<u>FIFTH GRADE MATHEMATICS</u>
<u>UNIT 4 STANDARDS</u>

Dear Parents,

We want to make sure that you have an understanding of the mathematics your child will be learning this year. Below you will find the standards we will be learning in Unit Four. Each standard is in bold print and underlined and below it is an explanation with student examples. Your child is not learning math the way we did when we were in school, so hopefully this will assist you when you help your child at home Please let your child's teacher know if you have any questions. ☺

<u>MGSE5.NF.1 Add and subtract fractions and mixed numbers with unlike denominators by finding a common denominator and equivalent fractions to produce like denominators.</u>

This standard builds on the work in 4th grade where students add fractions with like denominators. In 5th grade, the example provided in the standard has students find a common denominator by finding the product of both denominators. For $^1/_3 + ^1/_6$, a common denominator is 18, which is the product of 3 and 6. This process should be introduced using visual fraction models (area models, number lines, etc.) to build understanding before moving into the standard algorithm.

Students should apply their understanding of equivalent fractions and their ability to rewrite fractions in an equivalent form to find common denominators. They should know that multiplying the denominators will always give a common denominator but may not result in the smallest denominator.

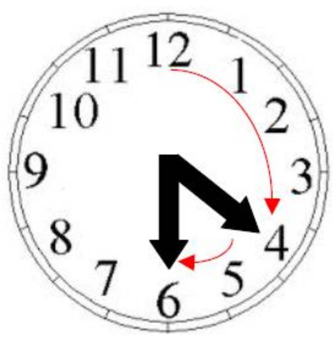
Examples:

$$\frac{2}{5}+\frac{7}{8}=\frac{16}{40}+\frac{35}{40}=\frac{51}{40}$$

$$3\frac{1}{4}-\frac{1}{6}=3\frac{3}{12}-\frac{2}{12}=3\frac{1}{12}$$

Example:

Present students with the problem $^1/_3 + ^1/_6$. Encourage students to use the clock face as a model for solving the problem. Have students share their approaches with the class and demonstrate their thinking using the clock model.



<u>MGSE5.NF.2 Solve word problems involving addition and subtraction of fractions, 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 + ½ = 3/7, by observing that 3/7 < ½.</u>

This standard refers to number sense, which means students' understanding of fractions as numbers that lie between whole numbers on a number line. Number sense in fractions also includes moving between decimals and fractions to find equivalents, also being able to use reasoning such as $^7/_8$ is greater than $^3/_4$ because $^7/_8$ is missing only $^1/_8$ and $^3/_4$ is missing ¼, so $^7/_8$ is closer to a whole Also, students should use benchmark fractions to estimate and examine the reasonableness of their answers. An example of using a benchmark fraction is illustrated with comparing $^5/_8$ and $^6/_{10}$. Students should recognize that $^5/_8$ is $^1/_8$ larger than $^1/_2$ (since $^1/_2 = ^4/_8$) and $^6/_{10}$ is $^1/_{10}$ $^1/_2$ (since $^1/_2 = ^5/_{10}$).

Example:

Your teacher gave you $^1/_7$ of the bag of candy. She also gave your friend $^1/_3$ of the bag of candy. If you and your friend combined your candy, what fraction of the bag would you have? Estimate your answer and then calculate. How reasonable was your estimate?

Student 1

$^1/_7$ is really close to 0. $^1/_3$ is larger than $^1/_7$ but still less than $^1/_2$. If we put them together we might get close to $^1/_2$.

$$^1/_7 + {}^1/_3 = {}^3/_{21} + {}^7/_{21} = {}^{10}/_{21}$$

The fraction $^{10}/_{21}$ does not simplify, but I know that 10 is half of 20, so $^{10}/_{21}$ is a little less than $^1/_2$.

Student 2

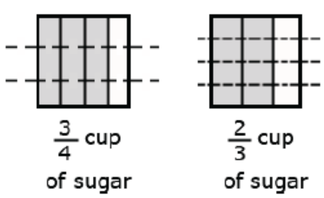
$^1/_7$ is close to $^1/_6$ but less than $^1/_6$. $^1/_3$ is equivalent to $^2/_6$. So $^1/_7 + {}^1/_3$ is a little less than $^3/_6$ or $^1/_2$.

