Hair-Coloring Solution (ECR)

Overview

Students will apply the four operations with decimals to determine the amount of hair-coloring solution a shop owner will make in milliliters and in liters.

Standards

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Convert like measurement units within a given measurement system.

5.MD.A.1 Convert among different-size standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m) and use these conversions in solving multistep real-world problems.

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
5.NBT.B.7	• 4.NBT.B.4 • 5.NBT.A.1 • 5.NF.A.1 • 5.NF.B.4	1. Add 243.98 + 76.08 + 43.2. a. 363.26 2. Subtract 1,132.75 – 342.6. a. 790.15 3. Multiply 643.98 x 4. a. 2,575.92 4. http://www.illustrativemathematics.org/illustrations/1293	• http://www.illustrativemathematics.org/illustrations/1562 • http://www.illustrativemathematics.org/illustrations/861 • http://www.illustrativemathematics.org/illustrations/855 • http://www.illustrativemathematics.org/illustrations/321 • http://www.illustrativemathematics.org/illustrations/965 • http://learnzillion.com/lessonsets/229-multiply-and-divide-by-decimals-to-the-hundredths • http://learnzillion.com/lessonsets/189-adding-and-subtracting-decimals-to-hundredths
5.MD.A.1	• 4.MD.A.1 • 4.MD.A.2	1. Convert 6,203 mL to liters. a. 6.203 liters	• http://www.illustrativemathematics.org/illustrations/1508

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
		2. Convert 23 liters to mL. a. 23,000 mL 3. http://www.illustrativemathematics.org/illustrations/293	• http://www.illustrativemathematics.org/illustrations/873 • http://learnzillion.com/lessonsets/697-convert-measurement-units-and-solve-real-world-problems • http://learnzillion.com/lessonsets/548-convert-among-differentsized-measurement-units-and-use-these-conversions-to-solve-realworld-problems

Real-World Preparation: The following questions will prepare students for some of the real-world components of this task:

- **What is a hair salon?** A hair salon is a place people go to have someone cut, style, or color their hair.
- **What is hair-coloring solution?** Hair-coloring solution is a mixture of different chemicals and colors that can be applied to hair in order to dye the hair a different color.
- **What is one application of solution?** One application of solution is the amount of solution it would typically take to dye one person's hair.

After the Task

For problem 1, students may not use place value precisely to add the amounts. Discuss with students the place value of each of the digits in the numbers. Guide students to use their understanding of four-tenths as a fraction to determine the equivalent fraction in hundredths in order to write the decimal 0.4 as 0.40. Then have students add the three amounts again using the correct place value.

For problem 2, students may understand that division is the necessary operation. However, division of decimals by a 3-digit divisor using the standard algorithm is not required at this grade. Guide students to use the relationship between multiplication and division to begin working the problem. Students only need to be able to find the whole number of application bottles that will be filled with the solution. Students can use their understanding of place value as well as their skill in multiplying multi-digit numbers to find the answer.

For problem 3, students may find the number of application bottles they can fill with the given amount of solution or how much of the solution would be divided evenly among 16 bottles. Encourage students to read the problem closely to identify the given information and the information they need to find. Ask probing questions to help students understand that they will first need to determine how much solution will be in 16 bottles if they are all filled completely. In part b, if students simply "move the decimal" to get the correct answer, discuss with them the math behind "moving the decimal" and have them write a mathematical equation to represent the conversion.

Student Extended Constructed Response

Jenny owns three hair salons and is making hair-coloring solution for use in all of her salons. To make the solution, she combines three colors using the amounts listed in the table below.

Color	Amount
Color A	311.25 mL
Color B	150.17 mL
Color C	90.4 mL

1. How many milliliters of the solution will be made? Show your calculations.

2. Jenny made more than one batch of the solution and has a total of 1,103.64 mL of the solution. She wants to pour the solution into application bottles so that there is one application per bottle. Each application bottle holds 135 mL of solution.
    a. How many application bottles can Jenny fill completely? Explain your reasoning.

    b. How many milliliters will be left after as many application bottles as possible have been completely filled with the solution Jenny made? Show how you found your answer.

3. Jenny has a recipe for a different hair-coloring solution that makes 575.48 mL in one batch. Jenny is going to ship this hair-coloring solution in single-application bottles to her other salons. Each shipping box can hold 16 application bottles, which hold 135 mL each.
    a. How many batches of the solution will Jenny need to make to completely fill 16 single-application bottles? Explain your reasoning.

    b. How many liters of the solution will be packed into one box? Show your calculations.

Extended Constructed Response Exemplar Response

Jenny owns three hair salons and is making hair-coloring solution for use in all of her salons. To make the solution, she combines three colors using the amounts listed in the table below.

