Mathematics Instructional Cycle Guide

Dividing Fraction (6.NS.A.1)

Mariliz Fitzpatrick, 2014 Connecticut Dream Team teacher

CT CORE STANDARDS

This Instructional Cycle Guide also relates to the following *Standards for Mathematical Practice* in the *CT Core Standards for Mathematics*:

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

6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for $\frac{2}{3} \div \frac{3}{4}$ = $\frac{8}{9}$ because $\frac{3}{4}$ of $\frac{8}{9}$ is $\frac{2}{3}$. (In general, $\frac{a}{b} \div \frac{c}{d} = \frac{ad}{bc}$) How much chocolate will each person get if 3 people share $\frac{1}{2}$ lb of chocolate equally? How many $\frac{3}{4}$ cup servings are in $\frac{2}{3}$ of a cup of yogurt? How wide is a rectangular strip of land with length $\frac{3}{4}$ mi and area $\frac{1}{2}$ square mi?

This Instructional Cycle Guide also relates to the following *Standards for Mathematical Practice* in the *CT Core Standards for Mathematics*:

MP. 1 Make sense of problems and preserve in solving them: Students will have an opportunity to plan a strategy and complete a problem. Students will also check for reasonableness by examining other students' work and comparing it to their own. If a change of thinking occurs, students will change their response accordingly.

MP. 2 Reason abstractly and quantitatively. Students describe a division number sentence. Students represent real world situation numerically. Students will make the connections between the real life situation, the model, and the number sentence.

MP. 7 Look for and make use of structure: Students will make use of structure renaming fractions using models. Students will write division number sentences by looking at how a model represents the division

WHAT IS INCLUDED IN THIS DOCUMENT?

- A Mathematical Checkpoint to elicit evidence of student understanding and identify student understandings and misunderstandings **(page 4)**
- A student response guide with examples of student work to support the analysis and interpretation of student work on the Mathematical Checkpoint **(page 6-9)**
- A follow-up lesson plan designed to use the evidence from the student work and address the student understandings and misunderstandings revealed **(page 10-14)**
- Supporting lesson materials **(page 15-28)**
- Precursory research and review of standard **6.NS.A.1** and assessment items that illustrate the standard **(page 26-27)**

HOW TO USE THIS DOCUMENT

1) Before the lesson, administer the **Using Models to find Quotients** ***Mathematical Checkpoint*** individually to students to elicit evidence of student understanding.
2) Analyze and interpret the student work using the ***Student Response Guide***
3) Use the next steps or ***follow-up lesson plan*** to support planning and implementation of instruction to address student understandings and misunderstandings revealed by the Mathematical Checkpoint
4) Make instructional decisions based on the checks for understanding embedded in the follow-up lesson plan

MATERIALS REQUIRED

- *Chart paper, rulers, calculators, fraction bars, yards sticks, colored pencils*

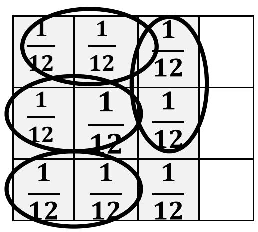
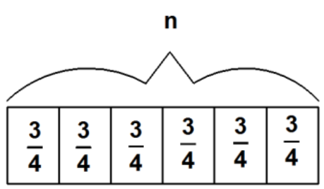
TIME NEEDED

Using Models to find Quotients Mathematical Checkpoint administration: **15 – 20 minutes**
Follow-Up Lesson Plan: **Two 60 minutes classes**

Timings are only approximate. Exact timings will depend on the length of the instructional block and needs of the

