

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 6

Number and Operations Base Ten

Using Models to Multiply and Divide of Whole Numbers, Decimals, and Fractions

NC.5.MD.1 Given a conversion chart, use multiplicative reasoning to solve one-step conversion problems within a given measurement system.

NC.5.NBT.5 Demonstrate fluency with the multiplication of two whole numbers up to a three-digit number by a two-digit number using the standard algorithm.

NC.5.NBT.6 Find quotients with remainders when dividing whole numbers with up to four-digit dividends and two-digit divisors using rectangular arrays, area models, repeated subtraction, partial quotients, and/or the relationship between multiplication and division. Use models to make connections and develop the algorithm.

NC.5.NBT.7 Compute and solve real-world problems with multi-digit whole numbers and decimal numbers.

- Add and subtract decimals to thousandths using models, drawings or strategies based on place value. (Strikethrough this standard for this cluster)
- Multiply decimals with a product to thousandths using models, drawings, or strategies based on place value.
- Divide a whole number by a decimal and divide a decimal by a whole number, using repeated subtraction or area models. Decimals should be limited to hundredths.
- Use estimation strategies to assess reasonableness of answers.

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, 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” in this cluster could have a variety of errors. Primarily, students are unable to interpret a multiplication or division of fraction or decimal word problem and choose an appropriate strategy or operation to solve the problem. While students may also demonstrate gaps with computational fluency, gaps in conceptual understanding such as choosing the correct operation and an appropriate strategy for multiplication and division of fractions and decimals should take priority.

Next Steps and Instructional Moves

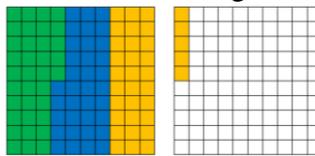
Next Steps:

For students struggling to use multiplicative reasoning to solve measurement tasks (NC.5.MD.1):

- Begin by posing tasks that go from a larger unit to a smaller unit, which is what students work with in Fourth Grade. Tasks should also include numbers less than 5 for the larger unit in order to allow students to easily model the situations, such as: “The running back ran for 4 yards on the first play of the game. How many feet did he run?”
- As students explore tasks discuss with students the process of determining the operation based on the units that are involved. The idea of an acronym or saying to memorize is not recommended compared to allowing students opportunities to measure, explore, and reason about common measurements and conversions, such as inches to feet, ounces to pounds, etc.

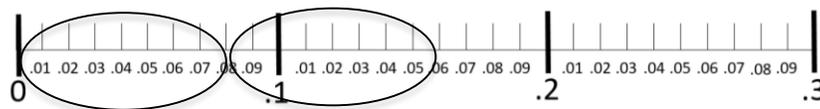
For students finding difficulty multiplying and dividing decimals (NC.5.NBT.7):

- For students who struggle on representing a multiplication of decimals task begin by posing tasks that involve a decimal less than 0.35 and a whole number that is 3 or less to facilitate modeling on a thousandths grid. For example, “I bought 3 bags of sugar at the store. Each bag weighed 0.35 kilograms. How much sugar did I buy?” As students are working and representing the task on the thousandths grid discuss with them how their model connects to repeated addition, such as adding $0.35 + 0.35 + 0.35$.



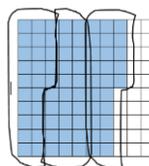
- Provide opportunities for students to use a number line to help them visualize the multiplication of decimals.

You live .16 miles from your friends' house. After walking half of the distance, you stop to talk to another friend. How much of a mile have you walked? ($0.16 \times .5 = .08$)



- For students who struggle on representing a division of decimals task begin by posing tasks that involve a decimal less than 1 and a whole number that is 4 or less to facilitate modeling on a thousandths grid. For example, “The school has 0.75 kilograms of sand that is shared between 3 people for an art project. How much sand does each person get?” As students are working and representing the task on the hundredths or thousandths grids discuss with them how their model connects to division, such as:

$$0.75 \div 3$$



Next Steps and Instructional Moves

- Pose tasks and have students discuss the action in the problem to determine an appropriate strategy or operation.
- The Multiplication of a Decimal by a Whole Number [lesson](#) and the Division with Decimals [lesson](#) provides opportunities to develop conceptual understanding and build a strong foundation.

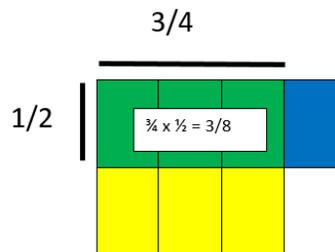
For students finding difficulty with multiplication of a fraction by a whole number or a fraction by a fraction(NC.5.NF.4):

- 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?” Discuss with students that $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 3 \times \frac{1}{4}$. If needed, go back to repeated addition of whole numbers with examples such as $5 + 5 + 5 = 3 \times 5$. This will encourage the students to see the connection between whole number multiplication and fractional multiplication.



