



MATH NEWS

Grade 5 | Module 4 | Topic E | Multiplication of a Fraction by a Fraction

Welcome

This document is created to give parents and students a better understanding of the math concepts found in the Eureka Math (© 2013 Common Core, Inc.) that is also posted in the [Engage New York](#) material taught in the classroom. Grade 5 Module 4 of Eureka Math ([Engage New York](#)) covers Multiplication and Division of Fractions and Decimal Fractions. This newsletter will address multiplication of a fraction by a fraction - both in fraction and decimal form.

Objectives

- Multiply unit fraction by unit fractions
- Multiply unit fractions by non-unit fractions
- Multiply non-unit fractions by non-unit fractions
- Solve word problems using tape diagrams and fractions-by-fraction multiplications
- Relate decimal and fraction multiplication
- Convert measures involving whole numbers, and solve multi-step word problems
- Convert mixed unit

Important Information

Words to Know

- multiply
- product
- quotient
- tape diagram
- area model
- convert
- unit fraction
- decimal fraction
- unit
- whole unit

Things to Remember

Unit: One segment of a portioned tape diagram

Unit Fraction: A fraction where the top number (the numerator) is 1. Example: $\frac{1}{100}, \frac{1}{21}, \frac{1}{5}$

Whole Unit: Any unit that is portioned into smaller, equally sized fractional units

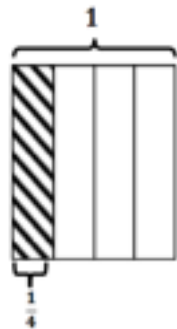
Decimal Fraction: A decimal fraction is a fraction where the denominator (the bottom number) is a power of ten (such as tenths, hundredths, thousandths, etc.)

Example: $\frac{43}{100}$ is a decimal fraction and it can be written as 0.43.

Example

Directions: Solve. Draw a model to explain your thinking. Joseph has $\frac{1}{4}$ of a pound of strawberries. He gave his teacher $\frac{1}{5}$ of the strawberries. What fraction of the strawberries did Joseph give to his teacher?

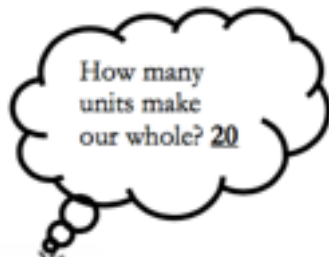
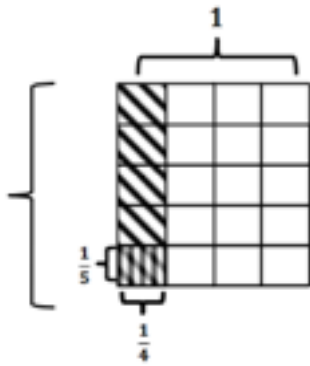
Think: We need to find $\frac{1}{5}$ of $\frac{1}{4}$ strawberries



Step 1: Draw a rectangle and cut it vertically into 4 equal parts. Shade 1 part and label it $\frac{1}{4}$.

Example Continued

Step 2: We need to find $\frac{1}{5}$ of $\frac{1}{4}$. Split the whole rectangle into 5 equal parts by drawing horizontal lines. Now, shade 1 of the 5 parts (that are already shaded) and label it $\frac{1}{5}$.



What's the name of these units? *Twentieths*

$$\frac{1}{5} \text{ of } \frac{1}{4} = \frac{1}{20} \rightarrow \frac{1}{5} \times \frac{1}{4} = \frac{1}{20}$$

Joseph gave his teacher $\frac{1}{20}$ of the strawberries.

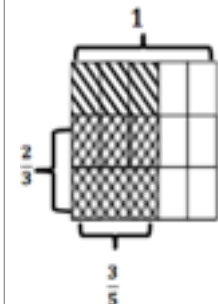
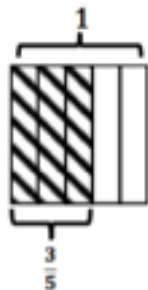
Application Problems

Directions: Solve. Draw a model to explain your thinking.

Of the students on Nia's track team, $\frac{3}{5}$ participate in running events. Of the students who participate in running events, $\frac{2}{3}$ are in the relay race. What fraction of the students on the track team ran in the relay race?

Think: We need to find $\frac{2}{3}$ of $\frac{3}{5}$.

Step 1: Draw a rectangle and cut it vertically into 5 equal parts. Shade 3 parts and label it $\frac{3}{5}$.

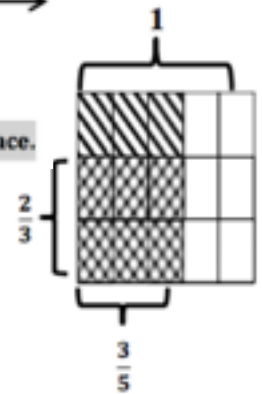


Step 2: Split the rectangle into 3 equal parts by drawing horizontal lines. Now shade 2 of the 3 parts (that are already shaded) and label it $\frac{2}{3}$.

How many units make our whole? 15
What's the name of these units? *Fifteenths*

$$\frac{2}{3} \text{ of } \frac{3}{5} = \frac{6}{15} \rightarrow \frac{2}{3} \times \frac{3}{5} = \frac{6}{15}$$

$\frac{6}{15}$ or $\frac{2}{5}$ of the students ran on the relay race.