Color	Amount
Color A	311.25 mL
Color B	150.17 mL
Color C	90.4 mL

1. How many milliliters of the solution will be made? Show your calculations.

   311.25
   + 150.17
   + 90.40
   551.82

   There will be 551.82 mL of the solution made.

2. Jenny made more than one batch of the solution and has a total of 1,103.64 mL of the solution. She wants to pour the solution into application bottles so that there is one application per bottle. Each application bottle holds 135 mL of solution.
   a. How many application bottles can Jenny fill completely? Explain your reasoning.

      I need to divide 1,103.64 by 135. I know that it's less than 10 because if I multiply 135 by 10, I get 1350, which is too much. So I tried 135 x 9, which is 1,215. That's still too much, so I tried 135 x 8 = 1,080. Jenny could put 1,080 mL of the 1,103.64 mL in 8 application bottles.

   b. How many milliliters will be left after as many application bottles as possible have been completely filled with the solution Jenny made? Show how you found your answer.

      1,103.64 – 1,080 = (1,103 – 1,080) + 0.64 = 23 + 0.64 = 23.64

      There would be 23.64 mL left of the solution Jenny made.

      ***Note: Students who have correct work based on an incorrect answer in part a should be given credit.*

3. Jenny has a recipe for a different hair-coloring solution that makes 575.48 mL in one batch. Jenny is going to ship this hair-coloring solution in single-application bottles to her other salons. Each shipping box can hold 16 application bottles, which hold 135 mL each.
   a. How many batches of the solution will Jenny need to make to completely fill 16 single-application bottles? Explain your reasoning.

      If Jenny needs to fill 16 bottles, she needs to make 16 x 135 = 2,160 mL of solution. One batch of this solution makes 575.48 mL. 575.48 x 2 = 1,150.96 mL made in two batches. 575.48 x 3 = 1,726.44 mL, and that isn't enough to fill all 16 bottles. 575.48 x 4 = 2,301.92 mL made in 4 batches. This is more than what she needs, but since three batches isn't enough, Jenny must make 4 batches of the solution to fill all 16 bottles.

b. How many liters of the solution will be packed into one box? Show your calculations.

16 bottles x 135 mL = 2,160 mL

$2{,}160 \div 1000 = 2.160$ *liters; there will be 2.160 liters in the box (2.16 is also acceptable).*

***Note: Students with correct work based on an incorrect answer in part a should be given credit.*

Baking Cakes (ECR)

Overview

Students will use multiplication and division of fractions to solve problems involving fractions of cakes.

Standards

Apply and extend previous understandings of multiplication and division.

5.NF.B.6 Solve real-world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

c. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division 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 1/2 lb. of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
5.NF.B.6	• 3.OA.A.1 • 3.OA.A.2 • 4.OA.A.1 • 4.OA.A.2 • 4.MD.A.2	1. Kristina has $\frac{3}{8}$ of a pizza left from the night before. She gave $\frac{1}{2}$ of what she had left to her brother. What fraction of the whole pizza did Kristina give her brother? a. $\frac{3}{16}$ 2. http://www.illustrativemathematics.org/illustrations/294 3. http://www.illustrativemathematics.org/illustrations/295	• http://www.illustrativemathematics.org/illustrations/1531 • http://www.illustrativemathematics.org/illustrations/1540 • http://www.illustrativemathematics.org/illustrations/263 • http://www.illustrativemathematics.org/illustrations/873 • http://learnzillion.com/lessonsets/538-solve-problems-involving-multiplication-of-fractions-and-mixed-numbers • http://learnzillion.com/lessonsets/67-multiply-fractions-and-mixed-numbers

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
5.NF.B.7c	• 3.OA.B.6 • 3.NF.A.1 • 4.NF.B.4	1. Hector has 2 cups of the yogurt that he eats for breakfast. If a serving of this yogurt is $\frac{1}{3}$ cup, how many mornings can Hector eat the yogurt for breakfast if he only eats one serving each morning? a. 6 mornings 2. http://www.illustrativemathematics.org/illustrations/1120	• http://www.illustrativemathematics.org/illustrations/833 • http://www.illustrativemathematics.org/illustrations/857 • http://learnzillion.com/lessonsets/737-divide-whole-numbers-by-unit-fractions-and-unit-fractions-by-whole-numbers

After the Task

For problem 1, students may have difficulty writing an equation to represent the situation. Ask students, "If $\frac{2}{3}$ of half of the cake is covered in sprinkles, what fraction of that half of the cake does not have sprinkles?" Have students translate the expression "$\frac{1}{3}$ of $\frac{1}{2}$ of the cake" into a mathematical expression using multiplication. Then repeat the process with the chocolate side of the cake. Guide students to write an addition equation using the multiplication expressions they created to represent the solution to the problem.