- Provide students with grid/graph paper and have them model. For example: Wendy had $\frac{3}{4}$ pounds of dog food left in her bag. She gave $\frac{1}{2}$ of it to Andy. How much dog food does she have left in the bag?

$$\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$$

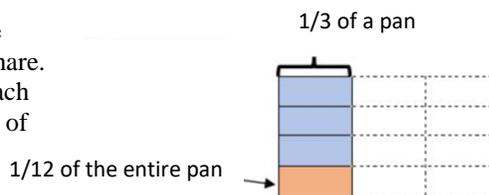


- Collecting Recyclables and Collecting More Recyclables [lessons](#) support foundational work of 5.NF.4

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 $\frac{1}{2}$, $\frac{1}{3}$ 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.

Four students sitting at a table were given $\frac{1}{3}$ of a pan of brownies to share. How much of the whole pan will each student get if they share the section of brownies equally?



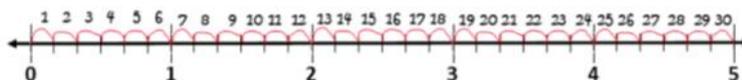
From NCDPI unpacking document

Next Steps and Instructional Moves

- Provide opportunities for students to use number lines to illustrate the division of whole numbers by a fraction.

I have 5 feet of yarn. For my project I have to cut the yarn into pieces that are one-sixth of a foot long. How many pieces will I have?

$$5 \div \frac{1}{6}$$



From NCDPI unpacking document

- 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.

Progressing

Students that are “Progressing” in this cluster may have a variety of errors. Students are unable to interpret a multiplication or division of fraction and decimal word problem and choose an appropriate strategy or operation to solve the problem. Students may also demonstrate some gaps with computational fluency and some gaps in conceptual understanding. Progressing students should show some mastery of appropriate use of models when solving multiplication and division of fractions and decimals.

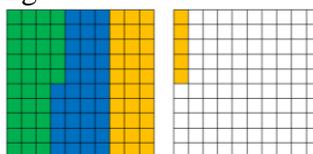
Next Steps:

For students struggling to use multiplicative reasoning to solve measurement tasks (NC.5.MD.1):

- Begin by posing tasks that go from a larger unit to a smaller unit, which is what students work with in Fourth Grade. Tasks should also include numbers less than 5 for the larger unit in order to allow students to easily model the situations, such as: “The running back ran for 4 yards on the first play of the game. How many feet did he run?” As students become more comfortable gradually increase size and pose tasks with a given smaller unit where students need to find a larger unit. For example, “There is 48 ounces of water in the pitcher. How many cups of water are there?”
- As students explore tasks discuss with students the process of determining the operation based on the units that are involved. The idea of an acronym or saying to memorize is not recommended compared to allowing students opportunities to measure, explore, and reason about common measurements and conversions, such as inches to feet, ounces to pounds, etc. Be sure to increase the rigor by integrating decimals using metric measurement.

For students finding difficulty adding and subtracting decimals (NC.5.NBT.7):

- For students who struggle on representing a multiplication of decimals task begin by posing tasks that involve a decimal less than 0.35 and a whole number that is 3 or less to facilitate modeling on a thousandths grid. For example, “I bought 3 bags of sugar at the store. Each bag weighed 0.35 kilograms. How much sugar did I buy?” As students are working and representing the task on the thousandths grid discuss with them how their model connects to repeated addition, such as adding $0.35 + 0.35 + 0.35$.

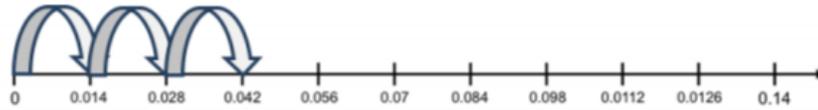


Next Steps and Instructional Moves

- Provide opportunities for students to use a number line to help them visualize the multiplication of decimals.

You live 14 hundredths of a mile from your friends' house. After walking 3 tenths of the distance, you stop to talk to another friend. How much of a mile have you walked? ($0.3 \times .14$)

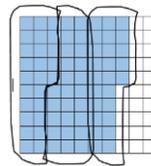
Number Line Model



Example taken from NCDPI Unpacking Document

- For students who struggle on representing a division of decimals task begin by posing tasks that involve a decimal less than 1 and a whole number that is 4 or less to facilitate modeling on a thousandths grid. For example, “The school has 0.76 kilograms of sand that is shared between 4 people for an art project. How much sand does each person get?” As students are working and representing the task on the hundredths or thousandths grids discuss with them how their model connects to division, such as:

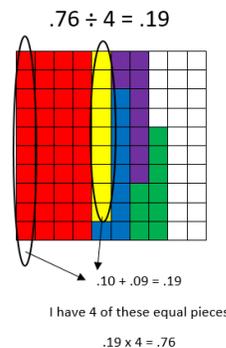
$$0.75 \div 3$$



- For students who struggle on representing a division of decimals task begin by posing tasks that involve a decimal less than 1 and a whole number that is 4 or less to facilitate modeling on a thousandths grid. For example, “The school has 0.76 kilograms of sand that is shared between 4 people for an art project. How much sand does each person get?” As students are working and representing the task on the hundredths grid discuss with them how their model connects to partial division and models, such as:

$$\begin{aligned} 0.76 \div 4 = \\ 0.1 \times 4 = 0.40 \\ 0.76 - 0.40 = 0.36 \\ 0.09 \times 4 = 0.36 \\ 0.36 - 0.36 = 0 \end{aligned}$$

The answer is the numbers
I multiplied by 4 which is
 $0.1 + 0.09 = 0.19$.