Step 1: Elicit evidence of student understanding

Mathematical Checkpoint: Using Models to find Quotients

<table>
<tr><th>Question(s)</th><th colspan="2">Purpose</th></tr>
<tr><td rowspan="2">
Select a model that represents the expression. Explain how the model represents the quotient.
Select a model that does not represent the expression. Explain how you know.
$\frac{3}{4} \div \frac{1}{6}$
<table>
<tr><td>
</td><td>Explain</td></tr>
<tr><td>
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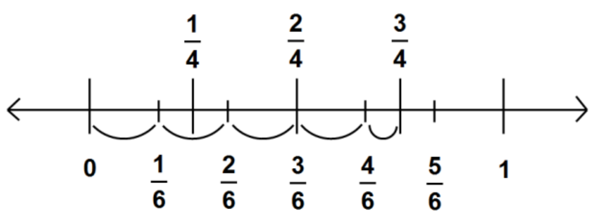
<tr><td>
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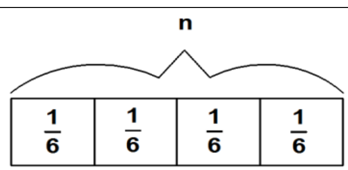
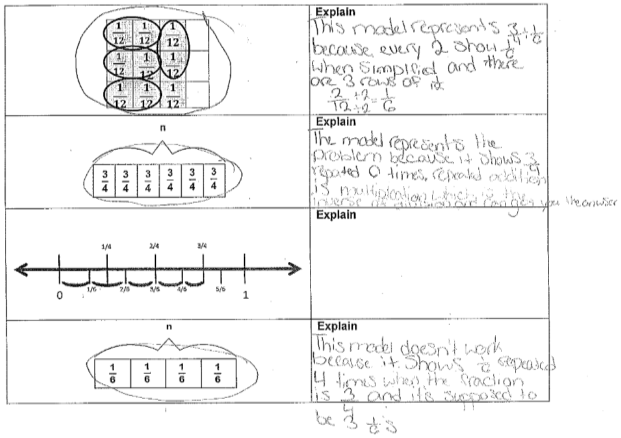
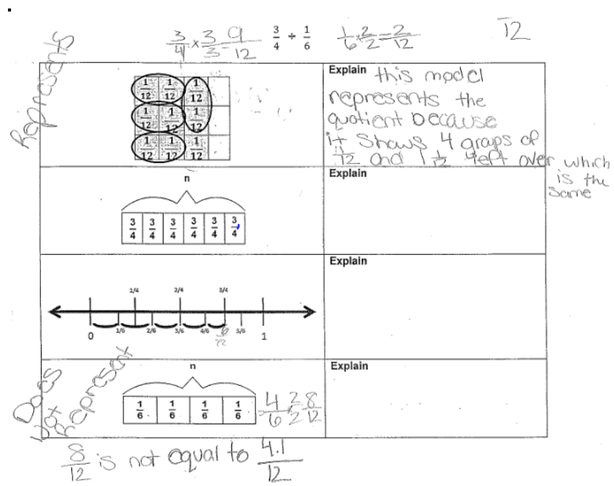
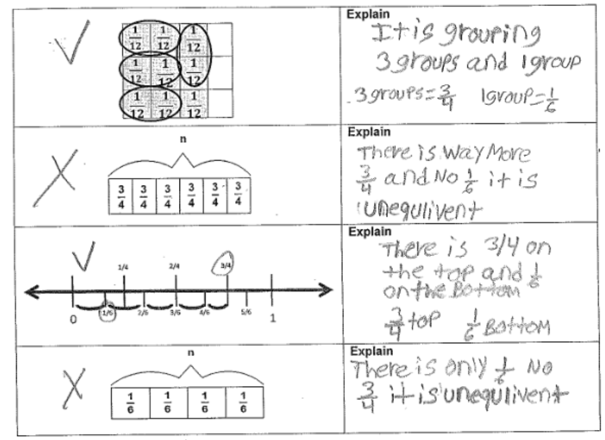
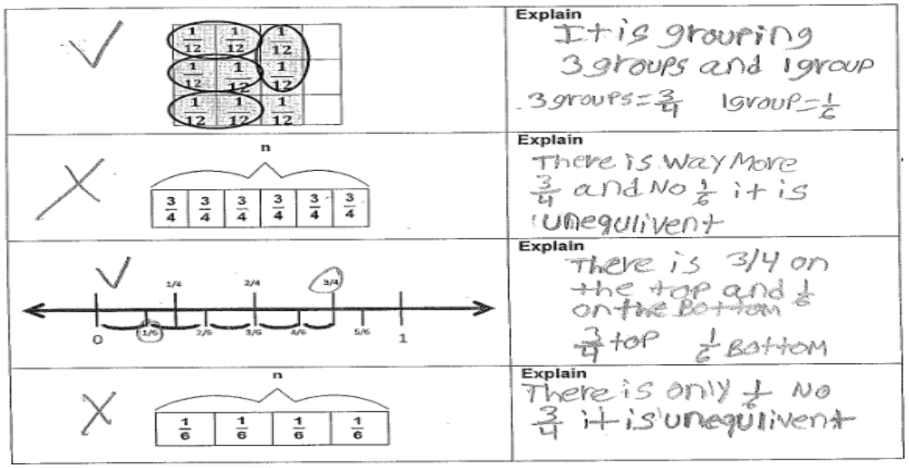
<tr><td>
</td><td>Explain</td></tr>
</table>
</td>
<td>CT Core Standard:</td><td>6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.</td></tr>
<tr><td>Target question addressed by this checkpoint:</td><td>Do students understand what it means to divide fractions? How well are students able to:

Identify the relationship between a model and an expression.
Recognize a model that represents the divisor and dividend accurately
Interpret the quotient and identify the remainder accurately.
Make sense of the quotient and explain reasoning
</td></tr>
</table>

Step 2: Analyze and Interpret Student Work		
Student Response Guide		
Got It	Developing	Getting Started
		

Getting Started

Student Response Example



Indicators

- Student response may not show understanding of the concept of equal sized group
- Student may not recognize the multiplication and division relationship
- Student may not show evidence of understanding which part of expression represents dividend or the divisor
- Student may not connect the model with the division expression or quotient

In the Moment Questions/Prompts

P: Look at each model and describe them to me.

P: Explain how the models you chose represents or do not represent the given expression

Q: What does it mean to divide?

Q: What is being divided in the expression?

Q: Do you see any equal sized groups in any of the models? Describe them.

P: Tell me about any patterns or repeated reasoning in the models.

Q: Are there any models that show how many groups of $\frac{1}{6}$ are in $\frac{3}{4}$?

Closing the Loop (Interventions/Extensions)

Use fraction bars, pattern blocks, (manipulative) to model and reinforce equal sized groups.

How many groups of $\frac{1}{3}$ are in 4

Problem	Build	Draw Model	Math Work
$4 \div \frac{1}{3}$			$4 \div \frac{1}{3}$ $\frac{12}{3} \div \frac{1}{3} = 12$

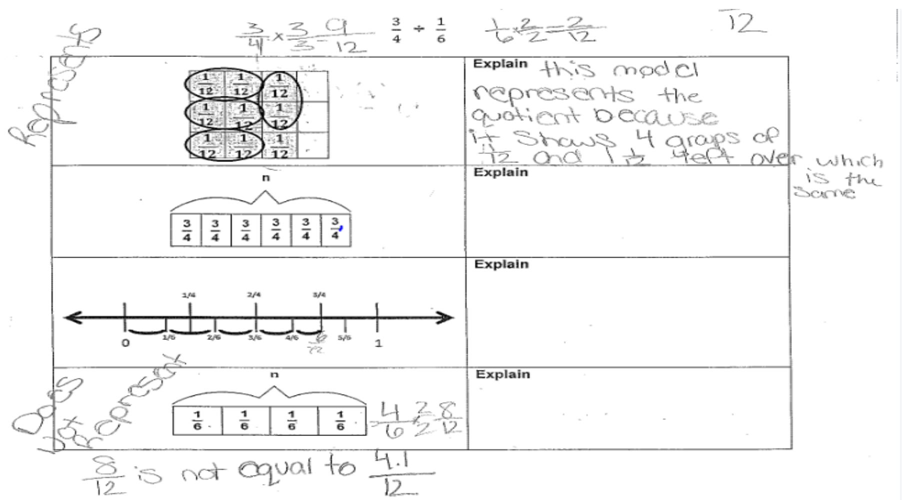
Reinforce concept of equal groups by including the following template, “How many groups of ________ are in _______.

Identify the dividend and divisor on various model and identify equal sized groups

http://ctdreamteam.learnzillion.com/lessons/3584-interpret-quotient-of-a-fractional-division-problem
This is an instructional video that teaches how to interpret and compute quotients. There is also a performance task available to download for additional practice

Developing

Student Response Example



Indicators

- Student response may show some understanding of the concept of equal sized groups.
- Student response does not indicate understanding of how to represent the quotient or the remainder.
- Student response shows evidence of using equivalent reasoning to analyze the models.
- Student's explanation may lack accurate mathematical reasoning.
- Student may not recognize the dividend and divisor in models selected.

In the Moment Questions/Prompts

Q: When two numbers of divided what is happening between them?
Q: How does the model you chose describe the quotient?

P: Tell me what the circles represent.

Q: Is there a remainder? What does it tell you?

P: Describe how the first model and the third model are similar or different?

Q: Do you see any patterns or repeated reasoning in any of the models? Tell me about them.

P: Tell me if any models to show multiplication?