Example:

Jerry was making two different types of cookies. One recipe needed $^3/_4$ cup of sugar and the other needed $^2/_3$ cup of sugar. How much sugar did he need to make both recipes?

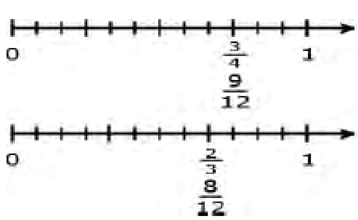
- **Mental estimation:** A student may say that Jerry needs more than 1 cup of sugar but less than 2 cups. An explanation may compare both fractions to $^1/_2$ and state that both are larger than $^1/_2$ so the total must be more than 1. In addition, both fractions are slightly less than 1 so the sum cannot be more than 2.

- **Area model**

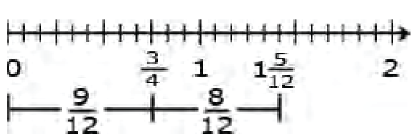


$\frac{3}{4} = \frac{9}{12}$ $\frac{2}{3} = \frac{8}{12}$ $\frac{3}{4} + \frac{2}{3} = \frac{17}{12} = \frac{12}{12} + \frac{5}{12} = 1\frac{5}{12}$

- **Linear model**

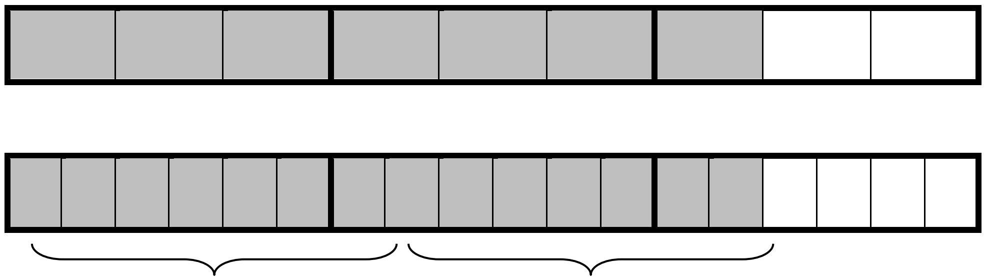


Solution:



Examples: ***Using a bar diagram***

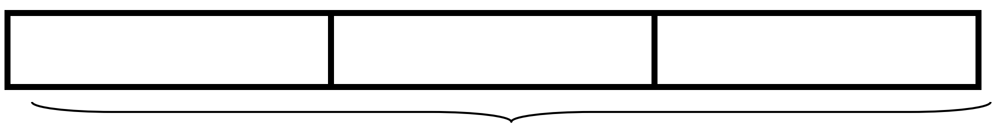
- Sonia had $2\frac{1}{3}$ candy bars. She promised her brother that she would give him $\frac{1}{2}$ of a candy bar. How much will she have left after she gives her brother the amount she promised?



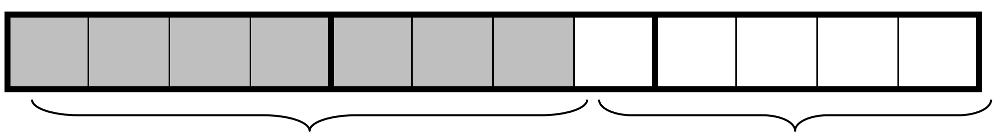
$\frac{7}{6}$ or $1\frac{1}{6}$ bars for her brother

$\frac{7}{6}$ or $1\frac{1}{6}$ bars for Sonia

- If Mary ran 3 miles every week for 4 weeks, she would reach her goal for the month. The first day of the first week she ran $1\frac{3}{4}$ miles. How many miles does she still need to run the first week?