For problem 2, students might divide 7 by 5 rather than divide each of the seven cakes into five pieces. Have students create a drawing of the seven cakes and draw the slices on each cake. After students count the pieces of the cake that would be created, ask student to represent their drawing with a mathematical equation. Guide them to see that drawing the slices on the cake is dividing the cake into fifths; to find the answer, they can multiply 7 by 5.

Student Extended Constructed Response

1. Monica works at a bakery and is making a large rectangular cake. The customer requested that half of the cake be frosted with vanilla icing, and the other half be frosted with chocolate icing. The customer also wants sprinkles on $\frac{2}{3}$ of the vanilla half, and on $\frac{1}{4}$ of the chocolate half.
    a. Draw a picture of the rectangular cake, showing which parts have vanilla icing, chocolate icing, and sprinkles.

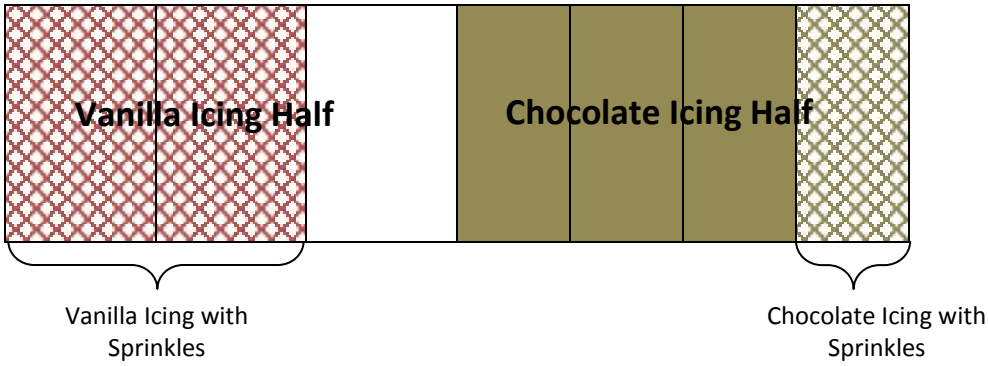
    b. Write and solve an equation to find the fraction of the cake that does **not** have sprinkles.

2. Monica is baking seven cakes that are all the same size. She will slice the cakes into equal pieces and sell the slices to customers in her store.
    a. One slice of each of these cakes is $\frac{1}{5}$ of the cake. How many slices of cake will Monica be able to sell? Show your work using words and/or pictures.

    b. Monica sold $\frac{4}{5}$ of the slices that she cut in part a. How many slices of cake did Monica sell? Show your calculations.

Extended Constructed Response Exemplar Response

1. Monica works at a bakery and is making a large rectangular cake. The customer requested that half of the cake be frosted with vanilla icing, and the other half be frosted with chocolate icing. The customer also wants sprinkles on $\frac{2}{3}$ of the vanilla half and on $\frac{1}{4}$ of the chocolate half.
    a. Draw a picture of the rectangular cake, showing which parts have vanilla icing, chocolate icing, and sprinkles.



    b. Write and solve an equation to find the fraction of the cake that does **not** have sprinkles.

$\frac{1}{3} \times \frac{1}{2} + \frac{3}{4} \times \frac{1}{2} = ?$ *? is the fraction of the cake without sprinkles*

$\frac{1}{6} + \frac{3}{8} = ?$

$\frac{4}{24} + \frac{9}{24} = ?$

$\frac{13}{24} = ?$

$\frac{13}{24}$ *of the cake will not have sprinkles.*

2. Monica is baking seven cakes that are all the same size. She will slice the cakes into equal pieces and sell the slices to customers in her store.
    a. One slice of each of these cakes is $\frac{1}{5}$ of the cake. How many slices of cake will Monica be able to sell? Show your work using words and/or pictures.

    If Monica cuts one cake into fifths, there are 5 equal pieces. If she cuts seven cakes so that each cake has 5 equal pieces, then there would be 35 pieces because 7 x 5 = 35.

    b. Monica sold $\frac{4}{5}$ of the slices that she cut in part a. How many slices of cake did Monica sell? Show your calculations.

$\frac{4}{5} \times 35 = \frac{140}{5} = 28$ *Monica sold 28 pieces of the cake.*

***Note: Students with correct work based on an incorrect response in part a should be given credit.*

Dairy Farm (ECR)

Overview

Students will use division and measurement conversion to answer questions about milk production on a dairy farm.

Standards

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.B.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Convert like measurement units within a given measurement system.

5.MD.A.1 Convert among different-size standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multistep real-world problems.

