Grade Level/Course: Grades 5 & 6

Lesson/Unit Plan Name: Modeling Division of Fractions – Division of a Fraction by a Whole Number and Division of a fraction by a fraction

Rationale/Lesson Abstract: Before students begin using multiple algorithms for the division of fractions, students should have a conceptual understanding of division of fractions. In this lesson students will understand the concept of division of fractions by using fractions tiles and other models.

Timeframe:
Dividing a Unit Fraction by a Whole Number – 30 minutes
Dividing a Unit Fraction by a Fraction – 30 minutes

Common Core Standard(s):

Grade 5:

5.NF7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions

a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) x 4 = 1/3.

b. Interpret division of a whole number by a unit fraction and compute such quotients. For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 x (1/5) = 4.

c. Solve real world problems involving division of unit fractions by non-zero whole numbers and divison of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. For example, how much chocolate will each person get if 3 people share ½ lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?

Grade 6:

Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

6.NS1 Interpret and compute quotients of fractions, and solve real-world problems involving division of fractions by fractions, e.g., by using visual fractions models and equations to represent the problem. For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share ½ lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length ¾ mi and area ½ square mile?

Instructional Resources/Materials:

- Class sets of Fraction Tiles
- Colored pencils and/or highlighters

Activity/Lesson:

A few tips for using Fraction Tiles (or any manipulative):

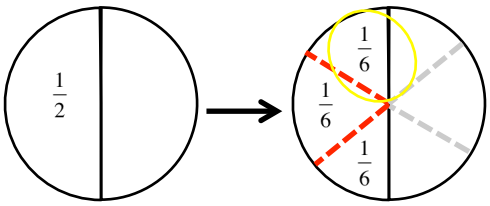
1. Have a set of Fraction Tiles for each student or each pair of students.
2. Have a system for passing out and collecting the Fraction Tiles. All Fraction Tiles should be in a closed Ziploc bag when passed out and returned in the same manner.
3. Fraction Tiles must remain on the desk and should not be on the floor. Students should handle the fraction tiles with care so that the fraction tiles can be used over and over again. Have students check the floor, at the end of the lesson, before returning the Fraction Tiles.
4. Give students about 2 minutes, prior to the actual lesson, to "play" with fraction tiles. Ask students to sort the Fraction Tiles by the end of the time limit. This will be helpful for selecting the Fraction Tiles for each example.
5. As the teacher, you will need your own set in order to model each problem.

Division of Unit Fractions by Whole Numbers

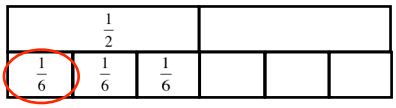
Example 1 Jasmine has $\frac{1}{2}$ of a pizza and would like to share it with 2 of her friends. How much of the whole pizza will Jasmine and her 2 friends get each?

Problem:	Think/Ask:	Simplify
$\frac{1}{2} \div 3$	How can $\frac{1}{2}$ be broken into 3 pieces?	$\therefore \frac{1}{2} \div 3 = \frac{1}{6}$

Model:



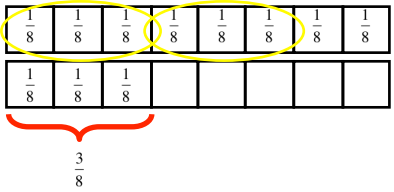
Another Model:



Example 2 $\frac{6}{8} \div 2$

Problem:	Think/Ask:	Simplify:
$\frac{6}{8} \div 2$	How can $\frac{6}{8}$ be broken into 2 pieces? What part of the whole is each piece?	$\therefore \frac{6}{8} \div 2 = \frac{3}{8}$

Model:

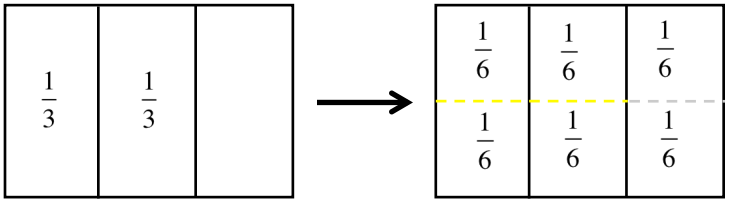


$\frac{6}{8}$ can be broken into 2 parts by placing 3 pieces in each group, which is 2 groups of $\frac{3}{8}$.

