Math Grade 5: Unit 4
Add, Subtract, Multiply & Divide Fractions

ATLANTA PUBLIC SCHOOLS — Making A Difference

Parent Guide

"I Can" Help My Student!

- Use equivalent fractions as a strategy to add and subtract fractions and mixed numbers. (5.NF.1)
- Solve word problems by adding and subtracting fractions and mixed numbers and represent my work by using visual models and/or equations. Estimate the reasonableness of my results by using number sense about benchmark fractions. (5.NF.2)
- Explain multiplying a fraction by a whole number and a fraction by a fraction using what I know about multiplication as "how many times greater" and representing my work in an area model. Solve word problems by multiplying fractions. (5.NF.4-6)
- Explain division of whole numbers by unit fractions $(\frac{1}{b})$ and unit fractions by whole numbers by using real-world division word problems, visual fraction models, and equations. (5.NF.7)

Words to Know

benchmark fraction: A common fraction, such as $\frac{1}{2}$, that can be used to estimate fractions. For example, because $\frac{5}{8}$ is greater than $\frac{1}{2}$, then $\frac{5}{8}$ doubled must be greater than 1.

common denominator: Two denominators that are the same unit or size. $\frac{1}{4}$ and $\frac{3}{4}$ have a common denominator of 4.

equivalent fractions: Two fractions that can be scaled down or up so many times to be the same size. $\frac{3}{4}$ and $\frac{6}{8}$ are equivalent.

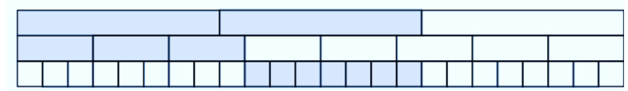
improper fraction: A fraction the numerator is greater than the denominator, making the entire fraction greater than 1. $\frac{11}{4}$ is an improper fraction. The **mixed number** name for $\frac{11}{4}$ is $2\frac{3}{4}$.

unit fraction: A fraction with a numerator of 1. $\frac{1}{4}$ is a unit fraction.

Big Ideas

Knowing "about how big" a fraction is, can help me to estimate answers to fraction problems. For example, if I know that a fraction is close to a benchmark fraction such as $\frac{1}{2}$, then I can use what I know about operating with $\frac{1}{2}$ to judge if my solution is reasonable.
$\frac{5}{8}$ is a little more than $\frac{1}{2}$ and $\frac{7}{10}$ is a little more than $\frac{1}{2}$. $\frac{1}{2} + \frac{1}{2} = 1$, so $\frac{5}{8} + \frac{7}{10}$ must be a little more than 1.

To add and subtract fractions, the size of the denominators must be the same, or common. For the example to the right, I cannot subtract eighths from thirds until I make the denominators the same size (common). The picture to the right shows and proves that $\frac{2}{3} - \frac{3}{8} = \frac{7}{24}$.



The first row is $\frac{2}{3}$ and the second row is $\frac{3}{8}$. Both thirds and eighths can be renamed to twenty-fourths. $\frac{2}{3} = \frac{16}{24}$ and $\frac{3}{8} = \frac{9}{24}$ which is shown in the third row. The difference in these amounts is $\frac{7}{24}$.

I can add and subtract fractions using any common denominator, not just the least common denominator. The solution may have many equivalent names, including simplest form, improper fraction, and mixed number.

Going back to the first estimation concept above, $\frac{5}{8} + \frac{7}{10}$ should be a little more than 1.

$$\frac{(\mathbf{5} \times 10) + (\mathbf{7} \times 8)}{\mathbf{8} \times \mathbf{10}} = \frac{50 + 56}{80} = \frac{106}{80} = \frac{53}{40} = 1\frac{13}{40}$$

Multiplication "scales" a quantity a certain number of times. Depending on the scale, the product is that many times greater or smaller.

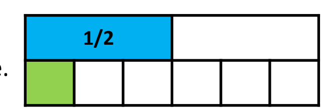
- When the number of times a quantity is scaled is greater than one, then the product will be greater than the original quantity.
- When the number of times a quantity is scaled is between 0 and 1, then the product will be less than the original quantity.

Marcus has $\frac{3}{4}$ of a pack of gum. Mary has 3 times as much. How much gum does Mary have?

