MATHEMATICS CONTENT MODULES

Module 3: Extending Proportional Reasoning to Functions

Session 0: Setting the Stage for Module 3

Grades 6–9

The goal of the initiative

Credit: Chad Baker / Jason Reed / Ryan McVay / Photodisc / Thinkstock

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.

Math Content Module 3, Session 0
Grades 6–9

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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 3 goals

Participants will

- Experience math tasks from EngageNY and other Tier 1 resources related to the focus content of proportional reasoning.
- Explore coherence between the LSSM related to proportional reasoning and functions and identify implications for teaching and learning.
- Investigate the impact of anticipating student responses to address misconceptions and connect student strategies to intended learning outcomes.
- Use tools for purposeful planning to develop a common understanding of grade-level/course standards to align teaching and learning using EngageNY and other Tier 1 resources.

Math Content Module 3
Grades 6–9

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MATHEMATICS CONTENT MODULES

Module 3: Extending Proportional Reasoning to Functions

Session 1: Deepening Mathematical Content Knowledge, Exploring Coherence in the LSSM, and Purposeful Planning

Grades 6–9

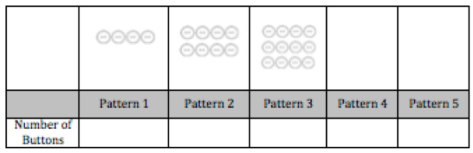
Engaging in the mathematics: Extending proportional reasoning to functions

Buttons tasks Grades 6–9

Handout M3_P-01
Buttons Tasks

Engaging in the mathematics

6th Grade – 6.EE.C.9
Gita plays with her grandmother's collection of buttons.
She arranges them in rows.
The first 3 patterns she has created are shown below.



	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5
Number of Buttons					

Draw patterns 4 and 5 and then complete the table.

Create a graph of this problem. Explain your choice of the independent and dependent variables.

Write an equation that represents this situation. Explain how you created your equation. Don't forget to define the variables you use.

Gita's grandmother asked her to create the 7th pattern. If Gita has 30 buttons, will she have enough to create it? Explain how you arrived at your answer.

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Coherence across the grades

In mixed-grade-level groups,

- Share your grade-level task, starting with grade 6 and move in order to Algebra I.
- How does the progression of the math in these tasks exemplify the coherence in the standards related to the idea of extending proportional reasoning to functions from grades 6 to 9?

Collaborative planning

What is collaborative planning?

- Working and learning together to plan instruction (including lessons, units, assessments, and activities) focused on building the intended learnings described by the standards.
- Discussing, interpreting, and refining curriculum resource materials together in order to use them to best meet students' needs in their learning.

Collaborative planning

Why collaborative planning?

Research tells us that high-quality collaboration benefits teachers and students.

"High-quality collaboration… among teachers is associated with increases in their students' achievement, their performance, and their peers' students' achievement."

— Ronfeldt, M., Farmer, S., McQueen, K., & Grissom, J. (2015). Teacher collaboration in instructional teams and student achievement. *American Educational Research Journal, 52*(3), 475–514. Available: https://learningforward.org/docs/default-source/jsd-october-2015/high-quality-collaboration-benefits-teachers-and-students.pdf .

Collaborative planning

What do we want to achieve in collaborative planning sessions?

- Build a shared understanding of the math content described in the standards and what that content looks like in teaching and learning.
- Consider and use instructional strategies and curricular resources that will best build on students' current understanding and connect to the intended learning.

Collaborative planning

What often comes out of unstructured planning sessions?

- Teams use “divide and conquer” planning instead of collaborating about instruction.
- Teachers leave the room with varied understandings of content, which leads to confusion and differences in instruction across classes.
- Teams spend time talking about logistical issues instead of collaborative planning.
- The tyranny of the urgent crowds out the important.

