IES Institute of Education Sciences

Regional Educational Laboratory Midwest

at American Institutes for Research

Teaching Fractions Toolkit

Professional development for grade 6 teachers: Module 6 facilitator guide

Implementation of ratio, rate, and proportion

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Contents

Facilitator guide overview

Facilitator guide purpose

Each Teaching Fractions Toolkit professional development module has a facilitator guide for facilitators who are leading the toolkit's professional development for a group of grade 6 math teachers. The facilitator guides, along with the slide decks for each module, provide facilitators with the information and accompanying resources they need to prepare for and lead teacher learning experiences. With these resources, a facilitator can support teachers with applying evidence-based strategies to enhance grade 6 students' fraction understanding.

Facilitator guide components

Each facilitator guide includes information and resources for the module as a whole (the module introduction), detailed instructions for two facilitated meetings (Meeting A and Meeting B), and interim activities that participating teachers will complete individually between the meetings. The components that follow this overview are as follows.

Professional development modules summary

The professional development modules summary table summarizes the six professional development modules, including their schedule and content. Review this overview to put in context the module you are currently preparing to facilitate for teachers.

Module introduction

The module introduction includes a summary of the module content and activities, the module objectives, a review of which practice guide recommendations are the focus of the module, a review of the sequence of meetings and activities in the module, and an overview of preparation and resources needed to facilitate the module.

Information for facilitating each section of the module

Information about facilitating the module for a group of teachers is divided into three sections:

1. Preparing for and leading Meeting A.
2. Supporting teachers in their individual work on interim activities for the module.
3. Preparing for and leading Meeting B.

The sections about facilitating Meetings A and B for the module include agendas with links to resources, detailed instructions for the professional development activities, tips, and background and rationale information. The section focused on the interim activities provides an overview of self-paced professional development activities that teacher participants will complete individually between meetings, along with guidance about supporting teachers in that work.

Credits and references

Credits and references are provided for citations, photos, and/or resources referred to in this facilitator guide and the presentation slide decks for this professional development module.

Color-coding in the facilitator guides

In both this guide and the associated module workbook, pages have a right-side page edge color that indicates the module section:

A brown edge indicates **general introductory information** about the module (starts on page 6).

A purple edge indicates information about the facilitated **Meeting A** of the module (starts on page 9).

A green edge indicates the information about the module's **interim activities** to be completed by teachers between meetings (starts on page 16).

A blue edge indicates information about the facilitated **Meeting B** of the module (starts on page 17).

Professional development modules summary

The complete professional development sequence includes six modules, each with three sections. The authors recommended that the modules be completed in sequential order because the activities of later modules build on the activities completed during prior modules.

Module and title	Description of module content	Module sections
Module 1 Fractions on a number line	• Provides a background for the professional development, including why a focus on effective fractions instruction, key areas of emphasis, activities, tools, associated icons, and module structure. • Introduces the practice guide and Recommendation 2 and the importance of visual representations. • Explores the Recommendation 2 implementation steps, with an emphasis on number lines as a central representational tool for teaching fraction concepts, and provides opportunities to engage with associated math tasks. • Introduces the Teacher Reflection Tool and uses it to record a baseline assessment of understanding and use of Recommendations 2–4. • Incorporates additional activities: using online apps for locating fractions on a number line and comparing fractions, introducing toolkit formative assessments, analyzing student work, and completing a module reflection.	**Meeting 1A** (120 minutes) **Module 1 interim activities** (teacher self-paced; 120 minutes) **Meeting 1B** (60 minutes)
Module 2 Understanding fraction addition and subtraction	• Introduces Recommendation 3 and its implementation steps, with a focus on creating and using area models, number lines, and other visual representations to understand the addition and subtraction of fractions. • Implements a formative assessment with students to help identify and plan to address any common mistakes and misunderstandings related to adding and subtracting fractions. • Incorporates additional activities: reading from the practice guide, using an online app for fraction estimation, working on a fraction addition task, analyzing student work from a fraction addition and subtraction formative assessment, and completing a module reflection.	**Meeting 2A** (60 minutes) **Module 2 interim activities** (teacher self-paced; 120 minutes) **Meeting 2B** (60 minutes)