Distance to run every week: 3 miles

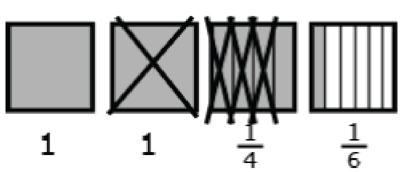


Distance run on 1st day of the first week

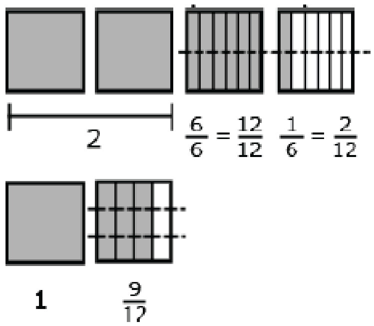
Distance remaining to run during 1st week: $1\frac{1}{4}$ miles

Example: ***Using an area model to subtract***

- This model shows $1\frac{3}{4}$ subtracted from $3\frac{1}{6}$ leaving $1 + \frac{1}{4} + \frac{1}{6}$ which a student can then change to $1 + \frac{3}{12} + \frac{2}{12} = 1\frac{5}{12}$.



- This diagram models a way to show how $3^1/_6$ and $1^3/_4$ can be expressed with a denominator of 12. Once this is accomplished, a student can complete the problem, $2^{14}/_{12} – 1^9/_{12} = 1^5/_{12}$.



Estimation skills include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate method of estimation, and verifying solutions or determining the reasonableness of situations using various estimation strategies. Estimation strategies for calculations with fractions extend from students' work with whole number operations and can be supported through the use of physical models.

Example:

Elli drank $^3/_5$ quart of milk and Javier drank $^1/_{10}$ of a quart less than Ellie. How much milk did they drink all together?

Solution:

$$\frac{3}{5} - \frac{1}{10} = \frac{6}{10} - \frac{1}{10} = \frac{5}{10}$$

$$\frac{3}{5} + \frac{5}{10} = \frac{6}{10} + \frac{5}{10} = \frac{11}{10}$$

This solution is reasonable because Ellie drank more than $^1/_2$ quart and Javier drank $^1/_2$ quart, so together they drank slightly more than one quart.

<u>MGSE5.NF.3 Interpret a fraction as division of the numerator by the denominator (*a/b = a ÷ b*). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *Example:* 35 *can be interpreted as "3 divided by 5 and as 3 shared by 5".*</u>

This standard calls for students to extend their work of partitioning a number line from third and fourth grade. Students need ample experiences to explore the concept that a fraction is a way to represent the division of two quantities. Students are expected to demonstrate their understanding using concrete materials, drawing models, and explaining their thinking when working with fractions in multiple contexts. They read 3/5 as "three fifths" and after many experiences with sharing problems, learn that 3/5 can also be interpreted as "3 divided by 5."

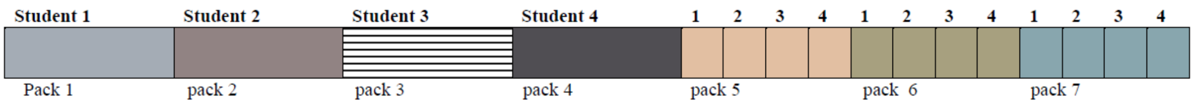
Examples:

1. Ten team members are sharing 3 boxes of cookies. How much of a box will each student get?
When working this problem a student should recognize that the 3 boxes are being divided into 10 groups, so s/he is seeing the solution to the following equation, $10 \times n = 3$ (10 groups of some amount is 3 boxes) which can also be written as $n = 3 \div 10$. Using models or diagram, they divide each box into 10 groups, resulting in each team member getting 3/10 of a box.

2. Two afterschool clubs are having pizza parties. For the Math Club, the teacher will order 3 pizzas for every 5 students. For the student council, the teacher will order 5 pizzas for every 8 students. Since you are in both groups, you need to decide which party to attend. How much pizza would you get at each party? If you want to have the most pizza, which party should you attend?

3. The six fifth grade classrooms have a total of 27 boxes of pencils. How many boxes will each classroom receive?
   Students may recognize this as a whole number division problem but should also express this equal sharing problem as $^{27}/_{6}$. They explain that each classroom gets $^{27}/_{6}$ boxes of pencils and can further determine that each classroom get $4^{3}/_{6}$ or $4^{1}/_{2}$ boxes of pencils.

4. Your teacher gives 7 packs of paper to your group of 4 students. If you share the paper equally, how much paper does each student get?



   Each student receives 1 whole pack of paper and $^{1}/_{4}$ of the each of the 3 packs of paper. So, each student gets $1^{3}/_{4}$ packs of paper.