Math Content Module 3, Session 1
Grades 6–9

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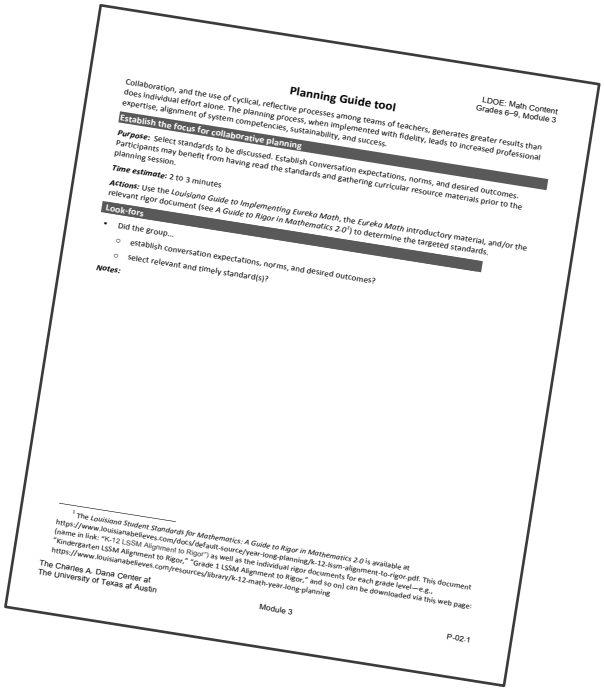
Tool that promotes effective collaborative planning:

The Planning Guide Tool



Planning Guide tool

LDOE: Math Content
Grades 6–9, Module 3

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, norms, and desired outcomes.

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.

Participants may benefit from having read the standards and gathering curricular resource materials prior to the planning session.

Look-fors

- Did the group…
  - establish conversation expectations, 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-lsm-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

The Charles A. Dana Center at
The University of Texas at Austin

Module 3

P-02.1

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Collaborative planning conversation

Observe the group using the Planning Guide tool to:

- establish the focus for collaborative planning.
- conduct a foundational study of the standards.

What did the team accomplish in their conversation?

Planning Guide Tool

Lets try it together!

Establish the focus for collaborative planning:

- Grade 6: 6.EE.C.9
- Grade 7: 7.RP.A.2c, 7.RP.A.2d
- Grade 8: 8.F.A.3, 8.F.B.4
- Alg I: A1: F-LE.A.1a, A1: F-LE.A.1b, A1: F-LE.A.2

Planning Guide Tool

Foundational study of the standards

1. Analyze the targeted standard(s) (examine Introduction, Domain, Cluster Heading, and Content Standard) to ensure a common understanding of the content.

2. Identify related standards in the grades/courses before and after using the Teacher Companion Document, Remediation Guide, or Coherence Map. Describe how the focus grade/course level standards are different than the adjacent standards.

Math Content Module 3, Session 1
Grades 6–9

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Planning Guide Tool

Foundational study of the standards

3. Describe the components of rigor addressed by the targeted standard(s). Use the Teacher Companion Document or the Rigor Document to better understand the standard(s).

Credit: Alexyndr / iStock / Thinkstock

Math Content Module 3, Session 1
Grades 6–9

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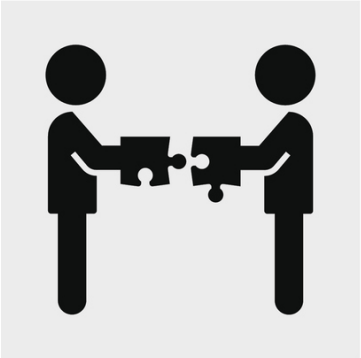
Planning Guide Tool

Foundational study of the standards

4. 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).



Math Content Module 3, Session 1
Grades 6–9
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Planning Guide Tool

Reflection on Planning Guide

- What important ideas surfaced in your grade-level study of the standards?

Preview the Bridge to Lesson Planning section

- Where is this conversation headed?
- How well-prepared do you feel to move into planning lessons aligned to the standards?

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Grades 6–9
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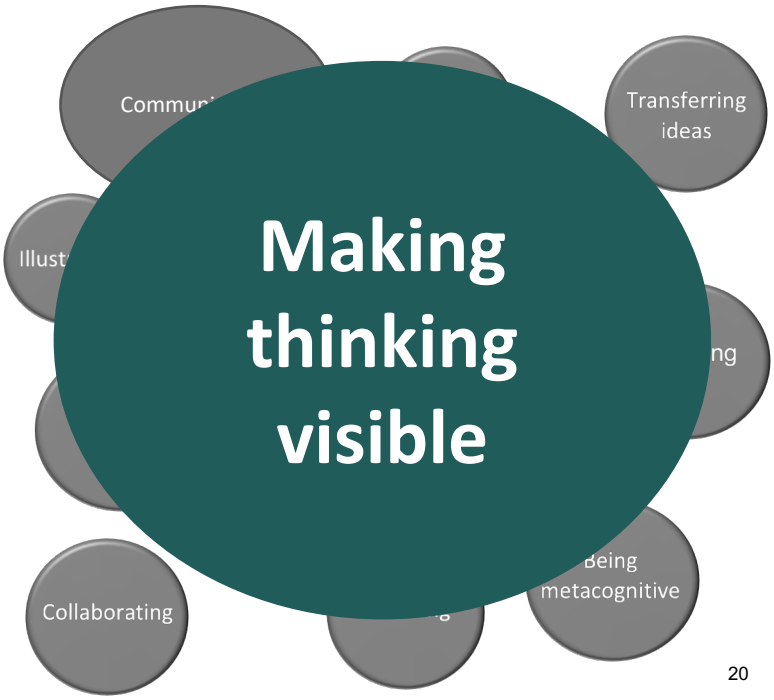
MATHEMATICS CONTENT MODULES