Closing the Loop (Interventions/Extensions)

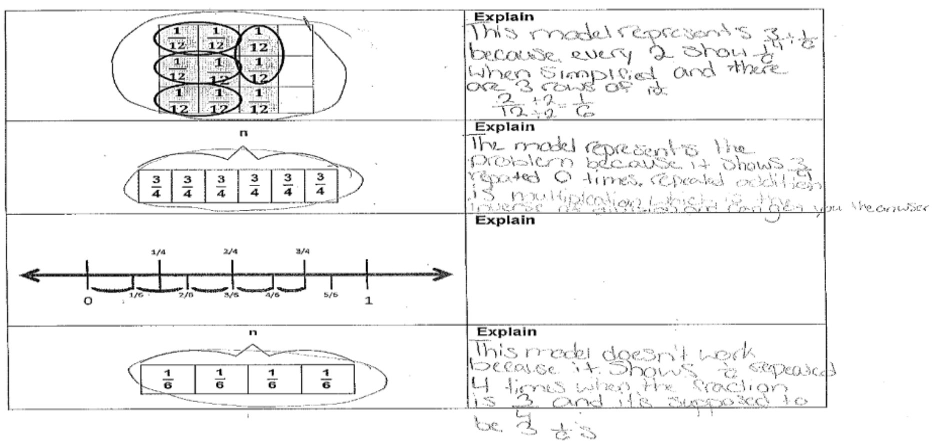
Use whole number fact families to build multiplication and division relationships with fractions. For example: $1\frac{1}{2}$ x 7 = $10\frac{1}{2}$

3 x 6 = 18	**18 ÷ 3 = 6**	**18 ÷ 6 = 3**
a x *b* = *c*	*c* ÷ *a* = *b*	*c* ÷ *b* = *a*
$1\frac{1}{2}$ x 7 = $10\frac{1}{2}$	$10\frac{1}{2}$ ÷ $1\frac{1}{2}$ = 7	$10\frac{1}{2}$ ÷ 7 = $1\frac{1}{2}$

Identify the dividend and divisor on various model and identify equal sized groups

https://www.illustrativemathematics.org/illustrations/692 This website provides opportunities for students to model each division problem with manipulative or drawings (pattern blocks or fraction strips) The order of the problems presented lead students to the connections to invert-and-multiply

http://learnzillion.com/lessons/209-interpret-remainders-when-dividing-using-modelsh This video uses bar model to show division and how to represent the remainder

<table>
<tr><th colspan="2">Got it</th></tr>
<tr><th>Student Response Example</th><th>Indicators</th></tr>
<tr><td>
</td><td>Student response may show understanding of equal sized groups.
Student may explain equivalence and how it applies in a division model.
Student may utilize inverse reasoning and how it applies to the model.
Students may identify incorrect model but explanation lacks justification of appropriate mathematical reasoning.</td></tr>
<tr><th>In the Moment Questions/Prompts</th><th>Closing the Loop (Interventions/Extensions)</th></tr>
<tr><td>Q: How do the models you selected represent the quotient?

Q: What does the remainder mean in this expression??

Q: Is the answer reasonable? How do you know?

Q: How are the models the same and how are they different?

P: Tell me more about what the number line represents.</td><td>Provide student with another division expression and ask student to create their own models to compute quotients. Possible expressions:
<table><tr><td>$\frac{5}{6} \div \frac{1}{3}$</td><td>$\frac{2}{3} \div \frac{1}{9}$</td><td>$1\frac{1}{2} \div \frac{3}{8}$</td></tr></table>Have students write another division expression of your own and create a model to represent it.

http://learnzillion.com/lessons/3594-computing-quoients-using-the-fractions-division-rule This video lesson demonstrates how to interpret and compute quotients.

https://www.illustrativemathematics.org/illustrations/408 The activity students must complete requires them to divide fractions in the opposite order. It provides students the opportunity to think carefully about the meaning of fraction division.</td></tr>
</table>

Steps 3 and 4: Act on Evidence from Student Work and Adjust Instruction	
Lesson Objective:	Students will be able to interpret quotients using fraction models to present fraction division involving remainders.
Content Standard(s):	6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
Targeted Practice Standard :	MP. 1 Make sense of problems and preserve in solving them: Students will have an opportunity to plan a strategy and complete a problem. Students will also check for reasonableness by examining other students' work and comparing it to their own. If a change of thinking occurs, students will change their response accordingly. MP. 2 Reason abstractly and quantitatively. Students describe a division number sentence. Students represent real world situation numerically. Students will make the connections between the real life situation, the model, and the number sentence. MP. 7 Look for and make use of structure: Students will make use of structure renaming fractions using models. Students will write division number sentences by looking at how a model represents the division.