<u>MGSE5.NF.4</u> Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Apply and use understanding of multiplication to multiply a fraction or whole number by a fraction.

Examples: $ab \times q$ **as** $ab \times q1$ **and** $ab \times cd = aabb$

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths.

Students need to develop a fundamental understanding that the multiplication of a fraction by a whole number could be represented as repeated addition of a unit fraction (e.g., $2 \times (^{1}/_{4}) = {}^{1}/_{4} + {}^{1}/_{4}$.

This standard extends student's work of multiplication from earlier grades. In 4th grade, students worked with recognizing that a fraction such as $^{3}/_{5}$ actually could be represented as 3 pieces that are each one-fifth ($3 \times {}^{1}/_{5}$). This standard references both the multiplication of a fraction by a whole number and the multiplication of two fractions.

Visual fraction models (area models, tape diagrams, number lines) should be used and created by students during their work with this standard.

As they multiply fractions such as $^{3}/_{5} \times 6$, they can think of the operation in more than one way.
$3 \times (6 \div 5)$ or $(3 \times {}^{6}/_{5})$
$(3 \times 6) \div 5$ or $18 \div 5$ (18/5)

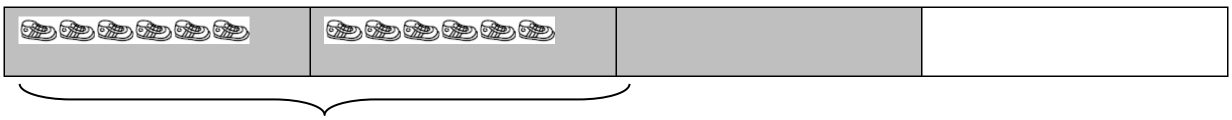
Students create a story problem for $^{3}/_{5} \times 6$ such as:
Isabel had 6 feet of wrapping paper. She used $^{3}/_{5}$ of the paper to wrap some presents. How much does she have left?
Every day Tim ran $^{3}/_{5}$ of mile. How far did he run after 6 days? (Interpreting this as $6 \times {}^{3}/_{5}$)

Example:

Three-fourths of the class is boys. Two-thirds of the boys are wearing tennis shoes. What fraction of the class are boys wearing tennis shoes?

This question is asking what is $^{2}/_{3}$ of $^{3}/_{4}$ what is $^{2}/_{3} \times$ ¾? In this case you have $^{2}/_{3}$ groups of size $^{3}/_{4}$. (A way to think about it in terms of the language for whole numbers is by using an example such as 4×5, which means you have 4 groups of size 5.)

Boys



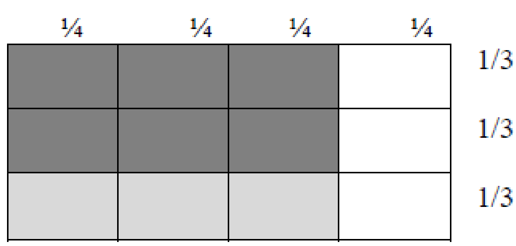
Boys wearing tennis shoes = ½ the class

Additional student solutions are shown on the next page.

Student 1

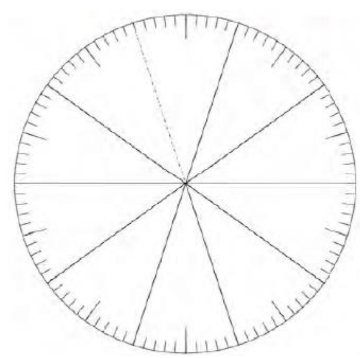
I drew rectangle to represent the whole class. The four columns represent the fourths of a class. I shaded 3 columns to represent the fraction that are boys. I then split the rectangle with horizontal lines into thirds.

The dark area represents the fraction of the boys in the class wearing tennis shoes, which is 6 out of 12. That is $^{6}/_{12}$, which equals $^{1}/_{2}$.

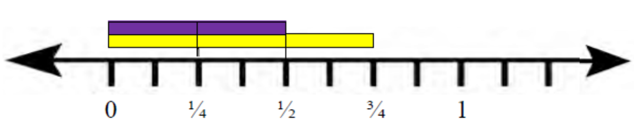


Student 2

I used a fraction circle to model how I solved the problem. First, I will shade the fraction circle to show the $^{3}/_{4}$ and then overlay with $^{2}/_{3}$ of that.