Module 3: Extending Proportional Reasoning to Functions

Session 2: Instructional Strategies to Improve Curriculum Implementation

Grades 6-9

What is productive discourse?



20

"Discourse is the mathematical communication that occurs in a classroom. Effective discourse happens when students articulate their own ideas and seriously consider their peers' mathematical perspectives as a way to construct mathematical understandings."

— National Council of Teachers of Mathematics (2010). Call for manuscripts: Discourse. Mathematics Teaching in the Middle School. From http://www.nctm.org/Publications/mathematics-teaching-in-middle-school/2010/Vol16/Issue2/Call-for-Manuscripts_-Discourse---September-2010

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Why promote student discourse?

Deepen student understanding

Encourage students to build on and construct new ideas

Make student thinking visible

Foster practices of mathematicians, scientists, and engineers

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What is a pitfall that teachers encounter in preparing students to talk about math?

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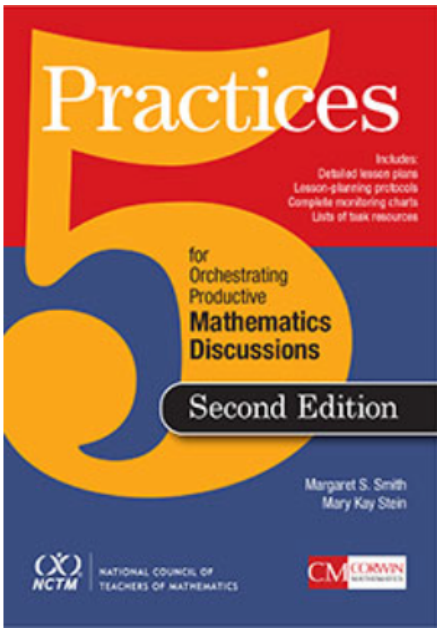
5 Practices for Orchestrating Productive Mathematics Discussions



— 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

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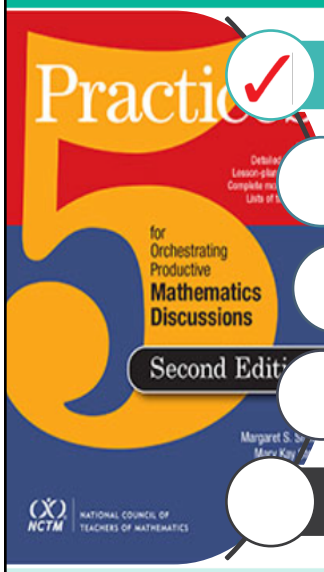
5 Practices for Orchestrating Productive Mathematics Discussions



- *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

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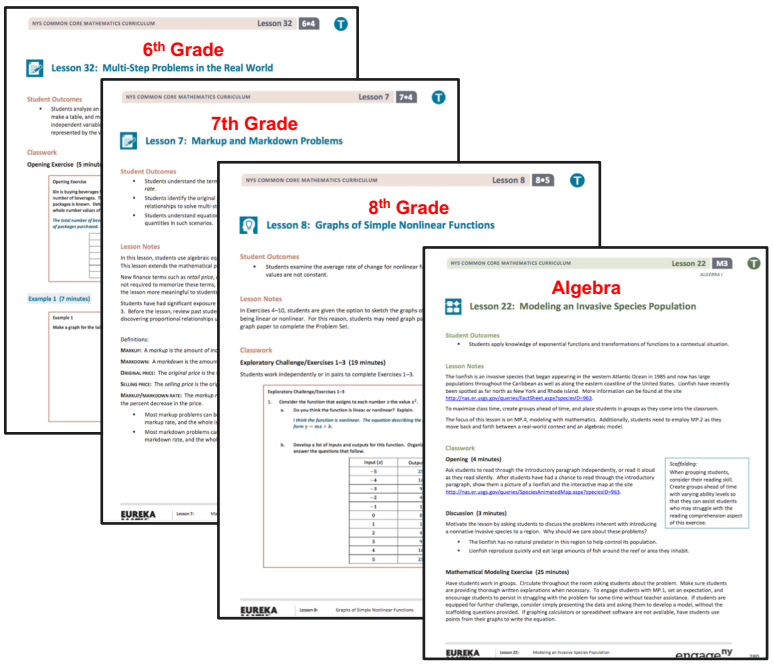
Establishing the learning goal