Module and title	Description of module content	Module sections
Module 3 Understanding fraction multiplication and division	• Explores Recommendation 3 implementation steps, with a focus on using real-world contexts with plausible numbers and the use of visual representations to improve students' understanding of procedures for multiplication and division with fractions. • Continues the focus on fraction division and Recommendation 3, with exploration of visual representations used for fraction division tasks and use of predicting and judging the reasonableness of answers for fraction division problems. • Reviews the implementation steps and potential roadblocks associated with Recommendation 3 and supports collaborative planning of a lesson that incorporates those implementation strategies to mitigate anticipated roadblocks. • Incorporates additional activities, including using an online app for dividing fractions, analyzing students' work and identifying strengths and roadblocks related to Recommendation 3, engaging with a sorting task while consolidating knowledge related to Recommendations 2 and 3, revisiting and updating the Teacher Reflection Tool, and completing a module reflection.	**Meeting 3A** (60 minutes) **Module 3 interim activities** (teacher self-paced; 120 minutes) **Meeting 3B** (60 minutes)
Module 4 Implementation of fraction computation	• Continues the focus on fraction computation and Recommendations 2 and 3, including activities focused on the relationship between fraction multiplication and fraction division. • Applies new classroom implementation strategies associated with implementation steps for Recommendations 2 and 3 and includes approaches to mitigate anticipated roadblocks. • Incorporates additional activities, including using an online app for multiplying fractions, reading about Recommendation 3 implementation steps, analyzing your students' work and identifying strengths and roadblocks related to Recommendations 2 and 3, and completing a module reflection.	**Meeting 4A** (60 minutes) **Module 4 interim activities** (teacher self-paced; 120 minutes) **Meeting 4B** (60 minutes)

Module and title	Description of module content	Module sections
Module 5 Understanding ratio, rate, and proportion	• Introduces Recommendation 4, with a focus on Implementation Steps 1 and 2, associated Roadblocks 4.1 and 4.2, and activities to support understanding of proportional relations and using visual representations to solve ratio, rate, and proportion problems. • Uses an online app to explore and use visual representations, including tape diagrams, to solve ratio and rate problems. • Incorporates additional activities, including using visual representations to explore the multiplicative relations within and between equivalent ratios; using double number lines to solve ratio, rate, and proportion problems; making connections between visual representations and the cross-multiplication strategy; and completing a module reflection.	**Meeting 5A** (60 minutes) **Module 5 interim activities** (teacher self-paced; 120 minutes) **Meeting 5B** (60 minutes)
Module 6 Implementation of ratio, rate, and proportion	• Explores Recommendation 4 further, with a particular focus on Implementation Step 3 and associated Roadblock 4.3. • Applies and supports reflection on classroom implementation based on Recommendation 4 implementation steps as well as approaches for mitigating anticipated roadblocks. • Incorporates additional activities, including using the Teacher Reflection Tool, to support reflection on understanding and use of the practice guide, and on learning completed across the professional learning modules.	**Meeting 6A** (60 minutes) **Module 6 interim activities** (teacher self-paced; 120 minutes) **Meeting 6B** (60 minutes)

Note: The information about how to carry out the recommendation is in the form of steps for implementing the recommendation, which are referred to as “implementation steps” throughout this professional development.

Module 6 introduction

Module 6 continues the focus on ratios, rates, and proportions and on Recommendation 4, which started in Module 5. The module focuses especially on Implementation Step 3 and Roadblock 4.3 by supporting the exploration of strategies across ratio, rate, and proportion contexts, and it includes the opportunity to plan and implement a lesson in the classroom based on Recommendation 4.

Additional activities facilitate consolidating knowledge and learning from across the six professional learning modules related to Recommendations 2, 3, and 4 to wrap up this professional learning experience.

Objectives for Module 6

By the end of Module 6, teachers will be able to do the following:

- Describe how to develop students' ability to identify ratio, rate, and proportion problems with a common underlying structure and set in a variety of contexts.
- Apply key points from Recommendation 4 when planning ratio, rate, or proportion lessons.
- Identify evidence in student work of how strategies associated with Recommendation 4 supported students in solving ratio, rate, and proportion problems.
- Identify learning about Recommendations 2, 3, and 4 across Modules 1 through 6.

Recommendation focus for Module 6

The Teaching Fractions Toolkit professional development focuses on practice guide Recommendations 2–4 in the context of grade 6 math content. The design of the professional development also is in line with Recommendation 5 and its implementation steps, which relate to professional development programs for teachers of students learning fractions content.

Module 6 specifically focuses on building knowledge related to Recommendation 4 in the context of grade 6 standards and extends to knowledge and skills often taught in grades 7–8.

Recommendation 4: "Develop students' conceptual understanding of strategies for solving ratio, rate, and proportion problems before exposing them to cross-multiplication as a procedure to use to solve such problems."

Sections of Module 6

This module includes an initial facilitated meeting (Meeting 6A), a set of self-paced activities for teachers to do between meetings (interim activities) that is estimated to take 2 hours, and a second facilitated meeting (Meeting 6B).

Module 6

Implementation of Ratio, Rate, and Proportion focuses on Recommendation 4, particularly Implementation Step 3 and Roadblock 4.3, and on classroom implementation; it also wraps up the professional learning experience.