Student 3

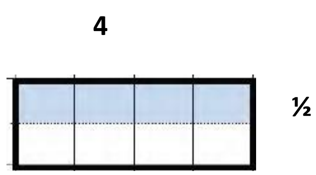


b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

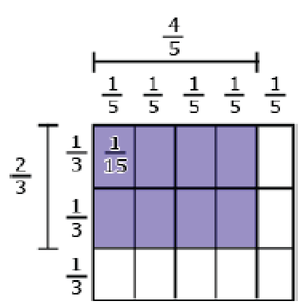
This standard extends students' work with area. In third grade students determine the area of rectangles and composite rectangles. In fourth grade students continue this work. The fifth grade standard calls students to continue the process of covering (with tiles). Grids (see picture) below can be used to support this work.

Example:
The home builder needs to cover a small storage room floor with carpet. The storage room is 4 meters long and half of a meter wide. How much carpet do you need to cover the floor of the storage room? Use a grid to show your work and explain your answer.

Student
In the grid below I shaded the top half of 4 boxes. When I added them together, I added ½ four times, which equals 2. I could also think about this with multiplication $\frac{1}{2} \times 4$ is equal to $^{4}/_{2}$ which is equal to 2.



Example:
In solving the problem $^{2}/_{3} \times {}^{4}/_{5}$, students use an area model to visualize it as a 2 by 4 array of small rectangles each of which has side lengths $^{1}/_{3}$ and $^{1}/_{5}$. They reason that $^{1}/_{3} \times {}^{1}/_{5} = {}^{1}/_{(3 \times 5)}$ by counting squares in the entire rectangle, so the area of the shaded area is $(2 \times 4) \times {}^{1}/_{(3 \times 5)} = {}^{(2 \times 5)}/_{(3 \times 5)}$. They can explain that the product is less than $^{4}/_{5}$ because they are finding $^{2}/_{3}$ of $^{4}/_{5}$. They can further estimate that the answer must be between $^{2}/_{5}$ and $^{4}/_{5}$ because of is more than $^{1}/_{2}$ of $^{4}/_{5}$ and less than one group of $^{4}/_{5}$.



The area model and the line segments show that the area is the same quantity as the product of the side lengths.

MGSE5.NF.5 Interpret multiplication as scaling (resizing), by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. ***Example: 4 x 10 is twice as large as 2 x 10.***

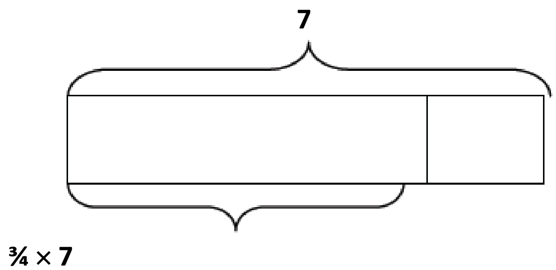
b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

This standard calls for students to examine the magnitude of products in terms of the relationship between two types of problems.

Example 1:
Mrs. Jones teaches in a room that is 60 feet wide and 40 feet long. Mr. Thomas teaches in a room that is half as wide, but has the same length. How do the dimensions and area of Mr. Thomas' classroom compare to Mrs. Jones' room? Draw a picture to prove your answer.

Example 2:
How does the product of 225 × 60 compare to the product of 225 × 30? How do you know? Since 30 is half of 60, the product of 225 × 60 will be double or twice as large as the product of 225 × 30.

Example:
¾ is less than 7 because 7 is multiplied by a factor less than 1 so the product must be less than 7.



a. **<u>Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence *a*/*b* = (*n* × *a*)/(*n* × *b*) to the effect of multiplying *a*/*b* by 1</u>**

This standard asks students to examine how numbers change when we multiply by fractions. Students should have ample opportunities to examine both cases in the standard:

a) when multiplying by a fraction greater than 1, the number increases and
b) when multiplying by a fraction less the one, the number decreases. This standard should be explored and discussed while students are working with MGSE5.NF.4, and should not be taught in isolation.