"Explicit learning goals clarify what counts as evidence of students' learning, how students learning can be linked to instructional activities, and how to revise instruction to facilitate students' learning more effectively."

— Page 14 in Smith, M. S., & Stein, M. K. (2011). *5 practices for orchestrating productive mathematics discussions*. Reston, VA: National Council of Teachers of Mathematics.



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Orchestrating productive mathematics discussions

Anticipating **student responses prior to the lesson**

What should you consider?	How is this supported?
• The strategies that students might use to approach or solve a challenging mathematical task • How to respond to what students product • Which strategies are most useful in addressing the mathematics to be learned	• *Solving the problem in as many ways as possible* • Solving the problem with other teachers • Drawing on relevant research when possible • Document students responses year to year

— Adapted from Smith, M. S., & Stein, M. K. (2011). *5 practices for orchestrating productive mathematics discussions.* |Reston, VA: National Council of Teacher of Mathematics.

Math Content Module 3, Session 2
Grades 6-9

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Anticipating student responses

- Is it necessary to address all misconceptions during the Classwork or Closing?
- How might the coherence of the standards help us anticipate/address misconceptions?

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Anticipating student responses

Session reflection

- How do collaborative conversations with colleagues help teachers plan for productive discourse?

MATHEMATICS CONTENT MODULES

Module 3: Extending Proportional Reasoning to Functions

Session 3: Purposeful Planning of the EngageNY Curriculum

Grades 6–9

How can we make instructional decisions that best meet the intent of the standards and the needs of all students?

— Page 77 in National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all.* Reston, VA: Author.

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"All stakeholders [should] focus on helping students achieve challenging standards by implementing a coherent curriculum….

Teachers need to enter into dialogue with colleagues to become more familiar with the mathematical expectations of the standards that are guiding their teaching, including discussions of how these ideas are developed in both horizontal and vertical components of the curriculum…

They need to evaluate the extent to which curricular materials and resources align with and support meaningful student learning of the content and practices in the standards."

— Page 77 in National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all.* Reston, VA: Author.

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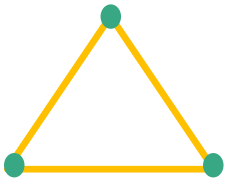
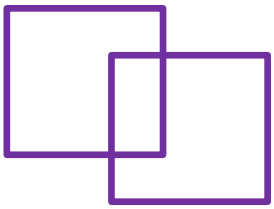
3-2-1

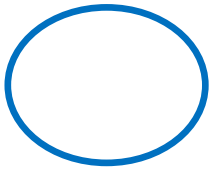
Planning Guide Tool



3 Points of learning you remember about the Planning Guide tool



2 Ways the Planning Guide tool informs purposeful planning



1 Idea still circling about the Planning Guide tool

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Planning Guide Tool

Recall from Session 1

The focus for collaborative planning: Extending Proportional Reasoning to Functions

Foundational study of the standards

- 6th Grade: 6.EE.C.9
- 7th Grade: 7.RP.A.2c, 7.RP.A.2d
- 8th Grade: 8.F.A.3, 8.F.B.4
- Alg I: A1: F-LE.A.1a, A1: F-LE.A.1b, A1: F-LE.A.2

