

Next Steps and Instructional Moves

The intended purpose of this document is to provide teachers with a tool to determine student understanding and suggest instructional moves that may help guide a student forward in their learning of a particular concept or standard. This guide is not an exhaustive list of strategies.

Fifth Grade: Cluster 3 Number and Operations- Fractions Using Models to Multiply and Divide Fractions

NC.5.NF.3 Use fractions to model and solve division problems.

- Interpret a fraction as an equal sharing context, where a quantity is divided into equal parts.
- Model and interpret a fraction as the division of the numerator by the denominator.
- Solve one-step word problems involving division of whole numbers leading to answers in the form of fractions and mixed numbers, with denominators of 2, 3, 4, 5, 6, 8, 10, and 12, using area, length, and set models or equations.

NC.5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction, including mixed numbers.

- Use area and length models to multiply two fractions [a fraction by a whole number], with the denominators 2, 3, 4.
- Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number and when multiplying a given number by a fraction less than 1 results in a product smaller than the given number.
- Solve one-step word problems involving multiplication of fractions using models to develop the algorithm.

NC.5.NF.7 Solve one-step word problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions using area and length models, and equations to represent the problem.

NC.5.OA.2 Write, explain, and evaluate numerical expressions involving the four operations to solve up to two-step problems. Include expressions involving:

- Parentheses, using the order of operations.
- Commutative, associative and distributive properties.

Not Yet

Students that are consistently scoring “Not Yet” on these Standards could have a variety of errors. These errors may include confusion with the operations of multiplication and division or confusion while interpreting a word problem. They may also demonstrate difficulty using appropriate strategies and operations. While students may also demonstrate gaps with computational fluency, gaps in conceptual understanding such as choosing the correct operation and an appropriate strategy should take priority.

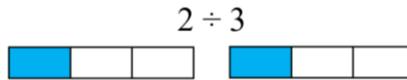
Next Steps:

For students demonstrating difficulties while solving problems involving the division of whole numbers (NC.5.NF.3):

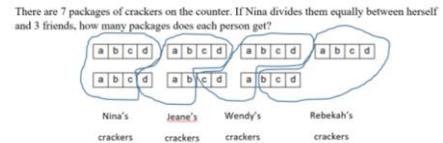
- Begin by having students interpret situations in which the numbers are small enough to be modeled and the quotient is a whole number, such as 4 pencils shared equally between 2 people OR where the quotient is a unit fraction, such as 1 object is shared equally among 2 or 4 people.

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- Continue then with situations with small numbers where the quotient is less than 1, such as “If 2 pounds of turkey shared between 3 people, how much turkey does each person get?”



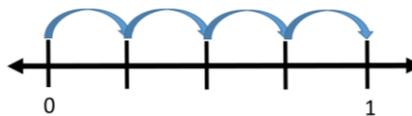
- Provide students with graph/grid paper to work on these tasks and encourage students to think about how their representation matches the situation.
- Have students check the reasonableness of their work and check their answer by thinking about the situation as a missing factor multiplication problem where they can repeatedly add. For example, if the situation were how much does each person get if 5 packs of gum is shared equally among 3 people, encourage students to think about, “If each person received 1 pack of gum would there be extra? and “If each person received 2 packs of gum would there be extra?” By determining between which 2 whole numbers the quotient will be between will help students model the situation, reason about the situation, and assess the reasonableness of their answer.
- Have students model the problem using bar models. Encourage students to think about fair shares and link to their prior knowledge of whole number division. Use real world examples to help develop conceptual understanding. The NCDPI unpacking document has examples for you to use with students.
- Division of Fractions [lesson](#) support foundation work of 5.NF.3



Adapted from NCDPI unpacking

For students finding difficulty with multiplication of a fraction by a whole number (NC.5.NF.4):

- Provide opportunities for students to work with situations that involve repeated addition of a unit fraction and discuss how repeated addition of a unit fraction is similar to multiplication of a fraction by a whole number. For example, “Sarah runs $\frac{1}{4}$ of a mile every day. How far will she have run after 1 day? 2 days? 3 days? 4 days?” Discuss with students that $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 4 \times \frac{1}{4}$. If needed go back to repeated addition of whole numbers with examples such as $5 + 5 + 5 = 3 \times 5$.



