MATH NEWS

Grade 5, Module 4, Topic E

5th Grade Math

Module 4: Multiplication of a Fraction by a Fraction

Math Parent Letter

This document is created to give parents and students a better understanding of the math concepts found in Eureka Math (© 2013 Common Core, Inc.) that is also posted as the Engage New York material which is 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 discuss Module 4, Topic E multiplication of a fraction by a faction - both in fraction and decimal form.

Topic E: Multiplication of a Fraction by a Fraction

Words to know

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

OBJECTIVES OF TOPIC E

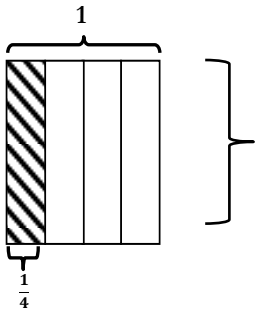
- Multiply unit fraction by unit fractions.
- Multiply unity fractions by non-unit fractions.
- Multiply non-unit fractions by non-unit fractions.
- Solve word problems using tape diagrams and fractions-by-fraction multiplications.
- Relate decimal and fraction multiplication.
- Covert measures involving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

Focus Area– Topic E

Multiplication of a Fraction by a Fraction

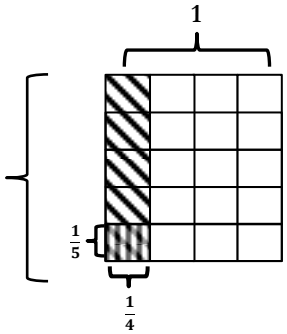
Solve. Draw a model to explain your thinking.
Joseph has $\frac{1}{4}$ of a pound of strawberries. He gave his teacher $\frac{1}{5}$ of the strawberries. What fraction of strawberries did Joseph give to his teacher?

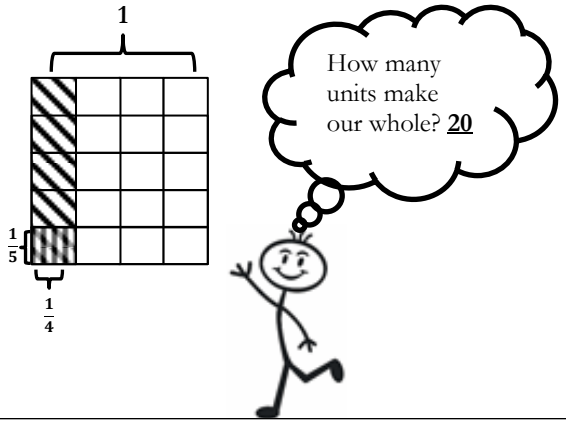
Think: We need to find $\frac{1}{5}$ of $\frac{1}{4}$ strawberries



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

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***

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

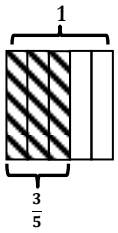
Joseph gave his teacher $\frac{1}{20}$ of the strawberries.

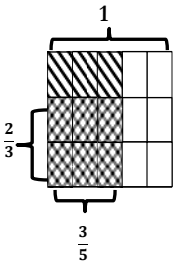
Solve. Draw a model to explain your thinking.

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* $\frac{3}{5}$.**

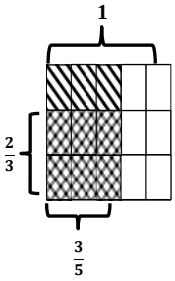
Step 1: Draw a rectangle and cut it vertically into 5 equal parts. Shade 3 parts and label it $\frac{3}{5}$.





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**



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

$\frac{6}{15}$ 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.

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

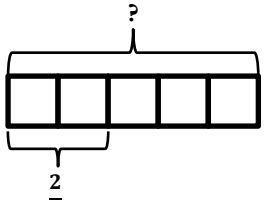
Method 2: Students divide by common factors prior to multiplying.

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

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?



(14 marbles)

2 units = 14
1 unit = 14 ÷ 2
= 7
5 units = 5 x 7 = 35

Dell has 35 marbles.

Relate decimal and fraction multiplication

Example A:

0.5 x 0.3 → or → **5 tenths**

$= \frac{5}{10} \times \frac{3}{10}$ — **x 3 tenths**

$= \frac{5 \times 3}{10 \times 10}$ — **1 5 hundredths = 0.15**

$= \frac{15}{100}$

= 0.15

Example B:

2.38 x 1.8 → or → **2 3 8 hundredths**

$= \frac{238}{100} \times \frac{18}{10}$ — **x 1 8 tenths**

$= \frac{238 \times 18}{100 \times 10}$ — **1 9 0 4**

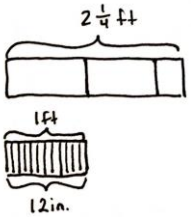
+2 3 8 0

$= \frac{4284}{1000}$ — **4 2 8 4 thousandths = 4.284**

= 4.284

Convert mixed unit measurements

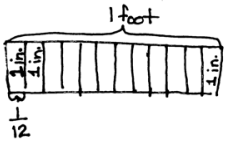
$2\frac{1}{4}$ ft = _____ in



$2\frac{1}{4}$ ft = ____ in
$2\frac{1}{4}$ ft $= 2\frac{1}{4} \times 1$ ft
$= 2\frac{1}{4} \times 12$ in
$= \frac{9}{4} \times 12$ in
$= \frac{9 \times 12^{3}}{1 \cancel{4}}$ in
$= 27$ in

We rename 1 foot as 12 inches.

9 inches = ____ ft

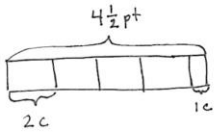


The tape diagram shows 1 foot divided into twelve equal parts. Each section represents 1 inch; therefore 1 inch is $\frac{1}{12}$ of a foot.

9 inches = 9 x 1 inch
= 9 x $\frac{1}{12}$ foot
= $\frac{9}{12}$ ft or $\frac{3}{4}$ 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)



$4\frac{1}{2}$ pt = $4\frac{1}{2} \times 1$ pt
= $4\frac{1}{2} \times 2$c
= $\frac{9}{2} \times 2$c
= $\frac{18}{2}$ c
= 9 c

9c x 2 = 18c
Two containers can hold 18 cups.