Math Content Module 3, Session 3
Grades 6–9

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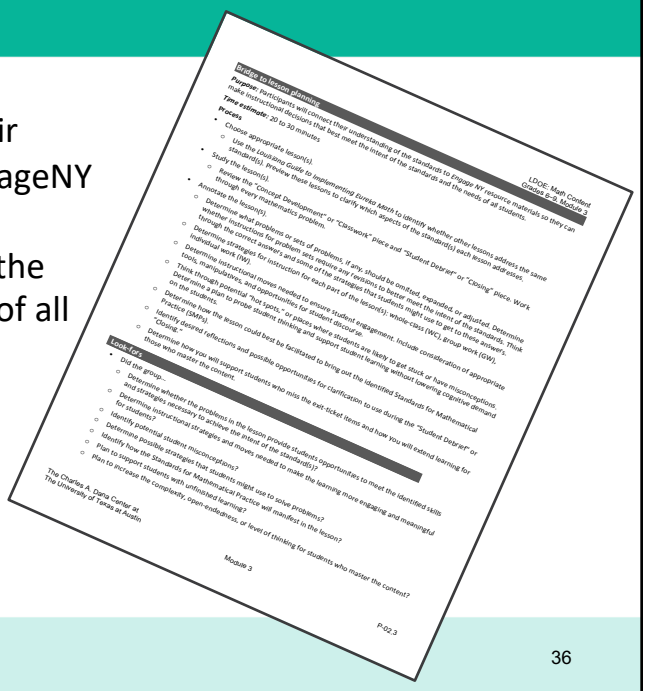
Quick review: Foundational study of the standards

1. Analyze the targeted standard(s) (examine Introduction, Domain, Cluster Heading, and Content Standard) to ensure a common understanding of the content.
2. Identify related standards in the grades/courses before and after using the Remediation Tables, or Coherence Map. Describe how the focus grade/course level standards are different than the adjacent standards.
3. Describe the components of rigor addressed by the targeted standard(s). Use the Rigor Document to better understand the standard(s).
4. 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).

Bridge to lesson planning

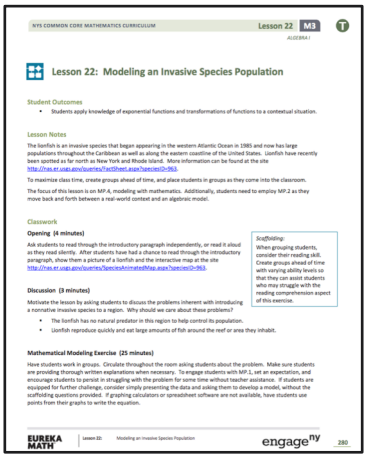
Purpose: Participants will connect their understanding of the standards to EngageNY resource materials in order to make instructional decisions that best meet the intent of the standards and the needs of all students.

Time estimate: 20 to 30 minutes



Planning Guide Tool

How does the *Bridge to lesson planning* conversation connect to the sample annotated EngageNY teacher lesson plan from Session 2?



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 22 M3 T
ALGEBRA I

Lesson 22: Modeling an Invasive Species Population

Student Outcomes

- Students apply knowledge of exponential functions and transformations of functions to a contextual situation.

Lesson Notes

The lionfish is an invasive species that began appearing in the western Atlantic Ocean in 1985 and now has large populations throughout the Caribbean as well as along the eastern coastline of the United States. Lionfish have recently been spotted as far north as New York and Rhode Island. More information can be found at the site http://nas.er.usgs.gov/queries/FactSheet.aspx?specieID=963.

To maximize class time, create groups ahead of time, and place students in groups as they come into the classroom.

The focus of this lesson is on MP.4, modeling with mathematics. Additionally, students need to employ MP.2 as they move back and forth between a real-world context and an algebraic model.

Classwork

Opening (4 minutes)

Ask students to read through the introductory paragraph independently, or read it aloud as they read silently. After students have had a chance to read through the introductory paragraph, show them a picture of a lionfish and the interactive map at the site http://nas.er.usgs.gov/queries/SpeciesAnimatedMap.aspx?specieID=963.

Scaffolding:
When grouping students, consider their reading skill. Create groups ahead of time with varying ability levels so that they can assist students who may struggle with the reading comprehension aspect of this exercise.

Discussion (3 minutes)

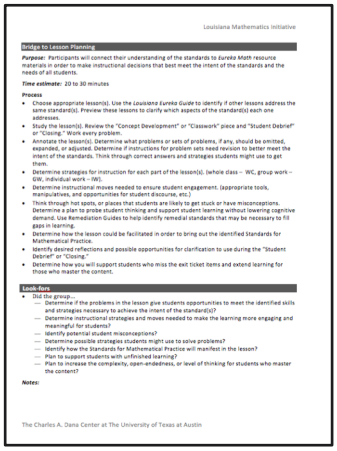
Motivate the lesson by asking students to discuss the problems inherent with introducing a nonnative invasive species to a region. Why should we care about these problems?