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
5.NBT.B.6	• 4.NBT.B.4 • 4.NBT.B.6 • 5.NBT.A.1 • 5.NBT.B.5	1. Divide $1290 \div 6$. a. 215 2. Divide $1476 \div 36$. a. 41	• http://www.illustrativemathematics.org/illustrations/1774 • http://www.illustrativemathematics.org/illustrations/1562 • http://www.illustrativemathematics.org/illustrations/1800 • http://www.illustrativemathematics.org/illustrations/1799 • http://learnzillion.com/lessonsets/211-find-whole-number-quotients-with-up-to-4digit-dividends-and-2digit-divisors
5.MD.A.1	• 4.MD.A.1 • 4.MD.A.2 • 5.NBT.B.7	1. Convert 36 quarts to gallons. a. 9 gallons 2. Convert 14 quarts to pints. a. 28 pints 3. http://www.illustrativemathematics.org/illustrations/878	• http://www.illustrativemathematics.org/illustrations/1508 • http://www.illustrativemathematics.org/illustrations/873 • http://www.illustrativemathematics.org/illustrations/1293 • http://learnzillion.com/lessonsets/697-

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
			convert-measurement-units-and-solve-real-world-problems • http://learnzillion.com/lessonsets/548-convert-among-differentsized-measurement-units-and-use-these-conversions-to-solve-realworld-problems

Real-World Preparation: The following questions will prepare students for some of the real-world components of this task:

- **What is a dairy farm?** A dairy farm is a farm where cows are raised to make milk and milk products, including cheese, ice cream, butter, and whipping cream.
- **What is a distributor?** A distributor is a person or company that distributes goods to various stores to be sold to consumers.

During the Task

- Students should be allowed to use the PARCC Assessment Reference Sheet[1] for Grade 5 to complete this task.

After the Task

For problem 1, students might find the number of gallons per cow or the number of gallons per day rather than the number of gallons per cow per day. Remind students that when they get one answer, that does not mean they are finished solving the problem. Have students read the problem closely and identify what the problem is asking them to find. Discuss with students what their next step should be to solve the problem.

[1] http://parcconline.org/sites/parcc/files/ApprovedPARCCReferenceSheet__081712.pdf

Student Extended Constructed Response

Lorenzo's class visits a dairy farm to learn about milk production. They learn that the 25 cows on the farm must be milked twice per day (every morning and evening). Together, the cows produce 1,050 gallons of milk per week.

1. How much milk does each cow produce in one day? Show your calculations, and be sure to include units.

2. The farm keeps 20 gallons of the milk produced each day to use on the farm and sells the rest of the milk to a distributor to be sold in stores. The farm packages 10 gallons of the milk it keeps into gallon containers. The remaining 10 gallons are divided so that 5 gallons will be divided among one-quart containers, and 5 gallons will be divided among one-pint containers.

    a. Find the number of one-quart containers needed each day. Show your calculations.

    b. Find the number of one-pint containers needed each day. Show your calculations.

    c. Explain how you would find the number of one-quart and one-pint containers needed each **week**.

Extended Constructed Response Exemplar Response

Lorenzo's class visits a dairy farm to learn about milk production. They learn that the 25 cows on the farm must be milked twice per day (every morning and evening). Together, the cows produce 1,050 gallons of milk per week.

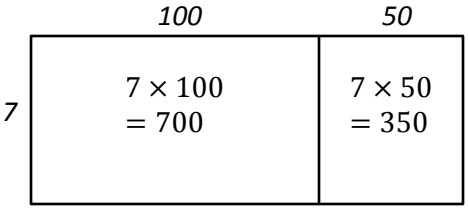
1. How much milk does each cow produce in one day? Show your calculations, and be sure to include units.

   $1050 \div 7 = ?$, so $7 \times ? = 1050$

   $7 \times 100 = 700$

   $7 \times 50 = 350$

   So, $7 \times 150 = 1050$.

   There are 150 gallons of milk produced each day.

   $150 \div 25 = ?$, so $25 \times ? = 150$

   $25 \times 4 = 100$

   $25 \times 2 = 50$

   So, $25 \times 6 = 150$. *This means each cow produces 6 gallons of milk each day.*

2. The farm keeps 20 gallons of the milk produced each day to use on the farm and sells the rest of the milk to a distributor to be sold in stores. The farm packages 10 gallons of the milk it keeps into gallon containers. The remaining 10 gallons are divided so that 5 gallons will be divided among one-quart containers, and 5 gallons will be divided among one-pint containers.

   a. Find the number of one-quart containers needed each day. Show your calculations.

      5 gallons x 4 quarts per gallon = 20 quarts

      20 one-quart containers will be needed.

   b. Find the number of one-pint containers needed each day. Show your calculations.