Mathematical Goals	**Success Criteria**
Understand meanings of division such as repeated subtraction, partitioning quantities into a given number of equal-sized groups. *Understand the relationship between multiplication and division in order to make sense of fraction division*	*Students will be able to draw a model to represent a fraction division problem and explain how the model shows the dividend, divisor, and quotient* *Students will be able to write a division expression that represents a real world situation* *Students will be able to interpret the quotient and represent the remainder with a fraction.*

Launch (Probe and Build Background Knowledge)

Purpose: Assess and activate background knowledge about division.

Provide students with the following prompt

Use words, pictures, or other ways to explain $12 \div 5 = 2\frac{2}{5}$

In groups, students will decide how to explain this equation and display their work on chart paper. Each group will present their work and teacher will elicit conversation about the meaning of division: partitive (sharing equally) or measurement (grouping). During discussion, teacher should remind students of situations that require division and how the answer should be interpreted.

Possible questions to ask during the discussion:

- What does the $2\frac{2}{5}$ tell you?
- What does the 5 tell you?
- How can you describe the difference between sharing and grouping? Refer to student work displayed if possible. If not, provide two models that show the difference.

Instructional Task

Purpose: Introduce the brownie recipe task

Engage (Setting Up the Task)
Launch the task by projecting the following story problem on the board.

Suppose you have a half of stick of butter and your brownie recipe calls for $\frac{1}{8}$ of a stick. How many brownie recipes could you make with a half stick of butter?

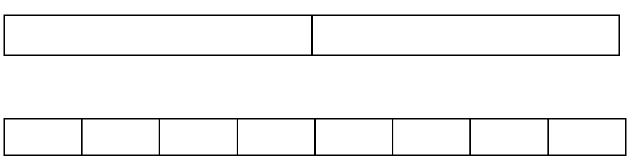
Facilitate discussion about this story problem by using the following prompts/questions.

- What are you trying to find out?
- What operations might you use to solve this problem?
- Is this a sharing or grouping problem?

Turn to your "elbow" partner (pair-share activity), share ideas of how to solve this problem. Each partner has 1 minute to share their idea/thoughts/questions.

Partners will share their ideas with the whole class. Teacher will elicit getting common denominators. "We can write $\frac{1}{2}$ as $\frac{4}{8}$ and see immediately that there are four eighths in one half. Therefore, 4 brownie recipes could be made with a half a stick of butter."

Teacher will introduce a model strategy by asking, "How could we draw a diagram to show this?" (Draw a fraction strip to show $\frac{1}{2}$ and another fraction strip to show parts equal to $\frac{1}{8}$.



"How can a model help us think about finding the quotient for $\frac{1}{2} \div \frac{1}{8}$?

(The bar is marked into eight equal pieces. Each is $\frac{1}{8}$. Now we can count to see that there are 4 eighths in the part of the part of the bar that represent $\frac{1}{2}$ of the stick of butter. So, 4 brownie recipes could be made.

Explore (Solving the Task)

Students will start by reading Task A and B silently. "Be sure to read each prompt 2 times. During the second read, circle important numbers and box important words. Students will work in groups to answer the following problem.

Materials for each group: Chart paper, rulers, calculators, fraction bars, yards sticks, colored pencils

A. *Daija and Justus have a job at a ribbon company that makes decorative bows. Daija takes a customer order for a bow. It takes $\frac{1}{6}$ yard make a bow for a gift box. How many bows can he make from the given amounts of ribbon below? Describe what each fractional part of the answer means.*

$\frac{1}{2}$ *yard*	$\frac{3}{4}$ *yard*	$2\frac{2}{3}$ *yards (Remember* $2\frac{2}{3} = \frac{8}{3}$ *)*

B. *Justus is working on an order for bows. He uses $\frac{2}{3}$ yard of ribbon to make one bow. How many bows can Justus make from each of the following amounts of ribbon below?*

$\frac{4}{5}$ *yard*	$1\frac{3}{4}$ *yards*	$2\frac{1}{3}$ *yards*

As students work, teacher may ask questions such as:

Focusing Question	**Probing Questions**	**Advancing Questions**
• *What do you know? What are you trying to find out?* • *Is this a sharing or grouping problem? Why?* • *What kind of model or diagram could help you?* • *How does the model show how many bows you can make?* • *Is there any leftover ribbon?*	• *How does your model represent the problem?* • *How does your model represent the quotient? How does it show the leftover ribbon?* • *Why do you think your method works?* • *Do any of these problems have anything in common?*	• *Prove your solution using another method.* • *How could you change task B so that there will not be a remainder?* • *How much ribbon would Justus need to make 5 bows?*

Elaborate (Discuss Task and Related Mathematical Concepts)

When students have completed most or the entire task, one student from each group will do a "gallery walk." This student will visit other groups to find out how they approached the task. Students will have 2 minutes to explain their strategy or pathway. The "gallery walker" will then continue to visit remaining groups and listen to each groups' reasoning and process. Finally, the "gallery walker" will report findings to his/her original group. Groups have an opportunity to make changes or keep the original work based on what they discovered.

Call the class back together as a whole to facilitate a discussion about group work.

- *Discussion about how to prove if an answer is reasonable will be elicited.*
- *Do you agree or disagree with the solution? Why?*
- *Was there any ribbon leftover? How does your work show this leftover ribbon?*
- *How is the remainder in the problem related to the divisor?*
- *Will the quotient always be larger when dividing two fractions? Should the quotient be larger or smaller? How do you know?*

Checking for Understanding

Purpose: To elicit evidence of students' understanding of interpreting quotients and naming remainders when dividing fractions.

We have $\frac{1}{2}$ yard of ribbon and we need $\frac{1}{6}$ yards of ribbon per bow. How many bows can you make with $\frac{1}{2}$ yard of ribbon?

Draw a model to represent this situation and explain how the model shows how many bows could be made.

6. NS.A.1 Dividing a Fraction by a Fraction: Real world problems	**Student is able to: (check all that apply**	Teacher Notes
Interpret word problem correctly.		
Write a division expression to match situation		
Create a visual representation/model of division problem		
Use the visual/model to interpret how much is being divided • Interprets the remainder accurately		

Common Misunderstanding

Purpose: Address a common misunderstanding students often have about interpreting and naming the remainder

Madison has 1 pound of cookies. She puts $\frac{3}{8}$ pound of cookies on each platter. Can Madison fill three platters? Explain by referring to the model below. (No, she will not have enough for 3 platters.)

1 lb of Cookies

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

How many platters can Madison completely fill? (She could 2 platters)

How many pounds of cookies will be leftover? (She will have $\frac{1}{4}$ pounds of cookies leftover)

Checking for Understanding

Purpose: To elicit evidence of students' understanding of interpreting quotients and naming remainders when dividing fractions.

Who is correct?

Lateisha and Don make scarves. They have 3 yards of fabric and need $\frac{2}{3}$ yard per scarf.

Lateisha thinks that they can make 4 scarves with $\frac{1}{3}$ yard left over.

Don thinks that they can make 4 scarves with $\frac{1}{2}$ yard leftover.

Who do you agree with? Why? Draw a model to justify your choice.

Closure

Purpose: Provide students the opportunity to self-assess their own learning.

What's your forecast?

How well can you draw a model to represent fraction division and explain how model shows the dividend, divisor, and quotient? Circle the image that applies.

Clear

Somewhat clear

Not so clear

*What specific question do you have:*____

Extension Task

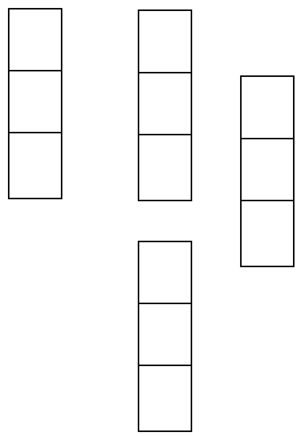
Purpose:

Write a real world story problem $1\frac{3}{4} \div \frac{1}{2} = N$ *Include a model to present your story.*

Draw your model below.

Is your division problem showing equal sized groups or sharing? How do you know?

“Getting Started” Closing the Loop Intervention Example

Problem	Build (pattern blocks or fraction bars)	Draw Model	Math Work
$4 \div \frac{1}{3}$			$4 \div \frac{1}{3}$ $\frac{12}{3} \div \frac{1}{3} = 12$

Problem	Build (pattern blocks or fraction bars)	Draw Model	Math Work
$5 \div \frac{3}{4}$			

“Getting Started” Closing the Loop Intervention Example

Reinforce concept of equal groups by including the following template,

How many groups of _______ are in _______?