- The lionfish has no natural predator in this region to help control its population.
- Lionfish reproduce quickly and eat large amounts of fish around the reef or area they inhabit.

Mathematical Modeling Exercise (25 minutes)

Have students work in groups. Circulate throughout the room asking students about the problem. Make sure students are providing thorough written explanations when necessary. To engage students with MP.1, set an expectation, and encourage students to persist in struggling with the problem for some time without teacher assistance. If students are equipped for further challenge, consider simply presenting the data and asking them to develop a model, without the scaffolding questions provided. If graphing calculators or spreadsheet software are not available, have students use points from their graphs to write the equation.

EUREKA MATH | Lesson 22: Modeling an Invasive Species Population engage^ny 280



Louisiana Mathematics Initiative

Bridge to Lesson Planning

Purpose: *Participants will connect their understanding of the standards to Eureka Math resource materials in order to make instructional decisions that best meet the intent of the standards and the needs of all students.*

Time estimate: 20 to 30 minutes

Process

- Choose appropriate lesson(s). Use the *Louisiana Eureka Guide* to identify if other lessons address the same standard(s). Preview these lessons to clarify which aspects of the standard(s) each one addresses.
- Study the lesson(s). Review the "Concept Development" or "Classwork" piece and "Student Debrief" or "Closing." Work every problem.
- Annotate the lesson(s). Determine what problems or sets of problems, if any, should be omitted, expanded, or adjusted. Determine if instructions for problem sets need revision to better meet the intent of the standards. Think through correct answers and strategies students might use to get them.
- Determine strategies for instruction for each part of the lesson(s). (whole class – WC, group work – GW, individual work – IW).
- Determine instructional moves needed to ensure student engagement. (appropriate tools, manipulatives, and opportunities for student discourse, etc.)
- Think through hot spots, or places that students are likely to get stuck or have misconceptions. Determine a plan to probe student thinking and support student learning without lowering cognitive demand. Use Remediation Guides to help identify remedial standards that may be necessary to fill gaps in learning.
- Determine how the lesson could be facilitated in order to bring out the identified Standards for Mathematical Practice.
- Identify desired reflections and possible opportunities for clarification to use during the "Student Debrief" or "Closing."
- Determine how you will support students who miss the exit ticket items and extend learning for those who master the content.

Look-fors

- Did the group…
  - Determine if the problems in the lesson give students opportunities to meet the identified skills and strategies necessary to achieve the intent of the standard(s)?
  - Determine instructional strategies and moves needed to make the learning more engaging and meaningful for students?
  - Identify potential student misconceptions?
  - Determine possible strategies students might use to solve problems?
  - Identify how the Standards for Mathematical Practice will manifest in the lesson?
  - Plan to support students with unfinished learning?
  - Plan to increase the complexity, open-endedness, or level of thinking for students who master the content?

Notes:

The Charles A. Dana Center at The University of Texas at Austin

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Bridge to lesson planning

Continuing the conversation from session 1

The focus for collaborative planning:
Extending Proportional Reasoning to Functions

Credit: Caiaras Images / Creatas / Thinkstock

Foundational study of the standards

- Grade 6: 6.EE.C.9
- Grade 7: 7.RP.A.2c, 7.RP.A.2d
- Grade 8: 8.F.A.3, 8.F.B.4
- Alg I: A1: F-LE.A.1a, A1: F-LE.A.1b, A1: F-LE.A.2

Math Content Module 3, Session 3
Grades 6–9

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Bridge to lesson planning

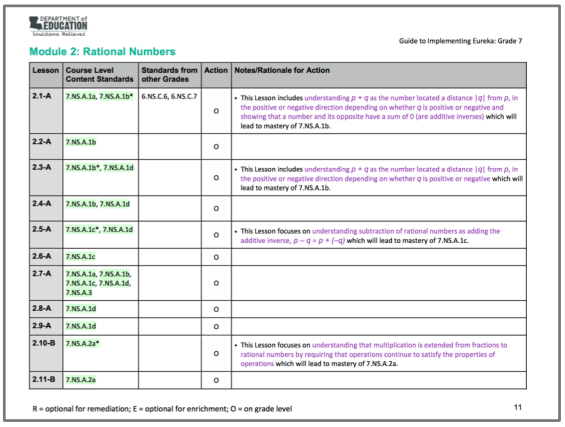
Process

Choose appropriate lesson(s).

