

DUVAL Math

Parent Tips

Multiplication and Division of Fractions and Decimal Fractions

In this Module, students will begin by measuring fractional parts on a number line as a concrete way of understanding fractional parts of a whole, and eventually move to more abstract fraction operations.

Before This Module: We learned to add and subtract fractions with unlike denominators, moving from concrete to abstract examples.

What Comes After This Module: In Module 5, we will work with the area and volume of two- and three-dimensional figures.

Fifth Grade,
Module 4

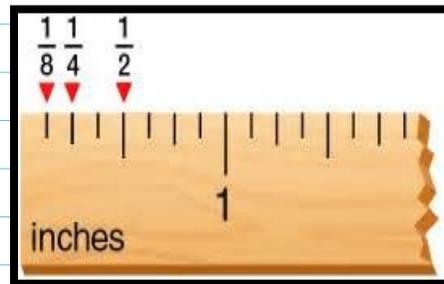
Special points of interest:

- ✓ Words to Know
- ✓ Line Plots of Fraction Measurements
- ✓ Multiplication of a Fraction by a Fraction
- ✓ Mathematical Practices
- ✓ Want to learn more about DUVAL Math?

Words to Know

Important Words: & Some Definitions

- Denominator
- Decimal Fraction
- Equation
- Equivalent Fraction
- Factors - numbers that are multiplied to obtain a product
- Line Plot
- Mixed Number
- Numerator
- Tape Diagram
- Unit - one segment of a partitioned tape diagram
- Unknown - the missing factor or quantity in multiplication or division
- Whole Unit - any unit that is partitioned into smaller, equally sized fractional units



Questions?

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Line Plots of Fraction Measurements

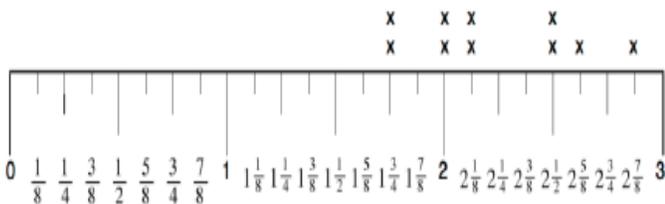
In Topic A, students construct line plots by measuring the same objects using three different rulers accurate to $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ of an inch. Students compare the line plots and explain how changing the accuracy of the unit of measure affects the distribution of points.

Things to Remember:

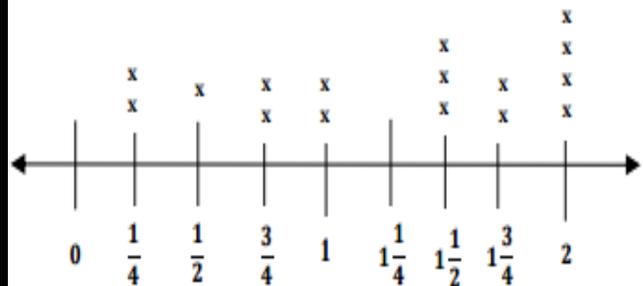
Line Plot- shows data on a number line with an 'x' or other mark to show frequency.

Example of a Line Plot

The line plot below shows the growth of 10 sunflowers plants. The count of cross marks above each fraction represents the height of each plant after one month of planting.



Gilbert recorded the lengths of his classmate's erasers. Use the following data to record his results on a **line plot** using $\frac{1}{4}$ inches.



1. How many erasers have a length of at least $1\frac{1}{2}$ inch? **2 erasers**

2. How many erasers measure less than a half inch? **2 erasers**

*3. What is the total length of all the erasers? **20 1/2 inches**

4. What is the difference between the shortest and longest eraser lengths? **1 3/4 inches**

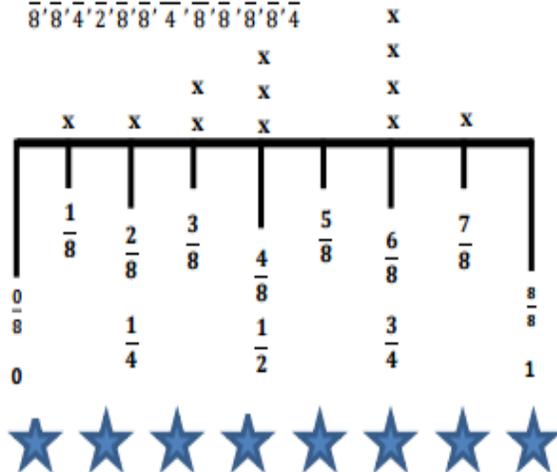
5. Which measurement appears most frequently? **2 inches**

*6. How many $\frac{1}{4}$ -inch erasers would it take to equal the length of a 2-inch eraser? **8 one-fourth inch erasers**

Students	Length
Student 1	1/2 inch
Student 2	1 inch
Student 3	2 inches
Student 4	1/4 inch
Student 5	1 1/2 inches
Student 6	1 1/2 inches
Student 7	2 inches
Student 8	2inches
Student 9	1/4 inches
Student 10	3/4 inches
Student 11	3/4 inches
Student 12	2 inches
Student 13	1 1/4 inches
Student 14	1 3/4 inches
Student 15	1 1/2 inches
Student 16	1 inch