Example:
Mrs. Bennett is planting two flower beds. The first flower bed is 5 meters long and 6/5 meters wide. The second flower bed is 5 meters long and $^{5}/_{6}$ meters wide. How do the areas of these two flower beds compare? Is the value of the area larger or smaller than 5 square meters? Draw pictures to prove your answer.
Example:
$2^{2}/_{3}$ × 8 must be more than 8 because 2 groups of 8 is 16 and $2^{2}/_{3}$ is almost 3 groups of 8. So the answer must be close to, but less than 24.
$^{3}/_{4} = {}^{(5 \times 3)}/_{(5 \times 4)}$ because multiplying $^{3}/_{4}$ by $^{5}/_{5}$ is the same as multiplying by 1

<u>MGSE5.NF.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.</u>

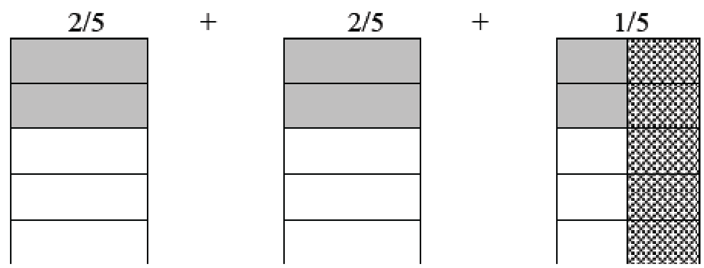
This standard builds on all of the work done in this cluster. Students should be given ample opportunities to use various strategies to solve word problems involving the multiplication of a fraction by a mixed number. This standard could include fraction by a fraction, fraction by a mixed number or mixed number by a mixed number.

Example:
There are $2^{1}/_{2}$ bus loads of students standing in the parking lot. The students are getting ready to go on a field trip. $^{2}/_{5}$ of the students on each bus are girls. How many busses would it take to carry ***only*** the girls?

Student 1

I drew 3 grids and 1 grid represents 1 bus. I cut the third grid in half and I marked out the right half of the third grid, leaving $2\,^1/_2$ grids. I then cut each grid into fifths, and shaded two-fifths of each grid to represent the number of girls.

When I added up the shaded pieces, $^2/_5$ of the 1^{st} and 2^{nd} bus were both shaded, and $^1/_5$ of the last bus was shaded.



= 5/5 = 1

It would take 1

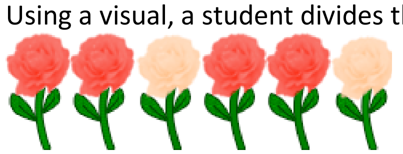
Student 2

$2\,^1/_2 \times {}^2/_5 = ?$

I split the $2\,^1/_2$ 2 and $^1/_2$. $2\,^1/_2 \times {}^2/_5 = {}^4/_5$, and $^1/_2 \times {}^2/_5 = {}^2/_{10}$. Then I added $^4/_5$ and $^2/_{10}$. Because $^2/_{10} = {}^1/_5$, $^4/_5 + {}^2/_{10} = {}^4/_5 + {}^1/_5 = 1$. So there is 1 whole bus load of just girls.

Example:

Evan bought 6 roses for his mother. $^2/_3$ of them were red. How many red roses were there?
Using a visual, a student divides the 6 roses into 3 groups and counts how many are in 2 of the 3 groups.

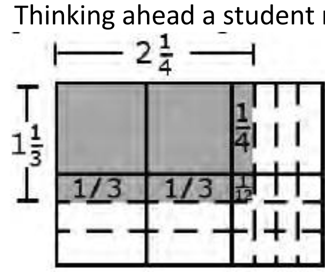


A student can use an equation to solve: $^2/_3 \times 6 = {}^{12}/_3 = 4$. There were 4 red roses.

Example:

Mary and Joe determined that the dimensions of their school flag needed to be $1\,^1/_3$ ft. by $2\,^1/_4$ ft. What will be the area of the school flag?

A student can draw an array to find this product and can also use his or her understanding of decomposing numbers to explain the multiplication. Thinking ahead a student may decide to multiply by $1\,^1/_3$ instead of $2\,^1/_4$.



The explanation may include the following:

- First, I am going to multiply $2\,^1/_4$ by 1 and then by $^1/_3$.
- When I multiply $2\,^1/_4$ by 1, it equals $2\,^1/_4$.
- Now I have to multiply $2\,^1/_4$ by $^1/_3$.
- $^1/_3$ times 2 is $^2/_3$.