- Use the *Louisiana Eureka Guide* to identify if other lessons address the same standard(s).
- Preview these lessons to clarify which aspects of the standard(s) each one addresses.

Study the lesson(s).

- Review the "Classwork" piece and "Closing."
- Work every problem.



DEPARTMENT of EDUCATION Louisiana Believes

Guide to Implementing Eureka: Grade 7

Module 2: Rational Numbers

Lesson	Course Level Content Standards	Standards from other Grades	Action	Notes/Rationale for Action
2.1-A	7.NS.A.1a, 7.NS.A.1b*	6.NS.C.6, 6.NS.C.7	O	• This Lesson includes understanding $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative and showing that a number and its opposite have a sum of 0 (are additive inverses) which will lead to mastery of 7.NS.A.1b.
2.2-A	7.NS.A.1b		O	
2.3-A	7.NS.A.1b*, 7.NS.A.1d		O	• This Lesson includes understanding $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative which will lead to mastery of 7.NS.A.1b.
2.4-A	7.NS.A.1b, 7.NS.A.1d		O	
2.5-A	7.NS.A.1c*, 7.NS.A.1d		O	• This Lesson focuses on understanding subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$ which will lead to mastery of 7.NS.A.1c.
2.6-A	7.NS.A.1c		O	
2.7-A	7.NS.A.1a, 7.NS.A.1b, 7.NS.A.1c, 7.NS.A.1d, 7.NS.A.3		O	
2.8-A	7.NS.A.1d		O	
2.9-A	7.NS.A.1d		O	
2.10-B	7.NS.A.2a*		O	• This Lesson focuses on understanding that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations which will lead to mastery of 7.NS.A.2a.
2.11-B	7.NS.A.2a		O	

R = optional for remediation; E = optional for enrichment; O = on grade level

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Bridge to lesson planning

Process

Annotate the lesson(s).

Determine:

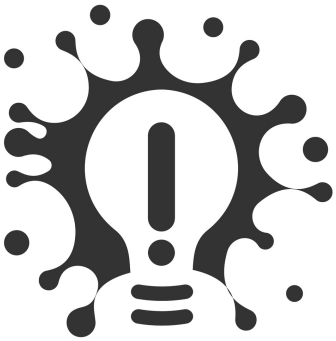
- Which problems or sets of problems, if any, should be omitted, expanded, or adjusted.
- If instructions for problem sets need revision to better meet the intent of the standards.
- Think through correct answers and strategies students might use to get them.

Bridge to lesson planning

Process

Determine:

- "Hot spots"—places where students are likely to get stuck or have misconceptions.
- A plan to probe student thinking and support learning without lowering cognitive demand.
- Remedial standards that may be necessary to fill gaps in learning.
- Facilitation moves to bring out the identified Standards for Mathematical Practice.



Math Content Module 3, Session 3
Grades 6–9

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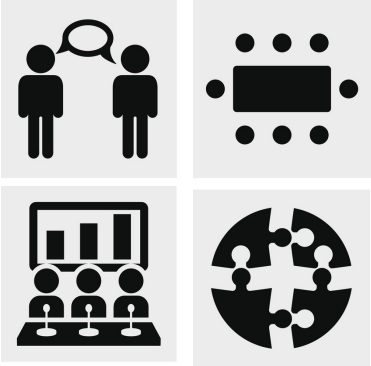
Bridge to lesson planning

Process

Determine:

- Strategies for instruction for each part of the lesson(s): whole class (WC), group work (GW), individual work (IW).
- Instructional moves necessary to ensure student engagement (appropriate tools, manipulatives, opportunities for student discourse, etc.).



Math Content Module 3, Session 3
Grades 6–9

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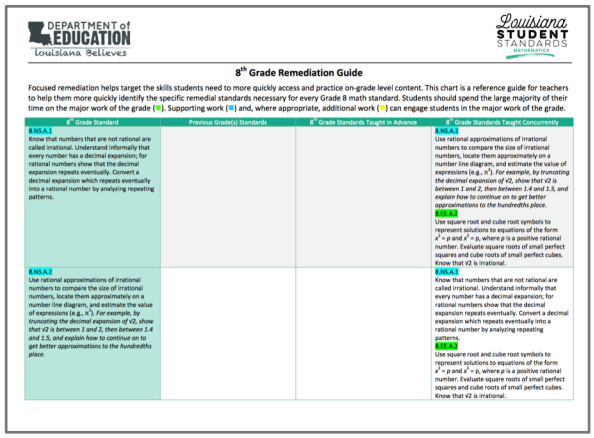
Bridge to lesson planning

Process

Identify desired reflections and possible opportunities for clarification to use during the "Closing."