Meeting 6A ➔ **Module 6 interim activities** ➔ **Meeting 6B**

Preparation and resources for Module 6

Before leading Module 6, be sure to review all resources and facilitator instructions in this guide and in the slide decks, review pages 35–41 of the practice guide, explore the module activities yourself if you have not done so before, and anticipate what questions your participants might have. Make sure that a room is reserved with workspace for teachers to explore tasks and discuss ideas if meeting in person or ensure a videoconference setup is available if meeting online. Ensure that you will have internet access so you can access and demonstrate the online apps. Based on the size of your group, consider when you will use breakout groups to increase opportunities for engagement and discussion. Also consider how you will gauge participants' developing understanding. In larger groups you might consider using informal checks for understanding or exit tickets.

To facilitate this module, in addition to this facilitator guide, you will need the materials listed below that are also posted on the Teaching Fractions Toolkit website. It may be helpful to print copies of these to refer to when preparing for and facilitating the meetings so you do not have to view everything electronically when leading the meetings:

- **Practice guide:** The full practice guide that serves as the foundation for this professional development toolkit.
- **Slide deck:** The Meeting 6A slide deck and the Meeting 6B slide deck.
- **Participant workbook:** The Module 6 workbook that includes all handouts used in this module. Each participant will need access to an electronic copy or a print copy of the workbook. Participants may prefer to have a print copy so they can write on it.
- **Additional resources:** Module activities refer to readings, videos, and other resources. Links to these resources are summarized in the following table for your quick reference and also embedded in the participant workbooks and on the Teaching Fractions Toolkit website.

Type	Resource	Link and description
Practice guide readings	Recommendation 4	Read pages 35–41 to learn about Recommendation 4, including its implementation steps and potential roadblocks.
Video	Strategies for Fractions Instruction	Watch the Strategies for Fraction Instruction video (https://youtu.be/j4hUJMUxs_Y) to see examples of Recommendation 4.
Teacher Reflection Tool		Review the Recommendations 2, 3, and 4 checklists and the notes and reflection questions in the Teacher Reflection Tool. Be prepared to facilitate a conversation about participants' growth on these recommendations and implementation steps.

Meeting 6A

During Meeting 6A, support participants as they continue their exploration of Recommendation 4 related to ratios, rates, and proportions by engaging them with multiple strategies for use across problem contexts and facilitating discussion about these strategies in relation to Implementation Step 3 and potential Roadblock 4.3. Lead participants in collaborative lesson planning to prepare to try out ideas from Recommendation 4 in the classroom. These activities set the foundation for the interim activities that participants will explore between Meetings 6A and 6B.

The agenda for Meeting 6A is as follows.

Agenda and resources for Meeting 6A

Minutes	Topic and resources
5	**Introduction** (slides 1-3)
30	**Recommendation 4: Strategies across ratio, rate, and proportion contexts** (slides 4-15) • Module 6, Handout 1: Ratio, rate, and proportion strategies
20	**Planning for Recommendation 4 implementation** (slides 16-19) • Module 6, Handout 2: Recommendation 4 lesson planning
5	**Wrap-up** (slides 20-24) • Instructions for Module 6 interim activities

Facilitator directions for Meeting 6A

The directions for how to facilitate each Meeting 6A agenda topic are provided below. The left side includes the main instructions, and the right side includes background information and tips.

Introduction (5 minutes, slides 1-3)

1. **Review the agenda** (slide 2).
2. **Introduce the content, structure, and objectives for this module** (slide 3).
   - Module 6 continues the exploration of Recommendation 4 started in Module 5, with a particular emphasis on Implementation Step 3, and on planning instruction related to all three implementation steps and incorporating strategies to mitigate potential roadblocks.
   - This module also includes activities to celebrate and consolidate knowledge gained across the six professional learning modules.

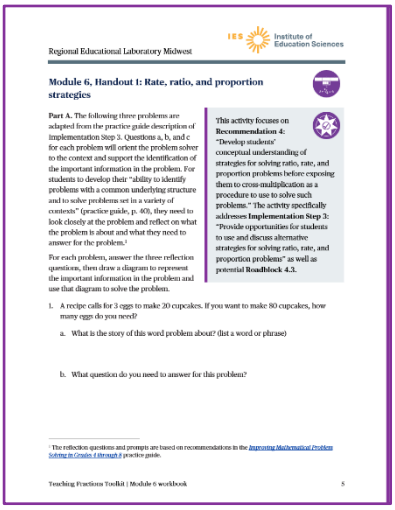
Recommendation 4: "Develop students' conceptual understanding of strategies for solving ratio, rate, and proportion problems before exposing them to cross-multiplication as a procedure to use to solve such problems."

Recommendation 4 implementation steps:

1. "Develop students' understanding of proportional relations before teaching computational procedures that are conceptually difficult to understand (e.g., cross-multiplication). Build on students' developing strategies for solving ratio, rate, and proportion problems."
2. "Encourage students to use visual representations to solve ratio, rate, and proportion problems."
3. "Provide opportunities for students to use and discuss alternative strategies for solving ratio, rate, and proportion problems."