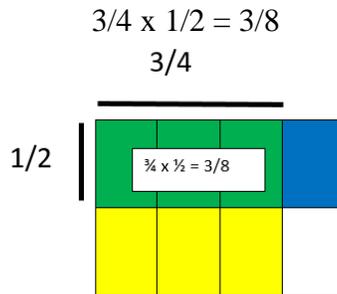


For students finding difficulty with multiplication of a fraction by a whole number or a fraction by a fraction(NC.5.NF.4):

- 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?” Discuss with students that $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 3 \times \frac{1}{4}$. If needed, go back to repeated addition of whole numbers with examples such as $5 + 5 + 5 = 3 \times 5$. This will encourage the students to see the connection between whole number multiplication and fractional multiplication.

Next Steps and Instructional Moves

- Provide students with grid/graph paper and have them model tasks involving the multiplication of a fraction by a whole number. For example: Wendy had $\frac{3}{4}$ pounds of dog food left in her bag. She gave $\frac{1}{2}$ of it to Andy. How much dog food does she have left in the bag?

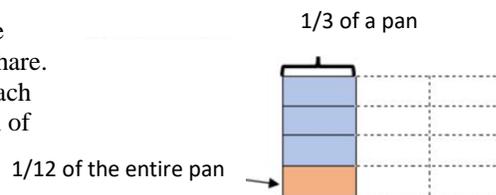


- Pose tasks related to repeated addition and discuss with student's various strategies to model the situation, such as jumps on a number line or shading an area model.
- Multiplying Fractions with Color Tiles [Task](#) and modifications of the task can provide additional practice.
- If students can 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 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 $\frac{1}{2}$, $\frac{1}{3}$ 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.

Four students sitting at a table were given $\frac{1}{3}$ of a pan of brownies to share. How much of the whole pan will each student get if they share the section of brownies equally?

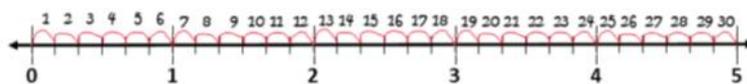


From NCDPI unpacking document

- Provide opportunities for students to use number lines to illustrate the division of whole numbers by a fraction.

I have 5 feet of yarn. For my project I have to cut the yarn into pieces that are one-sixth of a foot long. How many pieces will I have?

$$5 \div \frac{1}{6}$$



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- 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.

Next Steps and Instructional Moves

Meets Expectation	Students that are consistently scoring “Meets Expectation” have a good understanding of the concepts in this cluster. They are able to consistently interpret word problems by selecting an appropriate operation and strategy. Students are also able to clearly communicate the steps they use to solve the problem as well as their rationale for choosing those steps.
	<p><u>Next Steps:</u></p> <p>For students who have demonstrated proficiency using multiplicative comparisons to solve measurement tasks (NC.5.MD.1):</p> <ul style="list-style-type: none">● Fifth grade expects students to be able to solve all tasks with a conversion chart. Students who have demonstrated proficiency can work on two-step problems involving this standard or they can spend time on other standards. <p>For students who have demonstrated proficiency multiplying whole numbers (NC.5.NBT.5):</p> <ul style="list-style-type: none">● Provide students with an equation and have them write a word problem that matches it. Students may then switch problems with classmates and solve them.● Pose more tasks that focus on multiplying decimals (NC.5.NBT.7) <p>For students who have demonstrated proficiency dividing whole numbers (NC.5.NBT.6):</p> <ul style="list-style-type: none">● Provide students with an equation and have them write a word problem that matches it. Students may then switch problems with classmates and solve them.● Pose more tasks that focus on multiplying decimals (NC.5.NBT.7) <p>For students who have demonstrated proficiency with operations involving decimals (NC.5.NBT.7):</p> <ul style="list-style-type: none">● Provide students with an equation and have them write a word problem that matches it. Students may then switch problems with classmates and solve them.● Pose tasks involving the division of decimals in which the dividend is to the thousandths place. <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">● Focus on multiplication of two-mixed numbers. Begin to incorporate the denominators 6 and 8 into work in this standard, with a focus on conceptual understanding and modeling the multiplication of fractions. <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.

Next Steps and Instructional Moves

For students who have demonstrated proficiency with order of operations and evaluating expressions (NC.5.OA.2):

- 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. Increase the rigor by integrating decimals and fractions into evaluating expressions.