Overall Structure

1. **Explore, Play, and Discuss**: These activities provide opportunities for students to explore the initial ideas of the section. This section can be completed asynchronously using digital manipulatives and response tools, or using physical manipulatives and the student workbook pages with guiding questions for caregivers. If planning for a section per week, these activities would ideally be assigned earlier in the week.

2. **Deep Dive**: These activities are key learning opportunities for students around the section goals. **If there are chances for in-person or virtual synchronous time, these would be the activities to do collaboratively to share ideas and build community.** If done asynchronously, opportunities to view and respond to peer work or sample student work as well as receive feedback from teachers (and perhaps peers), is essential for these activities. Formative assessment is also a part of this section to check in on student understanding. If planning for a section per week, these activities would ideally be done mid-week.

3. **Synthesize and Apply**: These activities are ways for students to synthesize the learning of the section and for teachers to assess student understanding toward the section learning goals. These activities can be completed asynchronously, with either written, in-person, or automated feedback. If planning for a section per week, these activities would ideally be done toward the end of the section.

4. **Ongoing Practice**: These provide opportunities for students to practice unit topic ideas and build toward computational fluency. In K–5, the activities in this section are typically practice problems and center games that can be played independently, with a family member, or with classmates. In IM 6–12, each lesson includes a distributed practice set. Many existing digital platforms already have IM 6–12 practice problems loaded in so that students can complete and submit them online. Some can be autoscored.

5. **Anytime Resources:** The activities in this section have the flexibility to be used anytime during a section. In K–5, these are center activities that provide opportunities for students to build computational fluency across the year. In 6–12, these activities are modeling prompts that offer students the opportunities to engage in mathematical modeling.

Grade 5, Unit 3: Fraction Multiplication and Division

Abbreviated Unit Narrative

In this unit, students continue to build on the concept of area to reason about the multiplication of two fractions. Students also use their understanding of the relationship between multiplication and division to divide a whole number by a unit fraction and unit fraction by a whole number.

Students begin the unit by drawing diagrams to represent situations involving taking a fraction of a fraction. After drawing diagrams that make sense to them, students interpret area diagrams that represent the multiplication of two unit fractions, then a unit fraction times a non-unit fraction, then two non-unit fractions. As students gain a conceptual understanding of a fraction of a fraction, they begin to match these area diagrams to multiplication expressions and generalize that they can multiply the numerators together and the denominators together to find the product.

The focus of the unit then shifts from multiplication to division with unit fractions. Students begin by making sense of whole-number division and recalling that the dividend is smaller than the quotient. Students notice that this pattern holds true when the dividend is less than 1, and students divide a unit fraction by a whole number. Understanding this relationship can help students make sense of why dividing a whole number by a unit fraction results in a quotient that is larger than the whole number. These patterns are further illuminated as students interpret tape diagrams.

* Because there are 8 lessons in this section and it is a major work of grade, the work in this section will likely take more than 1 week.

Section A Goals

- Represent and describe multiplication of a fraction by a fraction using area concepts.
- Recognize that $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$ and use this generalization to multiply fractions numerically.

This section continues the story of fraction multiplication using area concepts as developed in the previous unit. In the first lesson, students connect taking a fraction of a fraction to multiplication of a fraction times a fraction. They begin by interpreting situations and drawing diagrams to represent the fractional area. As the section progresses, students connect the area of a rectangle with fractional side lengths to the multiplication of two fractions. In unit fraction by unit fraction multiplication, students see the denominator as the number of small rectangles in the unit square, structured as an array.

Students extend this conceptual understanding to multiply a unit fraction times a non-unit fraction (including fractions greater than 1), and a non-unit fraction times a non-unit fraction. In each case, they relate this multiplication to area and see the numerators as an array of small rectangles that make up the shaded region, and see the denominators as an array of small rectangles within a unit square.

Explore, Play, and Discuss	**Activity Suggestions** ● Lesson 1, Warm-Up and Activity 1 ○ Can be combined into 1 activity if needed. ○ After the warm-up ask the synthesis questions. ● Lesson 2, Warm-Up: Which One Doesn't Belong? ● Lesson 2, Activities 1 and 2: ○ Students should not be expected to write a multiplication expression, but this activity could be framed as exploratory - it asks them to explain where they see the expression. The teacher will have to formally introduce expressions and equations during the deep dive ○ Use the student work during the Deep Dive activities to introduce multiplication expressions. ● Scavenger Hunt: Parts of Parts ○ Sample items: ■ Find an object or situation that shows half of a half. ■ Find an object or situation that shows any fraction of a fraction.	**Assessment Suggestions** ● Lesson 1, Activity 2