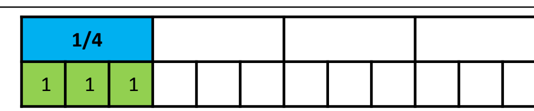
$= \frac{9}{4}$

$\frac{3}{4} \times 3 = \frac{9}{4}$ Mary has $\frac{9}{4}$ or $2\frac{1}{4}$ packs of gum.

$\frac{1}{3}$ of $\frac{1}{2}$ is $\frac{1}{6}$ of the whole.



Division is finding the number of groups or the size of the group. If there is $\frac{1}{4}$ of a cake left and 3 children to share it, how much of the whole cake will each child get? (Size of each piece?)



Each child will get $\frac{1}{12}$ of the cake. $\frac{1}{4} \div 3 = \frac{1}{12}$

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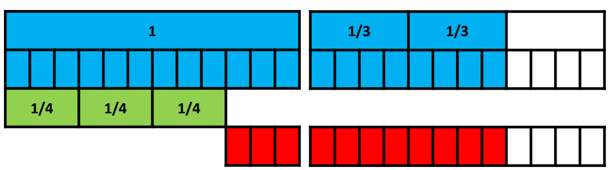
Sample Problems

1. There is one quart of chocolate milk in the refrigerator. Michael drinks 1/2 of the quart. Nancy drinks 1/3 of the quart. How much chocolate milk did Michael and Nancy drink altogether? How much of the original quart is left?

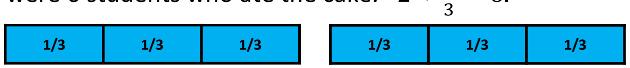
   SOLUTION: Altogether Michael and Nancy drank 5/6 of the quart. There is 1/6 of the quart left. Below is the picture of this problem.
   ½ = 3/6 and 1/3 = 2/6.
   3/6 + 2/6 = 5/6

2. Claire took $1\frac{2}{3}$ hours to read a book. Her brother, Dan, took $\frac{3}{4}$ hours less to read his book. How much more time did Claire spend reading than Dan? Extension Question: How much time did they spend altogether reading their books? (Following is just one way to solve the problem.)

   SOLUTION: As shown in the picture below, Claire read $\frac{12}{12}+\frac{8}{12}$ or $\frac{20}{12}$ hours and Dan read $\frac{3}{4}$ hours or $\frac{9}{12}$ hours less. $\frac{20}{12}-\frac{9}{12}=\frac{11}{12}$ so Dan read $\frac{11}{12}$ hours as shown in the last row. That means that Claire read $\frac{9}{12}$ or $\frac{3}{4}$ hours more than Dan. $\frac{20}{12}+\frac{11}{12}=\frac{31}{12}=2\frac{7}{12}$. So altogether, Claire and Dan read $2\frac{7}{12}$ hours.



3. If there were 2 cakes eaten and each student ate exactly $\frac{1}{3}$ of a cake, how many students were there?
   SOLUTION: The picture below shows that there are 6 groups of $\frac{1}{3}$ in 2 cakes. There were 6 students who ate the cake. $2 \div \frac{1}{3} = 6$.



4. You can find more problems and solutions related to this unit at http://www.illustrativemathematics.org/5.NF

How Can You Help Your Student?

- The ***???*** *Stack-N-Pack* game is available for checkout from your school's Parent Center. There are Stack-N-Pack books for math concepts from Kindergarten through High School. Here is the link for all the books: Stack-N-Pack Mathematics Games for K-HS
- Visit this GA DOE site for the student editions of all the elementary frameworks. For this framework, expand the Grade 5 link on the right side of the page and click Unit 4 Frameworks. https://www.georgiastandards.org/Common-Core/Pages/Math-K-5.aspx
- As you are cooking, find opportunities to discuss the fractions in your measurements. For example, discuss the relationships between ¼ of a cup and ½ of a cup, such as it would take two ¼ cups to make a ½ cup so 2 x ¼ = ½.
- Find opportunities to discuss fractions in every day situations. For example, there may be 10 windows in your house. What fraction of the windows are in your living room? What fraction of the windows in your house are in any 2 of the rooms altogether?
- To find the area of a room to carpet, we multiple the length and width in squares. What if the length and width are fraction measures? How do we show the area then? The following site is excellent for showing the visual representations for why fraction rules and operations work. http://www.visualfractions.com/