- $^{1}/_{3}$ times $^{1}/_{4}$ is $^{1}/_{12}$.

So, the answer is $2^{1}/_{4} + ^{2}/_{3} + ^{1}/_{12}$ or $2^{3}/_{12} + ^{8}/_{12} + ^{1}/_{12} = 2^{12}/_{12} = 3$

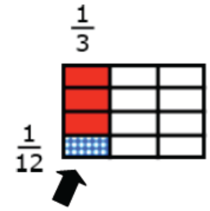
<u>MGSE5.NF.7 Apply and extend previous understandings of division to divide unit fractions, by whole numbers and whole numbers by unit fractions</u>

When students begin to work on this standard, it is the first time they are dividing with fractions. In 4th grade students divided whole numbers, and multiplied a whole number by a fraction. The concept *unit fraction* is a fraction that has a one in the denominator. For example, the fraction $^{3}/_{5}$ is 3 copies of the unit fraction $^{1}/_{5}$. $^{1}/_{5} + ^{1}/_{5} + ^{1}/_{5} = ^{3}/_{5} = ^{1}/_{5} \times 3$ or $3 \times ^{1}/_{5}$.

Example:

Knowing the number of groups/shares and finding how many/much in each group/share Four students sitting at a table were given $^{1}/_{3}$ of a pan of brownies to share. How much of a pan will each student get if they share the pan of brownies equally?

The diagram shows the $^{1}/_{3}$ pan divided into 4 equal shares with each share equaling $^{1}/_{12}$ of the pan.



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

This standard asks students to work with story contexts where a unit fraction is divided by a non-zero whole number. Students should use various fraction models and reasoning about fractions.

Example:

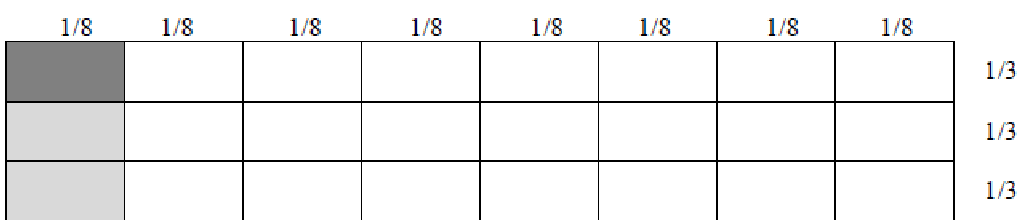
You have $^{1}/_{8}$ of a bag of pens and you need to share them among 3 people. How much of the bag does each person get?

Student 1

I know I need to find the value of the expression $^{1}/_{8} \div 3$, and I want to use a number line.

Student 2

I drew a rectangle and divided it into 8 columns to represent my $^{1}/_{8}$. I shaded the first column. I then needed to divide the shaded region into 3 parts to represent sharing among 3 people. I shaded one-third of the first column even darker. The dark shade is $^{1}/_{24}$ of the grid or $^{1}/_{24}$ of the bag of pens.



Student 3

$^1/_8$ of a bag of pens divided by 3 people. I know that my answer will be less than $^1/_8$ since I'm sharing $^1/_8$ into 3 groups. I multiplied 8 by 3 and got 24, so my answer is $^1/_{24}$ of the bag of pens. I know that my answer is correct because $(^1/_{24}) \times 3 = {}^3/_{24}$ which equals $^1/_8$.

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

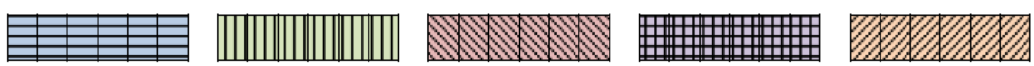
This standard calls for students to create story contexts and visual fraction models for division situations where a whole number is being divided by a unit fraction.

Example:
Create a story context for $5 \div {}^1/_6$. Find your answer and then draw a picture to prove your answer and use multiplication to reason about whether your answer makes sense. How many $^1/_6$ are there in 5?

Student

The bowl holds 5 Liters of water. If we use a scoop that holds $^1/_6$ of a Liter, how many scoops will we need in order to fill the entire bowl?