1. Create a **line plot** for the following data measured in $\frac{1}{8}$ inches.

2. $\frac{7}{8}$ $\frac{4}{8}$ $\frac{1}{4}$ $\frac{1}{8}$ $\frac{3}{8}$ $\frac{3}{8}$ $\frac{3}{8}$ $\frac{4}{8}$ $\frac{1}{8}$ $\frac{6}{8}$ $\frac{6}{8}$ $\frac{3}{4}$



Multiplication of a Fraction by a Fraction

Topic E introduces students to multiplication of fractions by fractions. The topic starts with multiplying a unit fraction by a unit fraction, and progresses to multiplying two non-unit fractions. Students use area models, rectangular arrays, and tape diagrams to model the multiplication. Students convert smaller units to fractions of a larger unit (e.g., 6 inches = ft). The inclusion of customary units provides a meaningful context for many common fractions (pint = 1 cup, yard = 1 foot, gallon = 1 quart, etc.).

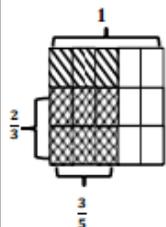
Solve. Draw a model to explain your thinking.

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?

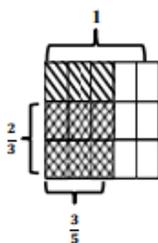


Think: We need to find $\frac{2}{3}$ of $\frac{3}{5}$.

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 $\frac{2}{3}$.



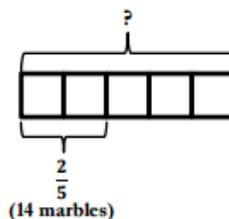
How many units make our whole? **15**
What's the name of these units? **Fifteenths**

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

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

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?

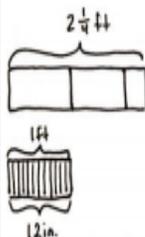


$$\begin{aligned} 2 \text{ units} &= 14 \\ 1 \text{ unit} &= 14 \div 2 \\ &= 7 \\ 5 \text{ units} &= 5 \times 7 = 35 \end{aligned}$$

Dell has 35 marbles.

Convert mixed unit measurements

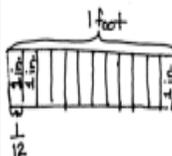
$$2\frac{1}{4} \text{ ft} = \underline{\hspace{2cm}} \text{ in}$$



$$\begin{aligned} 2\frac{1}{4} \text{ ft} &= \underline{\hspace{2cm}} \text{ in} \\ 2\frac{1}{4} \text{ ft} &= 2\frac{1}{4} \times 1 \text{ ft} \\ &= 2\frac{1}{4} \times 12 \text{ in} \\ &= \frac{9}{4} \times 12 \text{ in} \\ &= \frac{9 \times 12}{4} \text{ in} \\ &= 27 \text{ in} \end{aligned}$$

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 1 inch; therefore 1 inch is $\frac{1}{12}$ of a foot.

$$\begin{aligned} 9 \text{ inches} &= 9 \times 1 \text{ inch} \\ &= 9 \times \frac{1}{12} \text{ foot} \\ &= \frac{9}{12} \text{ ft or } \frac{3}{4} \text{ ft} \end{aligned}$$

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

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.

Standards for Mathematical Practice

Mathematical Practices Addressed in this Module:

- MP.2** Reason abstractly and quantitatively. Students reason abstractly and quantitatively as they interpret the size of a product in relation to the size of a factor, as well as interpret terms in a multiplication sentence as a quantity and scaling factor. Then, students create a coherent representation of the problem at hand while attending to the meaning of the quantities.
- MP.4** Model with mathematics. Students model with mathematics as they solve word problems involving multiplication and division of fractions and decimals, as well as identify important quantities in a practical situation and map their relationships using diagrams. Students use a line plot to model measurement data and interpret their results with respect to context of the situation, reflecting on whether results make sense, and possibly improve the model if it has not served its purpose.
- MP.5** Use appropriate tools strategically. Students use rulers to measure objects to the inch increments, recognizing both the insight to be gained and

Want to learn more about DUVAL Math? A great resource can be found following the link below:

<http://www.duvalschools.org/Page/17706>

Elementary Mathematics: Parent Partnerships for Success Grades K-2 and 3-5

The image is a video thumbnail for a presentation. At the top, it says 'Elementary Mathematics: Parent Partnerships for Suc...' and '2015 Parent Academy'. On the right is the Duval County Public Schools logo, which includes a stylized bridge and the text 'DUVAL COUNTY PUBLIC SCHOOLS'. The main title in the center is 'Elementary Mathematics: Parent Partnerships for Success Grades 3-5'. Below the title is a play button icon. At the bottom, it says 'Fall 2015' and 'Presented by: Beth Gonzalez & Kristen Brazell'. The background of the thumbnail shows a city skyline with a bridge over water.