      1 quart = 2 pints and 4 quarts = 1 gallon, so 1 gallon = 4 quarts x 2 pints per quart = 8 pints

      5 gallons x 8 pints per gallon = 40 pints

      40 one-pint containers will be needed.

      ***Note: Students might also convert the five gallons to quarts first, then to pints. They may also recognize that they can use the answer from part a, and multiply by 2 to get the number of pints. Both alternate methods are acceptable.*

c. Explain how you would find the number of one-quart and one-pint containers needed each **week**.

To find the number of one-quart containers for the week, I would multiply the number of one-quart containers needed per day by 7 since there are seven days in the week. To find the number of one-pint containers needed for the week, I would multiply the number of one-pint containers needed for one day by 7 since there are seven days in the week.

The Tasty Deli (ECR)

Overview

Students will use the four operations with whole numbers and decimals to answer questions about the daily and weekly operations of a local sandwich shop.

Standards

Write and interpret numerical expressions.

5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 x (8 + 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*

Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.B.6 Find whole-number quotients with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Convert like measurement units within a given measurement system.

5.MD.A.1 Convert among different-size standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m) and use the conversions in solving multistep real-world problems.

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
5.OA.A.2	• K.OA • 1.OA • 2.OA • 3.OA.A.1 • 3.OA.A.2 • 4.OA.A.1 • 4.OA.A.2 • 5.OA.A.1	1. Write an expression to represent "multiply 9 by 4, then add it to the product of 16 and 3." a. $9 \times 4 + 16 \times 3$ 2. http://www.illustrativemathematics.org/illustrations/556 3. http://www.illustrativemathematics.org/illustrations/590	• http://www.illustrativemathematics.org/illustrations/555 • http://www.illustrativemathematics.org/illustrations/969 • http://www.illustrativemathematics.org/illustrations/1596 • http://www.illustrativemathematics.org/illustrations/263 • http://learnzillion.com/lessonsets/648-write-

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
			interpret-describe-and-reason-about-expressions • http://learnzillion.com/lessonsets/614-write-and-interpret-expressions
5.NBT.B.6	• 4.NBT.B.4 • 4.NBT.B.6 • 5.NBT.A.1 • 5.NBT.B.5	1. Divide $7590 \div 22$. a. 345 2. http://www.illustrativemathematics.org/illustrations/878	• http://www.illustrativemathematics.org/illustrations/1562 • http://www.illustrativemathematics.org/illustrations/1800 • http://www.illustrativemathematics.org/illustrations/1799 • http://www.illustrativemathematics.org/illustrations/1774 • http://learnzillion.com/lessonsets/211-find-whole-number-quotients-with-up-to-4digit-dividends-and-2digit-divisors
5.NBT.B.7	• 4.NBT.B.4 • 5.NBT.A.1 • 5.NF.A.1 • 5.NF.B.4	1. Multiply 2.63 x 0.5. a. 1.315 2. Multiply 10.76 x 0.1. a. 1.076 3. http://www.illustrativemathematics.org/illustrations/1293	• http://www.illustrativemathematics.org/illustrations/321 • http://www.illustrativemathematics.org/illustrations/965 • http://www.illustrativemathematics.org/illustrations/1563 • http://learnzillion.com/lessonsets/229-multiply-and-divide-by-decimals-to-the-hundredths • http://learnzillion.com/lessonsets/189-adding-and-subtracting-decimals-to-hundredths
5.MD.A.1	• 4.MD.A.1 • 4.MD.A.2	1. How many ounces are in 9.25 pounds? a. 148 2. http://www.illustrativemathematics.org/illustrations/293	• http://www.illustrativemathematics.org/illustrations/1508 • http://www.illustrativemathematics.org/illustrations/873 • http://learnzillion.com/lessonsets/697-convert-measurement-units-and-solve-real-world-problems • http://learnzillion.com/lessonsets/548-convert-among-differentsized-measurement-units-and-use-these-conversions-to-solve-realworld-problems

During the Task

- Allow the students to use the PARCC Assessment Reference Sheet[2] for Grade 5 with this task to aid them with the conversions.

After the Task

Students may forget about the decimal when multiplying in problem 1. Have students make use of structure to rewrite 6.5 as 6 + 0.5 and use the distributive property to multiply to help them find the correct answer. Students should recognize 0.5 as being one-half, which can help with the multiplication.

When dividing for problem 1b, students may use the standard algorithm, partial quotients (as shown in the exemplar response), or the properties of operations. Have students think about what multiplication facts they know that can help them divide the given numbers. Students need to keep track of the factors they use in order to get the correct quotient.