Recommendation 4: Strategies across ratio, rate, and proportion contexts (30 minutes, slides 4-15)

1. **Introduce Recommendation 4** by briefly reviewing both the recommendation itself and its three implementation steps (slides 5-6).
2. **Let participants know that the focus for this activity is on Implementation Step 3** and the related potential Roadblock 4.3 (slide 7). However, during lesson planning later in this meeting, participants may focus on all the Recommendation 4 implementation steps and potential roadblocks.
3. **Introduce Module 6, Handout 1, and give directions for working on part A of the handout** (slide 7) first individually and then with a partner.
4. **Give participants time to individually reflect** on the questions on part B of Handout 1 (slide 8).
5. **Lead a discussion about what participants noticed about the problems** (slide 8) focused on similarities and differences between the problems and on what strategies they used with the problems. Participants should share their diagrams while explaining how they used one or more strategies across the problems.
6. **Review the problem context types outlined under Implementation Step 3** (slide 9) and remind participants of the example problem contexts referenced on page 40 of the practice guide and discussed in earlier modules. Review the previous contexts and introduce scaling as an additional example from the practice guide:
   - Problems with a **unit price context** are based on purchasing scenarios and the unit price of an object. They may involve comparing the value of two items or determining how much a certain amount of an item costs based on the unit price. One example that participants have seen is the balloons problem in Module 5.
   - Problems with a **scaling context** are about enlargements or reductions of a photo, drawing, or geometric shape. Participants have not yet looked at an example in a scaling context but will with slide 10.
   - Problems with a **recipe context** are about cooking and recipes and are based on the ratio of different ingredients or of a particular ingredient to the number of servings or batches the recipe produces.



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Module 6, Handout 1: Rate, ratio, and proportion strategies

Part A. The following three problems are adapted from the practice guide description of implementation Step 3. Questions a, b, and c for each problem will orient the problem solver to the context and support the identification of the important information in the problem. For students to develop their "ability to identify problems with a common underlying structure and to solve problems set in a variety of contexts" (practice guide, p. 40), they need to look closely at the problem and reflect on what the problem is about and what they need to answer for the problem.[1]

For each problem, answer the three reflection questions, then draw a diagram to represent the important information in the problem and use that diagram to solve the problem.

This activity focuses on **Recommendation 4:** "Develop students' conceptual understanding of strategies for solving ratio, rate, and proportion problems before exposing them to cross-multiplication as a procedure to use to solve such problems." The activity specifically addresses **Implementation Step 3:** "Provide opportunities for students to use and discuss alternative strategies for solving ratio, rate, and proportion problems" as well as potential **Roadblock 4.3.**

1. A recipe calls for 3 eggs to make 20 cupcakes. If you want to make 80 cupcakes, how many eggs do you need?
   a. What is the story of this word problem about? (list a word or phrase)
   b. What question do you need to answer for this problem?

[1] The reflection questions and prompts are based on recommendations in the Improving Mathematical Problem Solving in Grades 4 through 8 practice guide.

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(Module 6, Handout 1, Workbook)

Background: The problems used in Module 4, Handout 1 are adapted from problems presented with Recommendation 4, Implementation Step 3 in the practice guide.

Tip: For each problem, questions a, b, and c will orient the problem solver to the problem context and then support identification of the important information in the problem, in line with Implementation Step 3. For students to develop their "ability to identify problems with a common underlying structure and to solve problems set in a variety of contexts," they need to look closely at the problem and reflect on what the problem is about and what they need to answer for the problem. The participants will experience this reflection process to assist them in observing the structure of each problem. Reflecting on the problem-solving process also is consistent with Recommendation 1

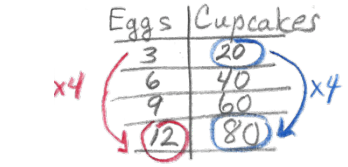
In Module 5, participants saw examples about baking bread and about a recipe that required a certain amount of cream; in this module, participants work on a cupcake recipe problem.

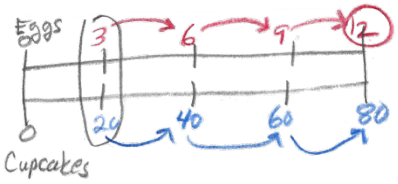
- Problems with a **mixture context** are about the mixture of two or more liquids. Students can compare the concentration of a mixture or determine how to maintain the original ratio between liquids in a mixture if the amount of one of the liquids changes. Participants have seen examples with mixing paints in Module 5.
- In **time/speed/distance context** problems, students are told the time, speed, and/or distance traveled for one or more objects that are traveling (such as cars). In Modules 5 and 6, participants saw problems that involve time, speed, and distance for people traveling on bicycles and on foot.
- **Other contexts** also exist, in which ratio, rate, and proportion questions can be asked, and the same ideas apply about supporting students to see the important information and comparing those problems to those in other contexts. For example, in this module, participants worked on a problem about how many boards it takes to build a certain number of doghouses, and in Module 5 participants explored problems about the cost of baseball cards (which are similar to the unit price context in that they are about costs and purchasing but don't necessarily lend themselves to a unit ratio strategy and thus are not quite the same context-type).