$6 \div \frac{3}{5}$

How many groups of $\frac{3}{5}$ are in 6.

Draw a model to show equal groups.

Is there anything left over? If so, what does the leftover tell you?

Launch to Brownie Recipe Lesson

Use words, pictures, or other ways to explain

$$12 \div 5 = 2\frac{2}{5}$$

Decide how to explain this equation and display your work on chart paper. Each group will present their work to the class.

In your presentation, consider the following questions:

- What does the $2\frac{2}{5}$ tell you?
- What does the 5 tell you?

Explore (Solving the Task: Ribbon Company)

Read Task A and B silently. Be sure to read each prompt 2 times. During the second read, circle important numbers and box important words. After having some private thinking time, you will work in a group to solve the problem.

A. Daija and Justus have a job at a ribbon company that makes decorative bows. Daija takes a customer order for a bow. It takes $\frac{1}{6}$ of a yard to make a bow for a gift box. How many bows can he make from the given amounts of ribbon below?

Describe what each fractional part of the answer means.

$\frac{1}{2}$ *yard*	$\frac{3}{4}$ *yard*	$2\frac{2}{3}$ *yards (Remember* $2\frac{2}{3} = \frac{8}{3}$ *)*

B. Justus is working on an order for bows. He uses $\frac{2}{3}$ yard of ribbon to make one bow. How many bows can Justus make from each of the following amounts of ribbon below?

$\frac{4}{5}$ *yard*	$1\frac{3}{4}$ *yards*	$2\frac{1}{3}$ *yards*

Check for Understanding

We have $\frac{1}{2}$ yard of ribbon and we need $\frac{1}{6}$ yards of ribbon per bow. How many bows can you make with $\frac{1}{2}$ yard of ribbon?

Draw a model to represent this situation and explain how the model shows how many bows could be made.

6. NS.A.1 Dividing a Fraction by a Fraction: Real world problems	**Student is able to: (check all that apply**	**Teacher Notes**
Interpret word problem correctly.		
Write a division expression to match situation		
Create a visual representation/model of division problem		
Use the visual/model to interpret how much is being divided • Interprets the remainder accurately		

Common Misunderstanding: Check for Understanding

Madison has 1 pound of cookies. She puts $\frac{3}{8}$ pound of cookies on each platter. Can Madison fill three platters? Explain by referring to the model below.

1 lb of Cookies

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

How many platters can Madison completely fill?

How many pounds of cookies will be leftover?

Checking for Understanding

Who is correct?

Lateisha and Don make scarves. They have 3 yards of fabric and need $\frac{2}{3}$ *yard per scarf.*

Lateisha thinks that they can make 4 scarves with $\frac{1}{3}$ *yard left over.*

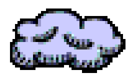
Don thinks that they can make 4 scarves with $\frac{1}{2}$ *yard leftover.*

Who do you agree with? Why? Draw a model to justify your choice.

Closure

What’s your forecast?

How well can you draw a model to represent fraction division and explain how model shows the dividend, divisor, and quotient? Circle the image that applies.

Clear **Somewhat clear** **Not so clear**

What specific question do you have?

____

____

____

____

____

Extension Task

Write a real world story problem $1\frac{3}{4} \div \frac{1}{2} = N$ *Include a model to present your story.*

Draw model below.

Is your division problem showing equal sized groups or sharing? How do you know?

Launch to Brownie Recipe Lesson: SOLUTION

Use words, pictures, or other ways to explain

$$12 \div 5 = 2\frac{2}{5}$$

Decide how to explain this equation and display your work on chart paper. Each group will present their work to the class.

In your presentation, consider the following questions:

- What does the $2\frac{2}{5}$ tell you?
- What does the 5 tell you?

Explore (Solving the Task: Ribbon Company) SOLUTION

Read Task A and B silently. Be sure to read each prompt 2 times. During the second read, circle important numbers and box important words. After having some private thinking time, you will work in a group to solve the problem.

C. Daija and Justus have a job at a ribbon company that makes decorative bows. Daija takes a customer order for a bow. It takes $\frac{1}{6}$ of a yard to make a bow for a gift box. How many bows can he make from the given amounts of ribbon below?

Describe what each fractional part of the answer means.