- Provide students with grid/graph paper or number line and have them model.
- Use fraction bars to model real world problems. For examples, “Ana needs to make 4 hair bows. Each hair bow requires $\frac{1}{2}$ yard of ribbon. How much ribbon does Ana need in total?”



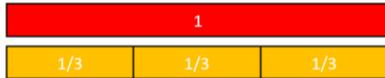
- Collecting Recyclables and Collecting More Recyclables [lessons](#) support foundational work of 5.NF.4

Next Steps and Instructional Moves

For students who are struggling solving problems involving the division of a whole number by a unit fraction or dividing a unit fraction by a whole number (NC.5.NF.7):

- Pose tasks in which the unit fraction is $\frac{1}{2}$ or $\frac{1}{4}$ and the whole number is 4 or less to facilitate students' work modeling the tasks with pictures on grid/graph paper or fraction bars.

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



$$2 \div \frac{1}{4} = 8$$



- Avoid references to the algorithm and focus on how students can represent the situation with a picture, how the numbers in the equation are represented in the picture, and if their answer makes sense.

For students struggling with order of operations and evaluating expressions (NC.5.OA.2):

- Support students by posing expressions that involve only addition and multiplication such as $3 + 4 \times 5$. Have students explore the answer without parentheses, as well as how the answer changes based on the placement of parentheses, such as around the 3 and 4 compared to around the 4 and 5.

Progressing

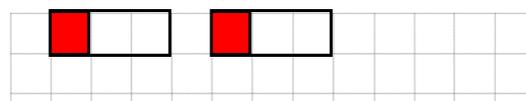
Students that are consistently scoring “Progressing” can interpret word problems and set problems up correctly. They may show difficulty carrying out a process in order to find the correct answer or correctly representing the problem with a picture or appropriate strategy.

Next Steps:

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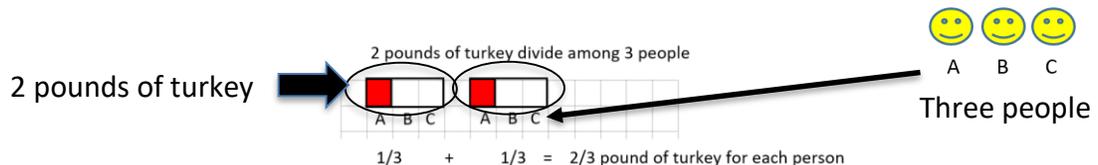
- Pose tasks with situations with small numbers where the quotient is less than 1, such as “If 2 pounds of turkey shared between 3 people, how much turkey does each person get?”

2 pounds of turkey divide among 3 people



$$\frac{1}{3} + \frac{1}{3} = \frac{2}{3} \text{ pound of turkey for each person}$$

- Provide students with tasks where they use graph/grid paper to work on these tasks. Encourage students to think about and communicate how their representation matches the situation, specifically by answering, “Where are the numbers in the task shown in your picture/representation?”

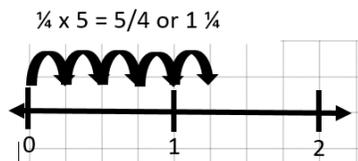


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- Have students check the reasonableness of their work and check their answer by thinking about the situation as a missing factor multiplication problem where they can repeatedly add. For example, if the situation were how much does each person get if 5 packs of gum is shared equally among 3 people, encourage students to think about, “If each person received 1 pack of gum would there be extra? and “If each person received 2 packs of gum would there be extra?” By determining between which 2 whole numbers the quotient will be between will help students model the situation, reason about the situation, and assess the reasonableness of their answer.

For students finding difficulty with multiplication of a fraction by a whole number (NC.5.NF.4):

- Provide students with grid/graph paper and have them model tasks involving the multiplication of a fraction by a whole number.
- Pose tasks related to repeated addition and discuss with students’ various strategies to model the situation, such as jumps on a number line or shading an area model.