You Try 1 Andrew has $\frac{2}{3}$ of his birthday cake left over from his party. He is going to share it equally with 3 of his friends, how much of the cake with Andrew and each of his friends get?

Problem:	Think/Ask:	Simplify:
$\frac{2}{3} \div 4$	How can $\frac{2}{3}$ be broken into 4 pieces? What part of the whole is each piece?	$\therefore \frac{2}{3} \div 4 = \frac{1}{6}$

Model:

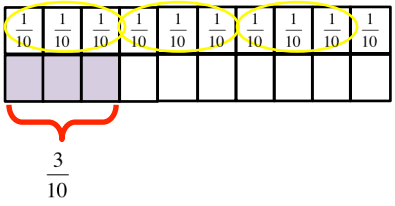


If the cake is cut into 4 pieces, each piece is how much of the whole?

You Try 2 $\frac{9}{10} \div 3$

Problem:	Think/Ask:	Simplify:
$\frac{9}{10} \div 3$	How can $\frac{9}{10}$ be broken into 3 pieces?	$\therefore \frac{9}{10} \div 3 = \frac{3}{10}$

Model:



Division of Fractions by Fractions

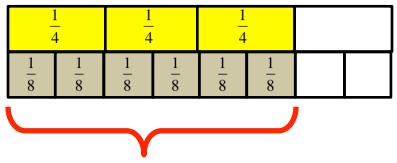
Example 3 $\frac{3}{4} \div \frac{1}{8}$

Problem: $\frac{3}{4} \div \frac{1}{8}$

Think/Ask: How many $\frac{1}{8}$'s are in $\frac{3}{4}$?

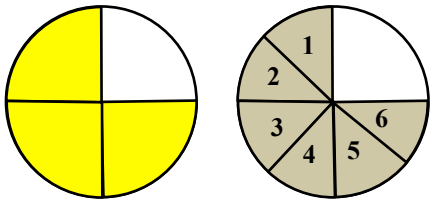
Simplify:

Model:



There are 6 $\frac{1}{8}$'s in $\frac{3}{4}$.

Another Model



$\frac{3}{4} = \frac{6}{8}$

Example 4 $\frac{5}{6} \div \frac{2}{3}$

Problem: $\frac{5}{6} \div \frac{2}{3}$

Think/Ask: How many $\frac{2}{3}$'s are in $\frac{5}{6}$?

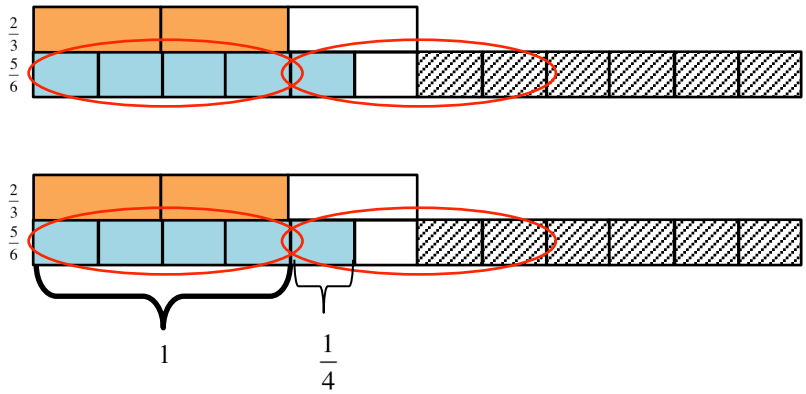
Simplify:

$\therefore \frac{5}{6} \div \frac{2}{3} = \frac{5}{4}$

or $= 1\frac{1}{4}$

For the model, take ***five-sixths*** of a whole and ask if we have at least one group of ***two-thirds***. To do this, line up fraction tiles of ***two-thirds*** above (or below) ***five-sixths.*** Notice that we have one group of ***two-thirds*** represented by the ***four-sixths*** (or **four *one-sixths***). Next we need to figure our how much of ***two-thirds*** is the ***one-sixth*** that we have "leftover". Since we are looking for groups of ***two-thirds***, ***two-thirds*** becomes our "whole" and we noticed that it took **four *one-sixths*** to make the "whole". The leftover ***one-sixth*** is one part of the whole and it takes four parts to make the whole. Therefore, it is ***one-fourth***. We have one whole group of ***two-thirds*** and ***one-fourth*** of a group of ***two-thirds***.

Model:



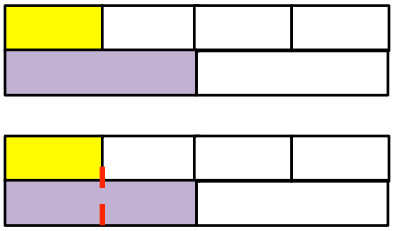
You Try 3 $\frac{1}{4} \div \frac{1}{2}$

Problem: $\frac{1}{4} \div \frac{1}{2}$

Think/Ask: How many groups of $\frac{1}{2}$ are in $\frac{1}{4}$?

Simplify: $\therefore \frac{1}{4} \div \frac{1}{2} = \frac{1}{2}$

Model:



We are looking for groups of ***one-half***, therefore, ***one-half*** becomes the "whole". How many groups of ***one-half*** are in ***one-fourth***? There is only ***half*** of a group of ***one-half*** in ***one-fourth***. (Another way of saying this is, ***one-fourth*** is ***half*** of ***one-half***)

You Try 4 $\frac{9}{10} \div \frac{3}{5}$

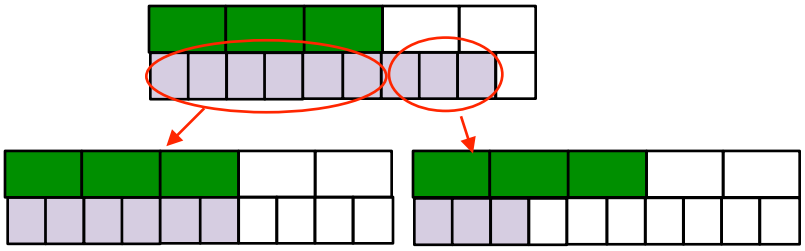
Problem: $\frac{9}{10} \div \frac{3}{5}$

Think/Ask: How many groups of $\frac{6}{10}$ are in $\frac{9}{10}$?

Simplify: $\therefore \frac{9}{10} \div \frac{3}{5} = 1\frac{1}{2}$

or $= \frac{3}{2}$

Model:



1 GROUP + ½ GROUP

1 group of ***three-fifths*** in ***nine-tenths***.

How many groups of ***three-fifths*** are in ***three-tenths***?

Three-fifths is <u>one-half</u> of ***three-tenths***.