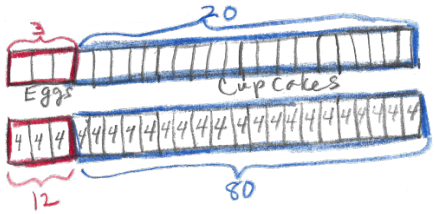
7. **Share an example problem for the scaling context and have students work on it briefly in pairs** (slides 10). Remind participants that they can have students solve problems related to the enlargement or reduction of a photo, drawing, or geometric shape (e.g., double the width and double the length of a photo to create a new photo whose area is four times the original).
8. **Have participants share their answers for the scaling problem and discuss** how they found their answers, how that involved different possible strategies, and how this problem is similar to or different from the three problems they explored earlier in part A of Handout 1 (slide 11-12). Note the following:
   - If using a buildup (additive) approach, a problem solver might find only whole number multiples of 3 in the Improving Mathematical Problem Solving in Grades 4 through 8 practice guide.

Background: For the problems on part A of Handout 1:

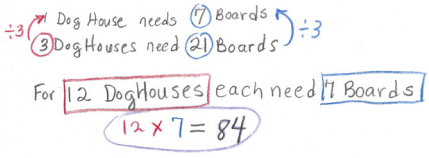
- Someone could show a buildup strategy on the first two problems by drawing a representation of the given ratio (for example, 3 eggs to 20 cupcakes; 3 doghouses to 21 boards) then repeating by drawing the number of times that it takes to get to the desired outcome (80 cupcakes or 12 doghouses). The following three examples show approaches participants could produce using a buildup strategy in a ratio table, double number line, and tape diagram:







- Problem 2 lends itself more easily to a unit ratio strategy because 3 divides evenly into 21, so for every 1 doghouse you need 7 boards).

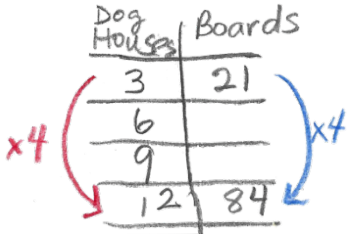


and 5 for the length and width (for example, 6 by 10, 9 by 15).

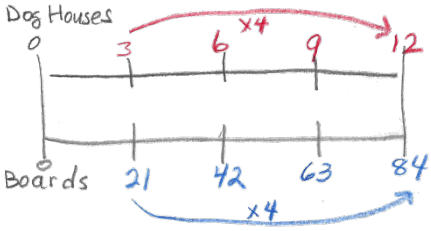
- On slide 12, ask the participants to notice scaling up to 4.5 x 7.5. You can also ask participants to point out where on the coordinate grid and double number line the values that represent doubling the height and width.
- Using a multiplicative or unit ratio approach, a problem solver could find an infinite number of possible photo sizes that maintain the ratio—a double number line is a good representation for demonstrating this.

9. **Review key points about Implementation Step 3** (slide 13). Explain the following:
   - Students need opportunities to see the meaningful features of different problem types (and to compare those features in line with Roadblock 4.3).
   - Identifying important information and quantities provided in a problem will support students in identifying strategies to use and in making connections across problems in different contexts.
   - There are a variety of context types for ratio, rate, and proportion problems, and it is important for students to explore those different contexts and make connections between strategies used in different contexts.
10. **Summarize Roadblock 4.3, connected to Implementation Step 3, and provide one example** of how comparing problems and strategies is helpful (slides 14-15). The example shown on slide 14 shows two problem contexts that participants have already explored (a doghouses problem from this module and a balloons problem from Module 5) and shows how looking at a strategy (in this case the unit ratio strategy) side-by-side can support seeing how the structure of the problem and strategies to solve the problem are the same even if the contexts are different. Note that the numbers in the doghouses problem are slightly altered from those presented in the handout used earlier in this meeting to further emphasize and visually show how the structure can match a different context, though the same underlying structure and strategy could be used with different numbers. The solution approach shown across the two contexts involves a student figuring out that if 6 balloons cost $24 (or if 6 doghouses take 42 boards to

- This can be shown on a double number line, or it can be shown by drawing the 3 doghouses next to 21 boards and then showing/circling the 7 boards that go with each doghouse.