$\frac{1}{2}$ *yard*	$\frac{3}{4}$ *yard*	$2\frac{2}{3}$ *yards (Remember* $2\frac{2}{3} = \frac{8}{3}$ *)*
3 bows; there will not be any extra ribbon	***$4\frac{1}{2}$ bows; 4 whole bows and $\frac{1}{2}$ of a bow.***	***16 bows; there will not be any extra ribbon.***

D. Justus is working on an order for bows. He uses $\frac{2}{3}$ yard of ribbon to make one bow. How many bows can Justus make from each of the following amounts of ribbon below?

$\frac{4}{5}$ *yard*	$1\frac{3}{4}$ *yards*	$2\frac{1}{3}$ *yards*
$1\frac{1}{5}$ bows	***$2\frac{5}{8}$ bows***	***$3\frac{1}{2}$ bows***

<table>
<tr><th colspan="2">Research and review of standard</th></tr>
<tr><th>Content Standard(s):</th><th>Standard(s) for Mathematical Practice:</th></tr>
<tr><td>6.NS.A.1
Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.</td><td>Standard Math Practice 2: Construct viable arguments and critique the reasoning of others
understand and use stated assumptions, definitions, and previously established results
justify their conclusions
build a logical progression of statements to explore the truth of their conjectures</td></tr>
<tr><th>Smarter Balanced Claim</th><th>Smarter Balanced Item</th></tr>
<tr><td>Claim 1</td><td>Hisaki is making sugar cookies for a school bake sale. He has $3\frac{1}{2}$ cups of sugar. The recipe calls for $\frac{3}{4}$ cup of sugar for one batch of cookies. Which equation can be used to find b, the total number of batches of sugar cookies Hisaki can make?
(A) $3\frac{1}{2} \times \frac{3}{4} = b$
(B) $3\frac{1}{2} \div \frac{3}{4} = b$
(C) $3\frac{1}{2} + b = \frac{3}{4}$
(D) $3\frac{1}{2} - b = \frac{3}{4}$</td></tr>
<tr><td>CPR Pre-Requisites
(Conceptual Understanding, Procedural Skills, and Representations)

Look at the Progressions documents, Learning Trajectories, LZ lesson library, unpacked standards documents from states, NCTM Essential Understandings Series, NCTM articles, and other professional resources. You'll find links to great resources on your PLC Platform.</td><td>Conceptual Understanding and Knowledge
Understand that fractions could compare a part of a whole, a whole to a part, or a part of a set.
Understand real world problem solving situations that require division
Understand division as both a notion of grouping (measurement) and the notion of sharing (partitive).
Understand the relationship between multiplication and division (inverse operation)
Understand how to apply knowledge of fact families to division problems
Understand how to interpret and create division models (pictures diagram, bar model, number line)
Procedural Skills
Understand how to rename to find common denominators
Understand how to multiply
Understand how to divide
Representational
Represent fractions in multiple ways (picture diagram, bar modes, number line).
Represent real world problems using an equation
Social knowledge (information a student doesn't know unless you tell them)
Know where the dividend and divisor are written in a division equation</td></tr>
</table>

Standards Progression **Look at LearnZillion lessons and expert tutorials, the Progressions documents, learning trajectories, and the "Wiring Document" to help you with this section*		
Grade(s) below	**Target grade**	**Grade(s) above**
3.OA.6 Understand division as an unknown-factor problem. *5.NS.7a* Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *5.NS.7b* Interpret division of a whole number by a unit fraction, and compute such quotients.	*6.NS.1* Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem *6.EE.7* Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.	*7.NS.A2c* Apply properties of operations as strategies to multiply and divide rational numbers. *7.SP.3* Informally assess the degree of visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers by expressing it as a multiple of a measure of variability.

Common Misconceptions/Roadblocks

What characteristics of this problem may confuse students?

- Students may have limited understanding of "baking a batch of cookies"
- *Students may have limited understanding of baking a batch of cookies.*

What are the common misconceptions and undeveloped understandings students often have about the content addressed by this item and the standard it addresses?

- Students do not understand how to write an equation that represents the divisor and dividend
- Students do not understand how to interpreting the remainder
- Students do not understand how to applying the relationship between multiplication and division
- Students do not understand how to interpreting the quotient of a problem that has a divisor that is larger than the dividend

What overgeneralizations may students make from previous learning leading them to make false connections or conclusions?

- Students incorrectly interpret the remainder
- Students might assume that the Commutative Property or Associative Property does apply to division

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