For problem 2, students might disregard the extra 8 sandwiches in error. Ask students to find how many sandwiches the shop will be able to send using the number of boxes they found. Then compare that number to the order. Students should realize they need at least one more box.

Students do not have to use parentheses for the expression in problem 3. If students do not use parentheses and do not follow the correct order of operations when evaluating the expression, have them identify the order in which they would perform the calculations. Discuss with students how they can write the expression so that everyone will perform the same operations in the same order.

For problem 4, struggling students should draw a model of the cost of the turkey and use that model to find one-tenth of the cost. Help students see that the value of each digit changes because it moves one place to the right in the number when multiplied by one-tenth.

[2] http://parcconline.org/sites/parcc/files/ApprovedPARCCReferenceSheet__081712.pdf

Student Extended Constructed Response

1. The Tasty Deli uses 6.5 pounds of ham each day.
    a. How many ounces of ham will be used in three weeks? Use equations or pictures to show how you found your answer.

    b. Each ham sandwich the deli sells uses 13 ounces of ham. How many sandwiches can the deli make in three weeks? Show your work or explain your reasoning.

2. The deli delivers sandwiches for parties. Employees can pack 14 sandwiches in one box. If the deli has an order for 120 sandwiches, what is the minimum number of boxes required to deliver the order? Explain your reasoning.

3. The deli manager pays $1.59 per pound for turkey and $1.75 per pound for beef. Write an expression that shows how to calculate the amount of money the deli manager will spend if he buys 9 pounds of beef and 15 pounds of turkey. Use the expression you wrote to find the total amount the manager will spend.

4. Bologna costs $\frac{1}{10}$ as much per pound as turkey. Find the amount the deli manager will pay for 100 pounds of bologna. Explain how you found your answer.

Extended Constructed Response Exemplar Response

1. The Tasty Deli uses 6.5 pounds of ham each day.
    a. How many ounces of ham will be used in three weeks? Use equations or pictures to show how you found your answer.

    6.5 x 16 = 16 x (6 + 0.5) = (16 x 6) + (16 x 0.5) = 96 + 8 = 104; the shop uses 104 ounces of ham per day.

    There are 7 days in a week, so 104 x 7 = 728, so the shop uses 728 ounces per week.

    Then 728 x 3 = 2,184, so the shop uses 2,184 ounces in three weeks.

    b. Each ham sandwich the deli sells uses 13 ounces of ham. How many sandwiches can the deli make in three weeks? Show your work or explain your reasoning.

    In order to find the number of sandwiches, I have to find $2184 \div 13$*. I know that 13 x 100 = 1300, and 2184 – 1300 = 884. Next, I know that 13 x 10 = 130 and 130 x 3 = 390, so 13 x 30 = 390. 884 – 390 = 494. Since 494 is greater than 390, I can subtract 390 again. 494 – 390 = 104. Because the ones digit is a 4, and I know 3 x 8 = 24, I multiply 13 x 8 to find that it is 104. So*

    13 x 100 = 1300

    13 x 30 = 390

    13 x 30 = 390

    13 x 8 = 104

    100 + 30 + 30 + 8 = 168. So $2184 \div 13 = 168$*. The shop can make 168 sandwiches in three weeks with the 2,184 ounces of ham.*

    ***Note: If students show correct work using an incorrect answer from part a, they should be awarded credit. Also, the method shown uses the relationship between multiplication and division, properties of operations (associative property), and understanding of place value. Students may use other methods, such as the standard algorithm; students are not required to master the standard algorithm for division until grade 6. Students may also use an area model to show their reasoning.*

2. The deli delivers sandwiches for parties. Employees can pack 14 sandwiches in one box. If the deli has an order for 120 sandwiches, what is the minimum number of boxes required to deliver the order? Explain your reasoning.

    The shop needs a minimum of 9 boxes to ship out the order. $120 \div 14 = 8$ *with a remainder of 8. So, 8 boxes can be packed with 14 sandwiches each while a ninth box will be needed to pack the remaining 8 sandwiches.*

3. The deli manager pays $1.59 per pound for turkey and $1.75 per pound for beef. Write an expression that shows how to calculate the amount of money the deli manager will spend if he buys 9 pounds of beef and 15 pounds of turkey. Use the expression you wrote to find the total amount the manager will spend.

   $1.59 x 15 + $1.75 x 9

   $23.85 + $15.75 = $39.60

   The manager will spend $39.60 to buy the 9 pounds of beef and 15 pounds of turkey.

4. Bologna costs $\frac{1}{10}$ as much per pound as turkey. Find the amount the deli manager will pay for 100 pounds of bologna. Explain how you found your answer.