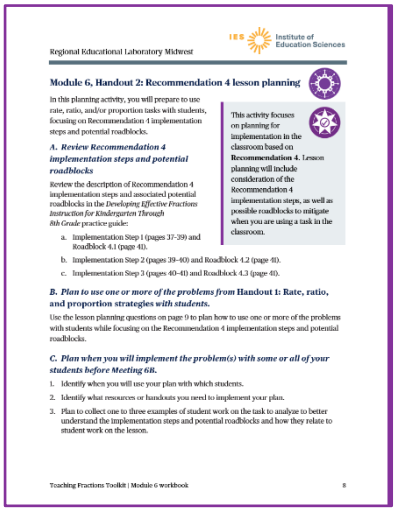
- A double number line is a good tool for using a multiplicative strategy with any of the problems.



build), then 1 balloon costs $4 (or 1 doghouse requires 7 boards). If students find that 1 balloon costs $4 (or 1 doghouse requires 7 boards), then they can find that 5 balloons cost $20 (or that 5 doghouses require 35 boards) by multiplying by 5.

Planning for Recommendation 4 implementation (20 minutes, slides 16–19)

1. **Let participants know that they will plan a classroom lesson focused on ratio, rate, and/or proportion problems**, while focusing on the Recommendation 4 implementation steps and strategies to mitigate potential roadblocks (slide 17). Let participants know the following:
   - The planning will focus on the problems participants explored today; they may select which to focus on for their lesson plans, and they may use different ratio, rate, and/or proportion tasks if they wish.
   - The appendix in the Module 6 workbook includes three versions of Module 6, Handout 1. These versions are formatted to be used with students, and they are written in English, Spanish, and Arabic.
   - During planning, participants will be asked to focus on how they are using Implementation Steps 1, 2, and/or 3 in designing and implementing the problems with students.
2. **Give participants time to read or review information about the implementation steps and potential roadblocks** for Recommendation 4 as they relate to ratio, rate, and proportion problems (slide 18).
3. **Have participants work in pairs or individually on lesson planning**, guided by Module 6, Handout 2 (slide 18).
4. **Facilitate sharing about participants' lesson plans** by having each person complete one sentence starter to describe the implementation step they are most focused on, a goal they have for students, or a question they have about their lesson planning (slide 19). Remind participants that if they have not finished their lesson plan, they should do so before implementing it with students.



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Module 6, Handout 2: Recommendation 4 lesson planning

In this planning activity, you will prepare to use rate, ratio, and/or proportion tasks with students, focusing on Recommendation 4 implementation steps and potential roadblocks.

This activity focuses on planning for implementation in the classroom based on **Recommendation 4.** Lesson planning will include consideration of the Recommendation 4 implementation steps, as well as possible roadblocks to mitigate when you are using a task in the classroom.

A. Review Recommendation 4 implementation steps and potential roadblocks

Review the description of Recommendation 4 implementation steps and associated potential roadblocks in the *Developing Effective Fractions Instruction for Kindergarten Through 8th Grade* practice guide:

a. Implementation Step 1 (pages 37-39) and Roadblock 4.1 (page 41).
b. Implementation Step 2 (pages 39–40) and Roadblock 4.2 (page 41).
c. Implementation Step 3 (pages 40–41) and Roadblock 4.3 (page 41).

B. Plan to use one or more of the problems from* Handout 1: Rate, ratio, and proportion strategies *with students.

Use the lesson planning questions on page 9 to plan how to use one or more of the problems with students while focusing on the Recommendation 4 implementation steps and potential roadblocks.

C. Plan when you will implement the problem(s) with some or all of your students before Meeting 6B.

1. Identify when you will use your plan with which students.
2. Identify what resources or handouts you need to implement your plan.
3. Plan to collect one to three examples of student work on the task to analyze to better understand the implementation steps and potential roadblocks and how they relate to student work on the lesson.

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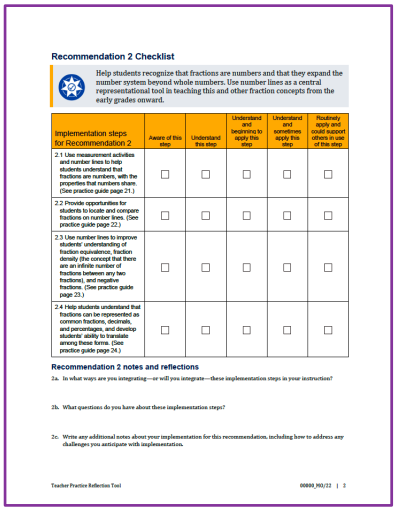
(Module 6, Handout 2, Workbook)

Tip: In a smaller group, each person could share their completed sentence aloud in the full group. In a larger group, you may wish to have everyone post their completed sentences in an online chat or document or on chart paper if meeting together in the same room.

Wrap-up (5 minutes, slides 20-24)

1. **Review the list of Module 6 interim activities** that participants should complete before Meeting 6B and answer any questions from participants (slide 21-22). Explain the following:
   - For Module 6, Handout 2, participants need to complete their lesson plan and then implement it with students and collect some student work. Remind them that they should finish the lesson plan before implementing it with students. Also, it may be helpful to have participants submit the student work samples to you prior to Meeting 6B.
   - For Module 6, Handout 3, they need to analyze the student work that they collected.
   - They also need to read from the practice guide, watch a short video, and complete the Teacher Reflection Tool one more time for all of Recommendations 2, 3, and 4.
2. **Verify that everyone knows the time and the location for Meeting 6B** (slide 21).



