MA.5.FR.2.2

Overarching Standard: MA.5.FR.2 *Perform operations with fractions.*

Benchmark of Focus

MA.5.FR.2.2	Extend previous understanding of multiplication to multiply a fraction by a fraction, including mixed numbers and fractions greater than 1, with procedural reliability.

Benchmark Clarifications

Clarification 1: Instruction includes the use of manipulatives, drawings, or the properties of operations.

Clarification 2: Denominators limited to whole numbers up to 20.

Related Benchmark/Horizontal Alignment

- MA.5.NSO.2.1/2.4
- MA.5.AR.1.2
- MA.5.GR.2.1

Vertical Alignment

Previous Benchmarks
- MA.4.FR.2.4

Next Benchmarks
- MA.6.NSO.2.2

Purpose and Instructional Strategies

The purpose of this benchmark is for students to learn strategies to multiply two fractions. This continues the work from Grade 4 where students multiplied a whole number times a fraction and a fraction times a whole number (MA.4.FR.2.4). Proceduralfluency will be achieved in Grade 6 (MA.6.NSO.2.2).
- During instruction, students are expected to multiply fractions including proper fractions,improper fractions (fractions greater than 1), and mixed numbers efficiently and accurately.
- Visual fraction models (area models, tape diagrams, number lines) should be used andcreated by students during their work with this benchmark (MTR.2.1). Visual fractionmodels should show how a fraction is partitioned into parts that are the same as the product of the denominators.

- When exploring an algorithm to multiply fractions $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$ make connections to an accompanying area model. This will help students understand the algorithm conceptually
and use it more accurately.
- Instruction includes students using equivalent fractions to simplify answers; however,putting answers in simplest form is not a priority.

Common Misconceptions or Errors

- Students may believe that multiplication always results in a larger number. Using models when multiplying with fractions will enable students to generalize about multiplication algorithms that are based on conceptual understanding (MTR.5.1).
- Students can have difficulty with word problems when determining which operation to use, and the stress of working with fractions makes this happen more often.
    - For example, the multi-step problem, *"Mark has $\frac{3}{4}$ yards of rope and he gives a third of the rope to a friend. How much rope does Mark have left?"* expects students to first find $\frac{1}{3}$ of $\frac{3}{4}$ or multiply $\frac{1}{3} \times \frac{3}{4}$ and then to find the difference to find how much Mark has left. On the other hand, *"Mark has $\frac{3}{4}$ yards of rope and gives $\frac{1}{3}$ yard of rope to a friend. How much rope does Mark have left?"* only requires finding the difference $\frac{3}{4} - \frac{1}{3}$.*

Questions to ask students:

How can you relate what you know about equal groups to model $\frac{2}{3} \times \frac{6}{8}$?

- I can represent $\frac{6}{8}$ using six eighth fraction strips.

I see that I can partition the six eighths into three equal groups to represent the thirds. If I look at two of those groups of thirds, there are two eighths in both those groups, for four eighths. So, $\frac{2}{3} \times \frac{6}{8} = \frac{4}{8}$.

Find the product of $\frac{4}{5}$ and $\frac{3}{4}$.

- Sample answer that indicates understanding... *I know my product will be less than either factor because I am taking a part of a fraction. I can draw an area model to prove my thinking. I draw a rectangle and first decompose it into fourths and shade three of those fourths. I then decompose the fourths into fifths which changes my model into twentieths. The overlap of four fifths and three fourths represents my product which is $\frac{12}{20}$.*
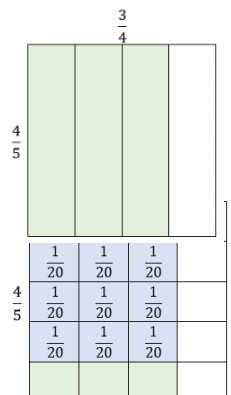
Find the product of $2\frac{1}{3}$ and $3\frac{1}{4}$.

- Sample answer that indicates understanding… *I know that multiplication can be related to area so just like I did with whole numbers I can create an area model with these factors and decompose them into wholes and fractions and determine the partial products. I then add the partial products to get the total product which is $7\frac{3}{12}$.*

Area model:

	2	$\frac{1}{3}$
3	6	1
$\frac{1}{4}$	$\frac{1}{2} = \frac{2}{12}$	$\frac{1}{12}$

Instructional Tasks

Instructional Task 1

Maritza has $4\frac{1}{2}$ cups of cream cheese. She uses $\frac{3}{4}$ of the cream cheese for a banana pudding recipe. After she uses it for the recipe, how much cream cheese will Maritza have left?

Instructional Items

Instructional Item 1

What is the product of $\frac{1}{5} \times 6\frac{1}{2}$?

   a. $\frac{6}{10}$

   b. $\frac{12}{5}$

   c. $6\frac{7}{10}$

   d. $1\frac{3}{10}$

Achievement Level Descriptors:

Benchmark	Context	Assessment Limits
MA.5.FR.2.2 Extend previous understanding of multiplication to multiply a fraction by a fraction, including mixed numbers and fractions greater than 1, with procedural reliability. Clarification 1: Instruction includes the use of manipulatives, drawings or the properties of operations. Clarification 2: Denominators limited to whole numbers up to 20	Mathematical	
ALD 2	ALD 3	ALD 4	ALD 5

Multiplies two fractions less than a whole by using models and various strategies.	Multiplies a fraction, including fractions greater than one, by a fraction less than a whole.	Extends previous understanding of multiplication to multiply a fraction by a fraction, including mixed numbers and fractions greater than one, with procedural reliability.	Identifies an error and multiplies a fraction by a fraction, including mixed numbers and fractions greater than one.

Additional Resources:

CPALMS

Khan Academy Multiplying a fraction by a fraction

Multiplying a mixed number by a mixed number

Resources/Tasks to Support Your Child at Home:

Multiplication of Fractions Game