   Turkey costs $1.59 per pound. I can change $\frac{1}{10}$ to 0.1, and I can multiply $1.59 x 0.1. When I multiply each digit by 0.1, it will move one place to the right, so $1.59 x 0.1 = 0.159. That means that bologna will cost $0.16 per pound. That is the same as $\frac{16}{100}$. If the manager buys 100 pounds of bologna, I can multiply $\frac{16}{100} \times 100$, which gives 16 as the answer. That means the manager will pay $16 for 100 pounds of bologna.

Milk and Cookies (ECR)

Overview

Students will add and subtract fractions to determine how much milk and flour are used in one day on Mike's dairy farm.

Standards

Use equivalent fractions as a strategy to add and subtract fractions.

5.NF.A.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12 (in general, a/b + c/d = (ad + bc)/bd.)*

5.NF.A.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result, 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are prerequisites for student success with this task's standards.

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
5.NF.A.1	• 4.NF.A.1 • 4.NF.B.3	1. Add $\frac{1}{2}+\frac{3}{5}+\frac{3}{4}$. a. $\frac{37}{20}$ or $1\frac{17}{20}$ 2. Subtract $2\frac{7}{15}-\frac{3}{5}$. State the answer as a mixed number. a. $1\frac{13}{15}$ 3. http://www.illustrativemathematics.org/illustrations/839 4. http://www.illustrativemathematics.org/illustrations/847 5. http://www.illustrativemathematics.org/illustrations/848 6. http://www.illustrativemathematics.org/illustrations/859	• http://www.illustrativemathematics.org/illustrations/743 • http://www.illustrativemathematics.org/illustrations/881 • http://www.illustrativemathematics.org/illustrations/831 • http://www.illustrativemathematics.org/illustrations/837 • http://www.illustrativemathematics.org/illustrations/968 • http://learnzillion.com/lessonsets/536-add-and-subtract-fractions-and-mixed-numbers-with-unlike-denominators-using-fraction-bars • http://learnzillion.com/lessonsets/383-add-and-subtract-fractions-and-mixed-numbers-with-unlike-denominators-using-area-models • http://learnzillion.com/lessonsets/216-add-and-subtract-fractions-with-unlike-denominators • http://learnzillion.com/lessonsets/63-add-and-subtract-mixed-numbers

Grade Level Standards	The Following Standards Will Prepare Them	Items to Check for Task Readiness	Sample Remediation Items
5.NF.A.2	• 4.NF.A.2	1. Otto walked $\frac{3}{8}$ mile more than Denis at the track today. Otto walked a total of $1\frac{1}{4}$ miles. How far did Denis walk? a. Denis walked $\frac{7}{8}$ mile. 2. http://www.illustrativemathematics.org/illustrations/481 3. http://www.illustrativemathematics.org/illustrations/1172	• http://www.illustrativemathematics.org/illustrations/812 • http://www.illustrativemathematics.org/illustrations/811 • http://www.illustrativemathematics.org/illustrations/183 • http://learnzillion.com/lessonsets/642-assess-the-reasonableness-of-answers-to-word-problems-involving-the-addition-and-subtraction-of-fractions • http://learnzillion.com/lessonsets/385-solve-word-problems-involving-the-addition-and-subtraction-of-fractions-with-unlike-denominators • http://learnzillion.com/lessonsets/223-solve-word-problems-involving-addition-and-subtraction-of-fractions-referring-to-the-same-whole-2 • http://learnzillion.com/lessonsets/219-solve-word-problems-involving-addition-and-subtraction-of-fractions-referring-to-the-same-whole-1 • http://learnzillion.com/lessonsets/64-add-and-subtract-fractions

Real-World Preparation: The following questions will prepare students for some of the real-world components of this task:

- **What is a dairy farm?** A dairy farm is a farm where cows are raised to make milk and milk products, including cheese, ice cream, butter, and whipping cream.

After the Task

For problem 1, students may have difficulty finding a common denominator for all three fractions. Remind students to apply the properties of operations and add two of the fractions first. Once they have added two of the fractions, students can add the result to the remaining fraction from the problem.

In problem 2, students who focus on translating key words into operations will likely use the incorrect operations for this portion of the task. Have students write equations with symbols or words for the unknown amounts. Once students find the values for the unknown amounts, ask them to read the problem again to determine if their answers are reasonable in the given context (e.g., the amount of flour used for the brownies is less than the amount used for the cake).

Problem 3 asks students to do two operations—addition, then subtraction. Some students may write an expression without parentheses and choose to work it out by adding first, then subtracting. Discuss with students the need to be precise when recording their work and in their calculations. Guide students to rewrite the expression using the parentheses or by using subtraction twice.