Recommendation 2 Checklist

Help students recognize that fractions are numbers and that they expand the number system beyond whole numbers. Use number lines as a central representational tool in teaching this and other fraction concepts from the early grades onward.

Implementation steps for Recommendation 2	Aware of this step	Understand this step	Understand and beginning to apply this step	Understand and sometimes apply this step	Routinely apply and could support others in use of this step
2.1 Use measurement activities and number lines to help students understand that fractions are numbers, with the properties that numbers share. (See practice guide page 21.)	☐	☐	☐	☐	☐
2.2 Provide opportunities for students to locate and compare fractions on number lines. (See practice guide page 22.)	☐	☐	☐	☐	☐
2.3 Use number lines to improve students' understanding of fraction equivalence, fraction density (the concept that there are an infinite number of fractions between any two fractions), and negative fractions. (See practice guide page 23.)	☐	☐	☐	☐	☐
2.4 Help students understand that fractions can be represented as common fractions, decimals, and percentages, and develop students' ability to translate among these forms. (See practice guide page 24.)	☐	☐	☐	☐	☐

Recommendation 2 notes and reflections

2a. In what ways are you integrating—or will you integrate—these implementation steps in your instruction?

2b. What questions do you have about these implementation steps?

2c. Write any additional notes about your implementation for this recommendation, including how to address any challenges you anticipate with implementation.

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(Module 6, Teacher Reflection Tool, Recommendation 2 checklist)

Tip: Let participants know that the interim activities include Handout 2 in their workbooks that they started working on during Meeting 6A.

Module 6 interim activities

Between Meetings 6A and 6B, participants will complete interim activities, which should take approximately 2 hours. These activities include learning more about Recommendation 4 by reviewing the practice guide and watching a short video, implementing the lesson plans they created during Meeting 6A and then reflecting on student work from the lesson, and completing the Teacher Reflection Tool one more time to reflect on their current understanding and use of Recommendations 2, 3, and 4. These activities will be discussed further in Meeting 6B. Refer to the information for Meeting 6B for additional details about the interim activities.

Activity	Participants will ...
Reading and video	Read pages 40–41 in the practice guide for a review of Implementation Step 3 and all three potential roadblocks and solutions for Recommendation 4; watch the short Strategies for Fraction Instruction video (https://youtu.be/j4hUJMUxs_Y) with examples of Recommendation 4.
Module 6, Handout 2	Implement the plan you created during Meeting 6A with students and collect student work for analysis. If you did **not** complete the lesson plan during Meeting 6A, then finish it before implementing the lesson with students.
Module 6, Handout 3	Review and analyze the student work you collected after implementing your lesson plan (from Handout 2). These analyses will be discussed during Meeting 6B.
Teacher Reflection Tool	Complete the Teacher Reflection Tool to indicate your current understanding of all three recommendations explored through this professional learning: Recommendations 2, 3, and 4. You will use these reflections during Meeting 6B.

Interim activities facilitator role

In the participant workbooks, participants have directions and all the resources they need to complete the interim activities between the two meetings. As a facilitator, you might wish to send a reminder midway between the two meetings to remind participants that they should be working on the interim activities and to check in to see whether any participants have questions or need support concerning the interim activities. It also may be helpful to ask participants to submit work ahead of time, so that you can review the work and/or share the work more easily at meeting 6B.

Meeting 6B

During Meeting 6B, support participants to share and discuss their experience of trying ratio, rate, and/or proportion problems with students, with a focus on Recommendation 4 implementation steps and potential roadblocks. Then lead a discussion on any questions from participants based on the video and readings from the interim activities about Recommendation 4. For the second half of the meeting, facilitate activities and discussions to wrap up and celebrate this professional learning experience while supporting participants to summarize their learning across Recommendations 2, 3, and 4.

The agenda for Meeting 6B is as follows.

Agenda for Meeting 6B

Minutes	Topic and resources
5	**Introduction** (slides 1-2)
20	**Recommendation 4 debrief** (slides 3-7) • Module 6, Handout 3: Recommendation 4 student work analysis
30	**Final reflections and takeaways** (slides 8-12) • Teacher Reflection Tool
5	**Wrap-up** (slides 13-16)

Facilitator directions for Meeting 6B

The directions for how to facilitate each section of the Meeting 6B agenda are in the following table.

Introduction (5 minutes, slides 1–2)	
1. **Review the agenda** (slide 2). 2. **Let participants know that they will engage in a variety of activities** to wrap up a focus on Recommendation 4 and celebrate and reflect on the entire professional learning experience.	