Warm-Up

CST: 5NS2.4/ 5.NF.7b

$12 \div \frac{3}{4}$

a. 9

b. $9\frac{1}{4}$

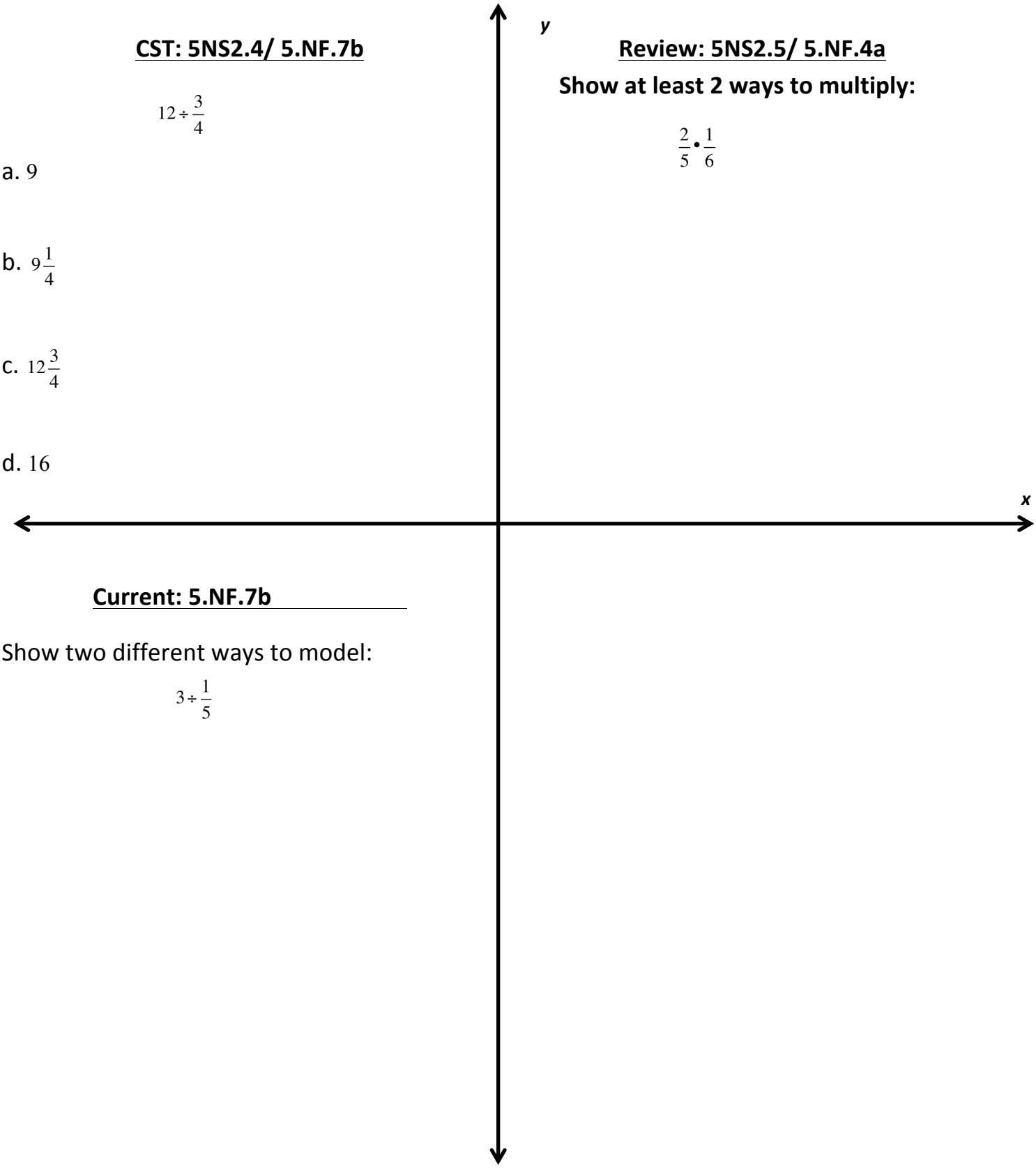
c. $12\frac{3}{4}$

d. 16

Review: 5NS2.5/ 5.NF.4a

Show at least 2 ways to multiply:

$\frac{2}{5} \bullet \frac{1}{6}$



Current: 5.NF.7b

Show two different ways to model:

$3 \div \frac{1}{5}$

Warm-Up Debrief

Quadrant 1: Review

Show two ways to multiply:

$$\frac{2}{5}\bullet\frac{1}{6}$$

Method 1: Multiply across and decompose to find equivalent forms of one

$$\frac{2}{5}\bullet\frac{1}{6}$$
$$=\frac{2\bullet 1}{5\bullet 2\bullet 3}$$
$$=\frac{1}{5\bullet 3}$$
$$=\frac{1}{15}$$

Method 2: Multiply across, then simplify.