Student Extended Constructed Response

1. Mike collected milk from 3 of his cows at the dairy farm. From the first cow, he collected $\frac{4}{5}$ gallon of milk. The second cow produced $\frac{6}{8}$ gallon, and the last cow produced $\frac{3}{4}$ gallon.

    a. How many gallons of milk did Mike collect in all? Show how you found your answer. Write your answer as a mixed number.

    b. After using some of the milk he collected for baking, Mike found that he only had $\frac{5}{6}$ gallon of milk left. How much milk did he use for baking? Show how you found your answer.

2. Mike baked brownies, cookies, and cake for treats for the family and others working on the farm. He used $\frac{1}{8}$ pound less flour to make the cookies than he used to make the cake. He used $\frac{1}{4}$ pound more flour to make the cake than he used to make the brownies. If Mike used $\frac{1}{2}$ pound of flour to make the cake, how much flour did he use to make the brownies? How much flour did he use to make the cookies? Show how you found your answers.

3. With the remaining $\frac{5}{6}$ gallon of milk, Mike decided to make chocolate milk and strawberry milk for his children to have with their baked treats. He used $\frac{1}{3}$ gallon of milk for the chocolate milk and $\frac{1}{4}$ gallon of milk for the strawberry milk. How much regular milk was left? Show how you found your answer.

Extended Constructed Response Exemplar Response

1. Mike collected milk from 3 of his cows at the dairy farm. From the first cow, he collected $\frac{4}{5}$ gallon of milk. The second cow produced $\frac{6}{8}$ gallon, and the last cow produced $\frac{3}{4}$ gallon.

   a. How many gallons of milk did Mike collect in all? Show how you found your answer.

   $\frac{4}{5}+\frac{6}{8}+\frac{3}{4}=\frac{4}{5}+\left(\frac{6}{8}+\frac{6}{8}\right)=\frac{4}{5}+\frac{12}{8}=\frac{32}{40}+\frac{60}{40}=\frac{92}{40}=2\frac{12}{40}$

   Mike collected $2\frac{12}{40}$ *gallons of milk.*

   ***Note: Students may also provide* $2\frac{3}{10}$ *gallons as the answer. Other work is also acceptable.*

   b. After using some of the milk he collected for baking, Mike found that he only had $\frac{5}{6}$ gallon of milk left. How much milk did he use for baking? Show how you found your answer.

   $2\frac{3}{10}-\frac{5}{6}=2+\frac{3}{10}-\frac{5}{6}=\frac{3}{10}+\left(2-\frac{5}{6}\right)=\frac{3}{10}+1\frac{1}{6}=\frac{18}{60}+1\frac{10}{60}=1\frac{28}{60}$

   Mike used $1\frac{28}{60}$ *gallons for baking.*

   ***Note: Students may also give* $1\frac{7}{15}$ *gallons as the answer. Students who have correct work based on an incorrect answer in part a should also be given credit. There are other possible methods for arriving at this answer.*

2. Mike baked brownies, cookies, and cake for treats for the family and others working on the farm. He used $\frac{1}{8}$ pound less flour to make the cookies than he used to make the cake. He used $\frac{1}{4}$ pound more flour to make the cake than he used to make the brownies. If Mike used $\frac{1}{2}$ pound of flour to make the cake, how much flour did he use to make the brownies? How much flour did he use to make the cookies? Show how you found your answers.

   Cake = $\frac{1}{2}$ *pound of flour* *Cookies = Cake -* $\frac{1}{8}$ *Brownies = Cake -* $\frac{1}{4}$

   Cookies = $\frac{1}{2}-\frac{1}{8}=\frac{4}{8}-\frac{1}{8}=\frac{3}{8}$ *Mike used* $\frac{3}{8}$ *pound of flour to make the cookies.*

   Brownies = $\frac{1}{2}-\frac{1}{4}=\frac{2}{4}-\frac{1}{4}=\frac{1}{4}$ *Mike used* $\frac{1}{4}$ *pound of flour to make the brownies.*

3. With the remaining $\frac{5}{6}$ gallon of milk, Mike decided to make chocolate milk and strawberry milk for his children to have with their baked treats. He used $\frac{1}{3}$ gallon of milk for the chocolate milk and $\frac{1}{4}$ gallon of milk for the strawberry milk. How much regular milk was left? Show how you found your answer.

   $\frac{5}{6} - \left(\frac{1}{3} + \frac{1}{4}\right) = \frac{5}{6} - \left(\frac{4}{12} + \frac{3}{12}\right) = \frac{5}{6} - \left(\frac{7}{12}\right) = \frac{10}{12} - \frac{7}{12} = \frac{3}{12}$

   There is $\frac{3}{12}$ gallon of white milk left over.

   ***Note: Students may also give $\frac{1}{4}$ gallon for their answer. There are also other acceptable methods for the work.*