I created 5 boxes. Each box represents 1 Liter of water. I then divided each box into sixths to represent the size of the scoop. My answer is the number of small boxes, which is 30. That makes sense since $6 \times 5 = 30$.



$1 = {}^1/_6 + {}^1/_6 + {}^1/_6 + {}^1/_6 + {}^1/_6$ a whole has $^6/_6$ so five wholes would be $^6/_6 + {}^6/_6 + {}^6/_6 + {}^6/_6 + {}^6/_6 = {}^{30}/_6$.

c. **<u>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 ½ lb of chocolate equally? How many 1/3-cup servings are 2 cups of raisins*</u>**

Students should continue to use visual fraction models and reasoning to solve these real-world problems.

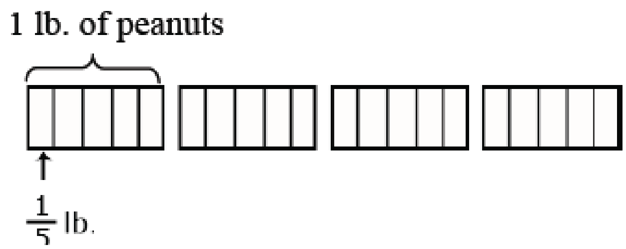
Example:
How many $^1/_3$-cup servings are in 2 cups of raisins?

Student
I know that there are three $^1/_3$ cup servings in 1 cup of raisins. Therefore, there are 6 servings in 2 cups of raisins. I can also show this since 2 divided by $^1/_3 = 2 \times 3 = 6$ servings of raisins.

Examples:
Knowing how many in each group/share and finding how many groups/shares

Angelo has 4 lbs of peanuts. He wants to give each of his friends $^1/_5$ lb. How many friends can receive $^1/_5$ lb of peanuts?

A diagram for $4 \div {}^1/_5$ is shown below. Students explain that since there are five fifths in one whole, there must be 20 fifths in 4 lbs.



1. How much rice will each person get if 3 people share $^1/_2$ lb of rice equally?

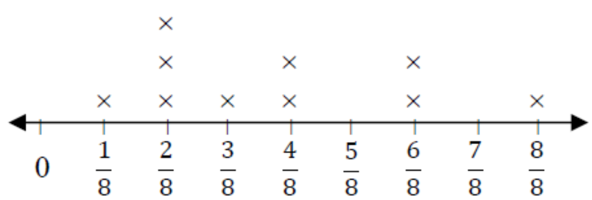
- $^1/_2 \div 3 = {^3/_6} \div 3 = {^1/_6}$
- A student may think or draw $^1/_2$ and cut it into 3 equal groups then determine that each of those part is $^1/_6$.
- A student may think of $^1/_2$ as equivalent to $^3/_6$. $^3/_6$ divided by 3 is $^1/_6$.

<u>MGSE5. MD.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were*</u>

This standard provides a context for students to work with fractions by measuring objects to one-eighth of a unit. This includes length, mass, and liquid volume. Students are making a line plot of this data and then adding and subtracting fractions based on data in the line plot.

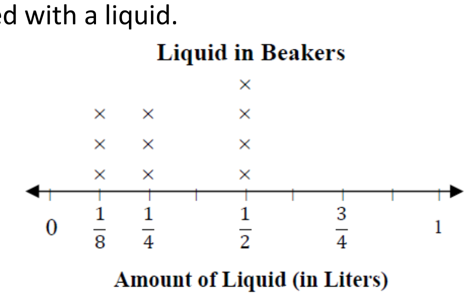
Example:

Students measured objects in their desk to the nearest ½, ¼, or 1/8 of an inch then displayed data collected on a line plot. How many objects measured $^1/_4$? $^1/_2$? If you put all the objects together end to end what would be the total length of **all** the objects?



Example:

Ten beakers, measured in liters, are filled with a liquid.



The line plot above shows the amount of liquid in liters in 10 beakers. If the liquid is redistributed equally, how much liquid would each beaker have? (This amount is the mean.)

Students apply their understanding of operations with fractions. They use either addition and/or multiplication to determine the total number of liters in the beakers. Then the sum of the liters is shared evenly among the ten beakers.