- Multiplying Fractions with Color Tiles [Task](#) and modifications of the task can provide additional practice.
- If students can successfully represent the problem and solve it, but struggle to rename an improper fraction as a mixed number, encourage students to use an area model to represent the improper fraction and determine how to rename it as a mixed number. Support students in the discussion of the reasonableness of their answer.

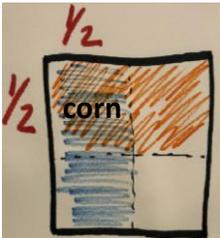
For students solving problems involving the division of a whole number by a unit fraction or dividing a unit fraction by a whole number (NC.5.NF.7):

- Pose tasks in which the unit fraction is $\frac{1}{2}$ or $\frac{1}{4}$ and the whole number is 4 or less to facilitate students’ work modeling the tasks with pictures on grid/graph paper.
- Avoid references to the algorithm and focus on how students can represent the situation with a picture, how the numbers in the equation are represented in the picture, and if their answer makes sense.

For students struggling with order of operations and evaluating expressions (NC.5.OA.2):

- Support students by posing expressions that involve only addition and multiplication such as $3 + 4 \times 5$. Have students explore the answer without parentheses, as well as how the answer changes based on the placement of parentheses, such as around the 3 and 4 compared to around the 4 and 5.
- Provide tasks that include both multiplication and division where division comes first, such as $12 \div 3 \times 2$. Discuss with students while the acronym PMDAS lists multiplication before division, multiplication and division both occur simultaneously when moving from left to right in an expression after all parentheses have been evaluated. The same applies to addition and subtraction. This means that in the expression $12 \div 3 \times 2$, divisions will occur before multiplication.
- Provide opportunities for students to discuss why solutions are correct or incorrect. For example, “Tim says that $4 + (2 \times 3)$ can be solved by adding 4 and 2 then multiplying 6 by 3 to get 18. Is Tim correct or not? How do you know?”

Next Steps and Instructional Moves

<p>Meets Expectation</p>	<p>Students that are consistently scoring “Meets Expectation” have a good understanding of how to interpret word problems, represent problems using an appropriate model or strategy, and find the correct answer. Students who are at this level also can clearly communicate their steps to solving tasks as well as their reasoning for choosing those steps.</p> <p>Next Steps:</p> <p>For students who have demonstrated proficiency solving problems involving the division of whole numbers (NC.5.NF.3):</p> <ul style="list-style-type: none">• Provide students with equations and have them write word problems that match the equations. Then have them solve their partners’ word problems.• Pose tasks that involve more difficult fractions to model, such as 6ths, 12ths, 5ths, and 10ths. <p>For students who have demonstrated proficiency while multiplying a fraction by a whole number (NC.5.NF.4):</p> <ul style="list-style-type: none">• In Cluster 6, students will multiply fractions by fractions, including mixed numbers. If you have data that students are proficient in multiplying a whole number by a fraction, pose tasks that involve the multiplication of unit fractions. Example: Half of a field is planted with vegetables. Half of the planted area is corn. How much of the field is corn?” ($\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$).  <p>For students who have demonstrated proficiency solving problems involving the division of a whole number by a unit fraction or dividing a unit fraction by a whole number (NC.5.NF.7):</p> <ul style="list-style-type: none">• Students may be given an equation and be asked to write a word problem that matches the equation. Students may then switch word problems with classmates and solve them.• The Grade 5 Standards do not involve dividing a fraction by a fraction. We recommend for students who have met this standard to maintain related skills during the year and spend time on other standards. <p>For students who have demonstrated proficiency with order of operations and evaluating expressions (NC.5.OA.2):</p> <ul style="list-style-type: none">• Provide more opportunities for students to solve two-step problems involving parentheses. Also provide tasks in which students must place parentheses in various places of an expression and determine all of the possible solutions based on the placement of the parentheses. Example: For the expression $8 - 5 \times 4$ put parentheses in all of the possible places. For each, describe how the placement of parentheses influences the order that you evaluate the expression and how it influences the answer.• Activity: Have students roll three dice. Each student then creates an expression. Each student then reads their expression and solves. For example: Students roll 4, 6, 2. They create the expression $2 + (6 \times 5)$. They say, “Two more than the product of six and five.”
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