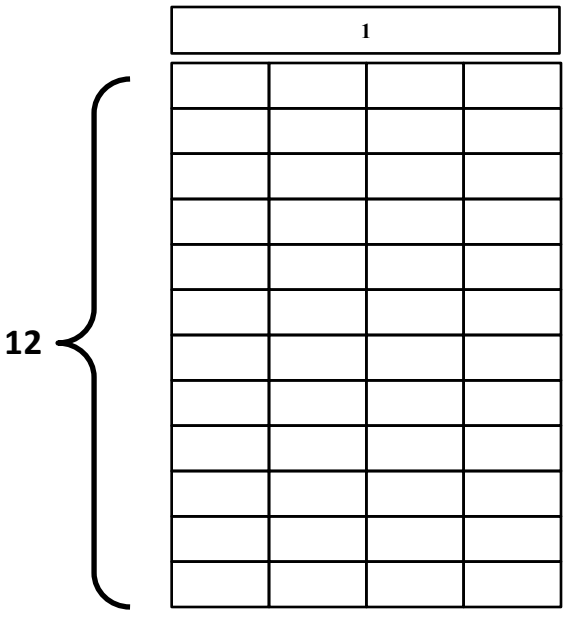
$$\frac{2}{5}\bullet\frac{1}{6}$$
$$=\frac{2\bullet 1}{5\bullet 6}$$
$$=\frac{2}{30}$$
$$=\frac{2\div 2}{30\div 2}$$
$$=\frac{1}{15}$$

Quadrant 2: CST

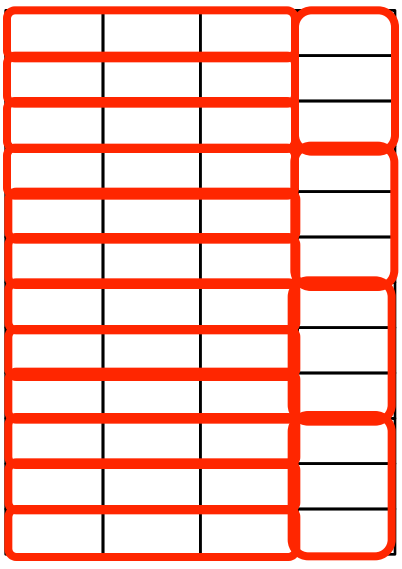
$$12\div\frac{3}{4}$$

How many groups of $\frac{3}{4}$ are in 12?

Method 1: Model using Fraction Tiles



Circle Groups of $\frac{3}{4}$



Method 2: Divide fractions using common denominators

$$12\div\frac{3}{4}$$
$$=\frac{12}{1}\div\frac{3}{4}$$
$$=\frac{12}{1}\left(\frac{4}{4}\right)\div\frac{3}{4}$$
$$=\frac{48}{4}\div\frac{3}{4}$$
$$=\frac{48\div 3}{4\div 4}$$
$$=16$$

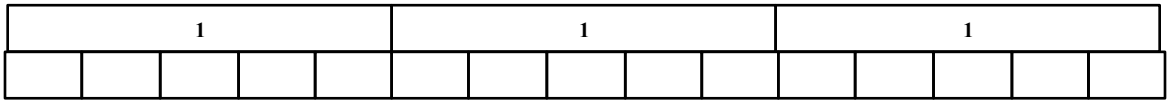
D. is the correct answer choice.

Quadrant 3: Current

$$3 \div \frac{1}{5}$$

Model 1:Fraction Tiles

There are five ***one-fifths*** in each **one**-unit. Therefore, there are 15 ***one-fifths*** in 3.



Model 2: Circles

There are five ***one-fifths*** in each **one**-circle. Therefore, there are 15 ***one-fifths*** in 3.