Method 1: Students will eventually see a pattern and multiply numerator times numerator and denominator times denominator.

$$\frac{2}{5} \times \frac{10}{12} = \frac{2 \times 10}{5 \times 12} = \frac{20}{60} = \frac{1}{3}$$

Method 2: Students divide by common factors prior to multiplying.

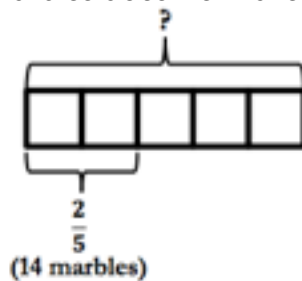
$$\frac{2}{5} \times \frac{10}{12} = \frac{\overset{1}{\cancel{2}} \times \overset{2}{\cancel{10}}}{\underset{1}{\cancel{5}} \times \underset{6}{\cancel{12}}} = \frac{2}{6} = \frac{1}{3}$$

A common factor of 2 and 12 is 2.

A common factor of 10 and 5 is 5.

Solve Word Problems Using a Tape Diagram

Dell has 14 blue marbles. His blue marbles make up $\frac{2}{5}$ of his total number of marbles. How many marbles does Dell have?



$$\begin{aligned} 2 \text{ units} &= 14 \\ 1 \text{ unit} &= 14 \div 2 \\ &= 7 \\ 5 \text{ units} &= 5 \times 7 = 35 \end{aligned}$$

Dell has 35 marbles.

Relate Decimal and Fraction Multiplication

Example A:

$$\begin{aligned} 0.5 \times 0.3 &\rightarrow 5 \text{ tenths} \\ &= \frac{5}{10} \times \frac{3}{10} && \times 3 \text{ tenths} \\ &= \frac{5 \times 3}{10 \times 10} && 15 \text{ hundredths} = 0.15 \\ &= \frac{15}{100} \\ &= 0.15 \end{aligned}$$

Example B:

$$2.38 \times 1.8 \xrightarrow{\text{or}} 238 \text{ hundredths}$$

$$= \frac{238}{100} \times \frac{18}{10}$$

$$= \frac{238 \times 18}{100 \times 10}$$

$$= \frac{4284}{1000}$$

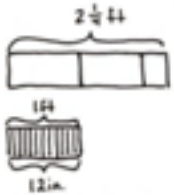
$$= 4.284$$

$$\begin{array}{r} 38 \\ \times 18 \\ \hline 1904 \\ +2380 \\ \hline 4284 \end{array}$$

4 2 8 4 thousandths = 4.284

Convert Mixed Unit Measurements

$2\frac{1}{4} \text{ ft} = \underline{\hspace{2cm}} \text{ in}$



$$2\frac{1}{4} \text{ ft} = \underline{\hspace{2cm}} \text{ in}$$

$$2\frac{1}{4} \text{ ft} = 2\frac{1}{4} \times 1 \text{ ft}$$

$$= 2\frac{1}{4} \times 12 \text{ in}$$

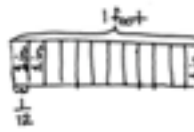
$$= \frac{9}{4} \times 12 \text{ in}$$

$$= \frac{9 \times 12}{4} \text{ in}$$

$$= 27 \text{ in}$$

We rename
1 foot as
12 inches.

$9 \text{ inches} = \underline{\hspace{2cm}} \text{ ft}$



The tape diagram shows 1 foot divided into twelve equal parts. Each section represents $\frac{1}{12}$ inch; therefore 1 inch is $\frac{1}{12}$ of a foot.

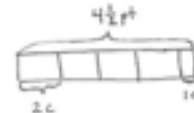
$$9 \text{ inches} = 9 \times 1 \text{ inch}$$

$$= 9 \times \frac{1}{12} \text{ foot}$$

$$= \frac{9}{12} \text{ ft or } \frac{3}{4} \text{ ft}$$

We rename
1 inch as
 $\frac{1}{12}$ of a foot.

Problem: A container can hold $4\frac{1}{2}$ pints of water. How many cups can 2 containers hold? (1 pint = 2 cups)



$$4\frac{1}{2} \text{ pt} = 4\frac{1}{2} \times 1 \text{ pt}$$

$$= 4\frac{1}{2} \times 2 \text{ c}$$

$$= \frac{9}{2} \times 2 \text{ c}$$

$$= \frac{18}{2} \text{ c}$$

$$= 9 \text{ c}$$

$$9 \text{ c} \times 2 = 18 \text{ c}$$

Two containers can hold 18 cups.

District Mathematics Website

Be sure to visit our District 97 5th Grade Math Resources Website. It has a ton of resources that can further assist your 5th Grade Family! Some of the specific elements are detailed below.

Website: <http://op97mathgrade5.weebly.com/module-4.html>

Homework Helper

Would you like written homework help specific for each lesson in this Topic? Click below to access it!

Website: http://op97mathgrade5.weebly.com/uploads/2/2/9/1/22918938/homework_helper-grade_5_module_4.pdf

Video Help

Flipped learning is a great way to review topics that your student is learning in the classroom. The following are links to videos that give detailed explanations for each lesson in this topic.

Website: <https://www.tes.com/lessons/ahONa5NczU7C7Q/video-help-module-4>

Module 4 Parent Tips

Eureka Math has created a guide to this Module specifically for parents. Click below to access it!

Website: http://op97mathgrade5.weebly.com/uploads/2/2/9/1/22918938/eureka_math_module_4_parent_tip_sheet.pdf