Deep Dive	**Activity Suggestions** ● Launch with Lesson 2 student responses. ○ Introduce the multiplication expression and equations for Activity 1 responses. ● Lesson 3, Warm-up and Activity 1 ○ Ask students to write equations to represent each diagram. ○ Multiplication of unit fraction and unit fraction ● Lesson 4, Activity 1 ○ Multiplication of unit fraction and non-unit fraction ● Lesson 5, Activity 2 ● Lesson 6, Activity 1	**Assessment Suggestions** ● Lesson 6, Cool-down
Synthesize and Apply	**Activity Suggestions** ● Lesson 6, Activity 2 ● Lesson 7, Activity 1 and Cool-down ● Lesson 8, Number Talk ● Student Lesson Summary	**Assessment Suggestions** ● Section A Checkpoint
Ongoing Practice	● Lesson 4 and 7, Warm-Up: Number Talk ● Lesson 7, Activity 2 ● Practice Problems ○ Pre-unit ○ Lesson	

Anytime Resources	
	• Center: Rolling for Fractions, Stage 5, 6, and 7 • IM Talking Math

Section B Goals

- Divide a whole number by a unit fraction using whole-number division concepts.
- Divide a unit fraction by a whole number using whole-number division concepts.

The section begins by revisiting whole number division to conceptualize and describe what happens to the value of the quotient when the dividend or divisor changes. As students draw tape diagrams and write expressions to represent situations involving the division of unit fractions, students recognize the inverse relationship between multiplication and division. As students make sense of division situations involving unit fractions, they represent them with diagrams and equations. They then write and solve their own problems involving fraction division.

* Because there are 8 lessons in this section and it is a major work of grade, the work in this section will likely take more than 1 week.

Explore, Play, and Discuss	**Activity Suggestions**
	• Lesson 9, Activity 1 and Activity 2
	• Lesson 9, Lesson Synthesis
	  ○ Ask students to read the synthesis and respond or include a video reading the synthesis.
	  ○ Add to this poster after the Deep Dive activities
	• Lesson 10, Activity 1
	  ○ Collect these responses to use in the Deep Dive section.
		Assessment Suggestions
		• Lesson 9, Warm-up

Deep Dive	**Activity Suggestions**
	• Ask students to share their responses from Lesson 10, Activity 1 in the Explore section.
	  ○ Discuss what was the same about their work? What was different?
	• Lesson 10, Activity 2
	• Lesson 11, Activity 1
		Assessment Suggestions
		• Lesson 11 and 12, Cool-down
		  ○ Can be combined into 1 cool-down

	○ Add Activity 2, problem 1 to this activity • Lesson 12, Warm-up and Activity 1 • Lesson 13, Activity 2	

Synthesize and Apply	**Activity Suggestions** • Lesson 12, Activity 2 • Lesson 14, Activity 2 • Lesson 15, Warm-up • Student Lesson Summary	**Assessment Suggestions** • Section B Checkpoint

Ongoing Practice	• Lesson 13, Warm-up and Activity 1 • Lesson 15, Activity 1 • Practice Problems

Anytime Resources	• Center: Rolling for Fractions, Stage 5, 6, and 7 • IM Talking Math

Section C Goals

- Solve problems involving fraction multiplication and division.

The final section of this unit allows students to apply what they have learned in the previous sections through problem solving. The situations students engage with allow them to see how fraction multiplication and division are relevant in everyday life. Students collaborate with one another to create and solve problems involving fraction multiplication and division. They use their understanding of the meaning of multiplication and division to strategize about when to use a particular operation. The inverse relationship becomes apparent when students realize that they can think about multiplication to solve a division problem, and vice versa.

Explore, Play, and Discuss	**Activity Suggestions** • Lesson 17, Warm-up • Lesson 19, Warm-up	**Assessment Suggestions** • Lesson 17, Cool-down
Deep Dive	**Activity Suggestions** • Lesson 18, Warm-up • Lesson 17, Activity 1 ○ Info Gap • Lesson 18, Activity 1	**Assessment Suggestions** • Lesson 18, Cool-down
Synthesize and Apply	**Activity Suggestions** • Lesson 19, Activity 1 • Lesson 19, Cool-down • Student Lesson Summary ○ After Lesson 19	**Assessment Suggestions** • End-of-unit Assessment

Ongoing Practice	
	• Lesson 19, Activity 2 • Practice Problems • Compare Expressions, Stage 6

Anytime Resources	
	• Center: Rolling for Fractions, Stage 5, 6, and 7 • IM Talking Math