade level's focus standards using the **Foundational study of the standards** (15 minutes).
- Connect your standards conversation to an EngageNY lesson and discuss instructional decisions regarding that lesson using the **Bridge to lesson planning** (30 minutes).

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Math Content Module 4, Session 5
Grades K–5

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Reflecting on purposeful planning

Points to Ponder

- How does purposeful planning help you attend to the components of *rigor*?
- What specific instructional strategies did you focus on?
- What changes did you make to the EngageNY lesson(s)? Why?
- How did your conversation help determine a plan to fill gaps in learning?

Math Content Module 4, Session 5
Grades K–5

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MATHEMATICS CONTENT MODULES

Module 4: Number and Operations in Base Ten: Place Value and Fluency
Session 6: Productive Classroom Culture

Grades K–5

Consider a time when you struggled to learn something new in either a personal situation or a professional situation.

- Describe the situation.
- What behaviors contributed to overcoming the struggle?

Persistence and effective effort

Read the Agile Mind article "Persistence and effective effort."

Highlight a **word**, a **sentence**, and a **phrase** that is important for your work with students.

1. Share your word, sentence, and phrase
2. As a group discuss what you heard and what insights you gained from the document.

Persistence and Effective Effort

LDOE: Math Content
Grades K–5, Module 4

Persistence and effective effort
Use with *Exploring* "Key influences on learning and achievement"

Persistence is continuation of effort and striving in the face of difficulty, opposition, or failure: it is a key characteristic of successful people across professional and academic disciplines. Persistence is evidenced by willingness to continue to try in the face of challenge. For students, this persistence can be a driving force to help them achieve their academic and personal goals.

But where does persistence in the face of adversity come from, and how can educators and parents promote it? Persistence, or academic resilience—academic achievement despite a challenging or threatening circumstance in the educational process—is often described as an outcome of high motivation and positive self-beliefs. For example, students with a strong belief in their own capabilities are shown to persist longer through academic difficulty.

Adults play a significant role in helping students develop persistence and apply **effective effort**—proven strategies paired with attitudes and beliefs that enable students to see the greatest benefit. They can reinforce a view of intelligence as malleable, or changeable, provide frequent and specific feedback to students on their academic progress, and encourage students to reflect on their own experiences with overcoming challenges and succeeding.

Educators can foster in students specific skills that are associated with effective effort, such as time management, organizational strategies, and goal setting. When students have a plan for how to deal with challenging academic situations that includes metacognitive strategies, or strategies for examining their own thinking, they are better equipped to continue to try when they struggle.

And classroom practice and routines influence students' effort. Students are more likely to

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Page 1 of 2

An Educator's Course In Academic Youth Development

Module 4

P-06.1

Persistence and effective effort

Key ideas from research

People become smarter with time, effective effort, and persistence on challenging tasks.

Planning, monitoring, and evaluating are metacognitive strategies that increase learning.

Educator actions

Provide students with challenging academic tasks and effectively facilitate student persistence through struggle.

Model for students that mistakes are part of learning and encourage students to take academic risks.

Teach and reinforce the use of metacognitive strategies in a variety of problem situations.

Provide feedback to students on using and developing problem-solving and personal strategies.

Persistence and effective effort

Identify in the lesson where you could support students in persistence and effective effort, including:

- Places where students are likely to struggle.
- Places where you can model that making mistakes and taking risks are ways we learn.
- Places where you can provide feedback to students that encourages metacognition and other effective effort strategies.
- Places where you can apply the specific educator actions discussed on the previous slide.

Be ready to share!

- 1 place where you can model persistence through a think-aloud or similar strategy.
- 1 place you anticipate students will struggle. Prepare appropriate responses.

Math Content Module 4, Session 6
Grades K–5

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Persistence and effective effort

What? What is one important takeaway from your learning?

So What? In what ways can you increase opportunities for students to take intellectual risks in your classroom routines?

Now What? What actions will you take as a result of this learning?

MATHEMATICS CONTENT MODULES

Module 4: Number and Operations in Base Ten: Place Value and Fluency Closing and Participant Evaluation Survey

Grades K–5

References

Key resources available via the Louisiana Department of Education web page K-12 Math Planning Resources, https://www.louisianabelieves.com/resources/library/k-12-math-year-long-planning include:

- *K–12 Louisiana Student Standards for Mathematics (LSSM) | Teachers Companion Documents*
- *Implement The Eureka Curriculum: Louisiana Eureka Guides | Help Students Who Struggle: Remediation Guides*.
- *The Louisiana Student Standards for Mathematics: A Guide to Rigor in Mathematics 2.0*, at https://www.louisianabelieves.com/docs/default-source/year-long-planning/k-12-lssm-alignment-to-rigor.pdf This document (name in link: "K-12 LSSM Alignment to Rigor") as well as the individual rigor documents for each grade level—e.g., "Kindergarten LSSM Alignment to Rigor," "Grade 1 LSSM Alignment to Rigor," and so on) can be downloaded via this web page: https://www.louisianabelieves.com/resources/library/k-12-math-year-long-planning

Other resources referenced include:

Agile Mind and the Charles A. Dana Center at The University of Texas at Austin. (2017) "Persistence and Effective Effort." *An Educator's Course in Academic Youth Development.* Author. Used with permission. See http://www.agilemind.com/programs/academic-youth-development

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Carpenter, T. P., Franke, M. L., Jacobs, V. R., Fennema, E., & Empson, S. B. (1998). A longitudinal study of invention and understanding in children's multi-digit addition and subtraction. *Journal for Research on Mathematics Education, 29*(1), 3–20.

EngageNY, from the New York State Department of Education: Various curriculum resources, available via https://www.engageny.org Including:

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(2014). Lesson: Grade 4 Mathematics Module 1, Topic A, Lesson 2. Available via https://www.engageny.org/resource/grade-4-mathematics-module-1-topic-lesson-2

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National Research Council. (2000). *How people learn: Brain, Mind, Experience, and School*. Washington, DC: The National Academies Press.

Smith, M. S., & Stein, M. K. (2011). *5 practices for orchestrating productive mathematics discussions.* Reston, VA: National Council of Teachers of Mathematics. Available at http://www.nctm.org/Store/Products/5--Practices-for-Orchestrating-Productive-Mathematics-Discussions

Van de Walle, J. A., Karp, K. S., Lovin, L. H., Bay-Williams, J. M. (2017). *Teaching Student-Centered Mathematics: Developmentally appropriate instruction for grades 3–5* (volume II). Third Edition. NY, NY: Pearson.

Module evaluation

Your feedback and comments are important to us. Please complete the module evaluation found at:

http://www.utdanacenter.org/ldoe/surveys