Recommendation 4 debrief (20 minutes, slides 3–7)	
1. **Remind participants of the three implementation steps and three potential roadblocks for Recommendation 4** that they focused on when planning to use ratio, rate, and/or proportion problems with students (slide 4). 2. **Give participants a few minutes to individually review and prepare to share the student work** they collected and their analysis of that work on Module 6, Handout 3. Participants should identify one piece of student work that they will share in their small group (slide 5). 3. **Divide participants into small groups to share and discuss what they learned from their student work** (slide 6). 4. **Circulate among the small groups** and support participants in identifying how their student work relates to the three implementation steps. 5. **Back in the full group, have participants share key examples and questions for Recommendation 4** from the student work they just examined and/or from the practice guide readings and video that they reviewed during the interim activities (slide 7).	**Background:** This student work analysis process is the same one used in Module 4 and is based on considering evidence separate from inferences about that evidence and on seeing the potential strengths to build on in students' work. Questions to ask include "What is your evidence for that?" and "What did the student do that shows understanding?"  Regional Educational Laboratory Midwest Module 6, Handout 3: Recommendation 4 student work analysis (Module 6, Handout 3, Workbook) **Tip:** If anyone did not bring student work to the meeting, make sure that they end up in a small group with other participants who did bring student work.

Final reflections and takeaways (30 minutes, slides 8–12)

1. **Tell participants that the rest of the meeting will focus on reflecting on and celebrating their learning** from this entire professional learning experience (slide 8).
2. **Review when participants completed the Teacher Reflection Tool** during this professional learning and which recommendations they focused on each time (slide 9).
3. **Have participants review their copies of the Teacher Reflection Tool from across the modules** and share and discuss with a partner one change in their understanding or use of the recommendations (slide 9).
4. **Give participants directions for a "chalk talk."** The purpose is for participants to silently share ideas in writing about key takeaways and changes in understanding for **Recommendations 2–4** (slide 10). Emphasize the following:
   - This writing time should be quiet writing time. Some people process ideas better orally, and some process them better with some quiet time for reflection. This time is an opportunity to practice that quiet reflection; there will be time for oral discussion shortly.
   - Participants may build on each other's ideas in writing by connecting a new idea/note/question to one that has already been written. (Connecting two ideas may look different depending on the format/platform the facilitator has chosen to do the chalk talk.)
   - Participants should aim to list at least two key ideas or examples for each recommendation during the silent writing time (but do not need to limit themselves to two!).
   - Note: Slide 10 is editable. It may be useful to include a link to the shared online space on this slide. (See **Tip**.)
5. **Have participants engage in the chalk talk** silently for about 5 minutes (slide 10).
6. **Split the participants into three groups, one focused on each recommendation** (slide 11) and have

Background: Teachers studied each focus recommendation at least twice across the professional learning modules (slide 9). The first time they completed the tool for a recommendation serves as a "baseline" of sorts, even if it is completed after participants have begun their exploration so that they know enough about what it is to be able to truly reflect on their understanding and use of it. The second time they return to reflecting on a particular recommendation is an opportunity to reflect on their understanding and use after some deeper study and exploration.

Tip: For the chalk talk, the facilitator can set up a shared online space and include this link directly on slide 10. If the group is meeting in person, then put pieces of chart paper on the wall or on tables for participants to write on with markers or have participants write on a whiteboard or blackboard.

Tip: For the final reflection sentences, ask participants to share just one word for the first sentence and to complete the second sentence. If the group is small enough, have everyone share both sentences aloud. If the group is larger, you may wish to have everyone share the one word for the first sentence aloud and share the other sentence in an electronic/written format that everyone can see or have them complete both sentences in an electronic/written format that everyone can see.

groups discuss their focus recommendation in relation to the following questions:

- What themes do we see in the ideas and examples for this recommendation?
- How would we explain this recommendation to a teacher who is new to the practice guide?
- What do we plan to do in our practice related to this recommendation?

7. Complete the reflection by having every participant share how they would complete two sentences (slide 12):
   - I am (**insert one word**) about implementing the practice guide recommendations in my classroom.
   - One takeaway from this learning experience is that (**complete the sentence**).

Wrap-up (5 minutes, slides 13-16)

1. **Check in with participants about any final questions** before ending this module as well as the professional learning experience (slide 14).
2. **Confirm any next** steps for this group (slide 14).

Tip: One way to celebrate and document participants' work in this professional learning is to create certificates of participation. This is particularly important if participants will need that kind of documentation to track their participation for license renewal or other purposes.

Credits

Information is provided about photos and other resources used in Module 2.

Photos

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Resources

The toolkit is based on the recommendations of the What Works Clearinghouse practice guide Developing Effective Fractions Instruction for Kindergarten Through 8th Grade.

The student work analysis protocol was excerpted and adapted from the Visual Access to Mathematics project, © 2018 Education Development Center, Inc.

The problems used in Module 4, Handout 1 are adapted from problems presented with Recommendation 4, Implementation Step 3 in the practice guide.

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