Determine how you will support students who miss the exit ticket items and extend learning for those who master the content.



DEPARTMENT of EDUCATION
Louisiana Believes

Louisiana STUDENT STANDARDS MATHEMATICS

8th Grade Remediation Guide

Focused remediation helps target the skills students need to more quickly access and practice on-grade level content. This chart is a reference guide for teachers to help them more quickly identify the specific remedial standards necessary for every Grade 8 math standard. Students should spend the large majority of their time on the major work of the grade (■). Supporting work (■) and, where appropriate, additional work (■) can engage students in the major work of the grade.

8th Grade Standard	Previous Grade(s) Standards	8th Grade Standards Taught in Advance	8th Grade Standards Taught Concurrently
8.NS.A.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually. Convert a decimal expansion which repeats eventually into a rational number by analyzing repeating patterns.			**8.NS.A.2** Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations to the hundredths place.* **8.EE.A.2** Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
8.NS.A.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations to the hundredths place.*			**8.NS.A.1** Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually. Convert a decimal expansion which repeats eventually into a rational number by analyzing repeating patterns. **8.EE.A.2** Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.

Bridge to lesson planning

Look-fors

- Did the group…
  - Determine if the problems in the lesson give students opportunities to meet the identified skills and strategies necessary to achieve the intent of the standard(s)?
  - Determine instructional strategies and moves needed to make the learning more engaging and meaningful for students?
  - Identify potential student misconceptions?
  - Determine possible strategies students might use to solve problems.
  - Identify how the Standards for Mathematical Practice will manifest in the lesson.
  - Plan to support students with unfinished learning.
  - Plan to increase the complexity, open-endedness, or level of thinking for students who master the content.

Reflecting on purposeful planning

Points to Ponder

How does this process create a "bridge" between the standards and the instruction?

In what ways might this process impact both teaching and learning in your classroom?

What specific instructional strategies did you focus on?

How did your conversation help determine a plan to fill gaps in learning?

Math Content Module 3, Session 3
Grades 6–9

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MATHEMATICS CONTENT MODULES

Module 3: Extending Proportional Reasoning to Functions

Module 3 Closing Slides and Participant Evaluation Survey

Grades 6–9

References

The following are 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

- *K–12 Louisiana Student Standards for Math.*
- *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 include:

EngageNY, from the New York State Department of Education. Various curriculum resources, available via https://www.engageny.org
The EngageNY curriculum resources are shared under the EngageNY terms of use (https://www.engageny.org/terms-of-use) and the Creative Commons license—Attribution-NonCommercial-ShareAlike 3.0 Unported (CC BY-NC-SA 3.0)—mentioned therein: https://creativecommons.org/licenses/by-nc-sa/3.0

National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all*. Reston, VA: Author.

National School Reform Faculty. Harmony Education Center. (n.d.) Four A's Text Protocol. Available at https://www.nsrfharmony.org/system/files/protocols/4_a_text_0.pdf

Ronfeldt, M., Farmer, S., McQueen, K., & Grissom, J. (2015). Teacher collaboration in instructional teams and student achievement. *American Educational Research Journal, 52*(3), 475–514. Available at https://learningforward.org/docs/default-source/jsd-october-2015/high-quality-collaboration-benefits-teachers-and-students.pdf .

Student Achievement Partners. Coherence Map. Available via t https://achievethecore.org/page/1118/coherence-map

USGS: United States Geological Survey. NAS: Nonindigenous Aquatic Species. Database, available at https://nas.er.usgs.gov

What to expect in Modules 4–6

- **Deepening Mathematical Content Knowledge** for effective instruction
- **Exploring Coherence** in the LSSM
- **Key Shifts in Action** through an EngageNY lesson
- **Promoting Rigor** in the classroom
- **Instructional Strategies** for implementing the EngageNY curriculum
- The role of a **Productive Classroom Culture** in the EngageNY curriculum
- **Purposeful Planning** of the EngageNY curriculum

Module evaluation

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

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