

Foundations of Algebra
 Day 6: Multiplying Fractions
 Practice Assignment

Unit 1: Number Sense & Quantity

Practice
 Name: Key
 0 25 50 75 100

1. Multiply the following fractions:

a. $\frac{1}{8} \times \frac{2}{3} = \frac{2}{24} = \frac{1}{12}$

b. $\frac{3}{5} \times \frac{10}{11} = \frac{30}{55} = \frac{6}{11}$

c. $\frac{8}{9} \times \frac{3}{4} = \frac{24}{36} = \frac{2}{3}$

d. $\frac{7}{10} \times \frac{2}{5} = \frac{14}{50} = \frac{7}{25}$

e. $\frac{1}{2} \times \frac{3}{4}$
 $\frac{3}{2} \times \frac{7}{4} = \frac{21}{8}$
 or
 $= 2\frac{5}{8}$

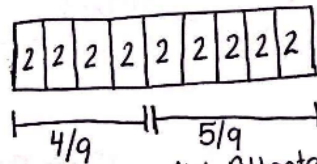
f. $2\frac{1}{3} \times 5\frac{2}{5}$
 $\frac{7}{3} \times \frac{27}{5} = \frac{63}{5}$
 or
 $= 12\frac{3}{5}$

g. $\frac{1}{2} \times 2\frac{1}{8}$
 $\frac{1}{2} \times \frac{17}{8} = \frac{17}{16}$
 or
 $= 1\frac{1}{16}$

h. $5 \times \frac{1}{5} = 1$

2. Sara just turned 18 years old. She spent $\frac{4}{9}$ of her life living in Atlanta, GA. How many years did Sara live in Atlanta? Draw a picture to model the scenario.

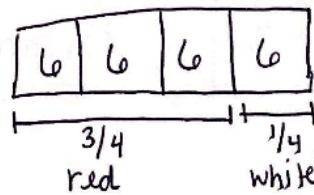
18 years
 9 sections



8 years of living in Atlanta

3. Tiffany buys 2 dozen roses. Of these roses, $\frac{3}{4}$ are red, and the rest are white. How many white roses did she buy? Draw a picture to model the scenario.

24 roses
 4 sections



6 white roses bought





Today's Notes

Dividing Fractions

Review: What does it mean when you are asked what $8 \div 2$ means? Draw a picture to represent $8 \div 2$.

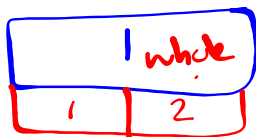
$$8 \div 2 = 4$$

$8 \div 2$ means how many groups of 2 are in 8?

Modeling Division of Fractions

Discover: For each of the following problems, interpret the expression and draw a representation to answer the question.

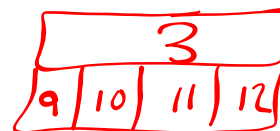
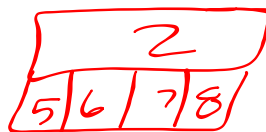
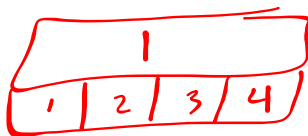
a. $2 \div \frac{1}{2} \rightarrow$ How many groups of $\frac{1}{2}$ are in 2?



$$2 \div \frac{1}{2} = 4$$

$2 \div \frac{1}{2} =$ 4 Therefore there are 4 $\frac{1}{2}$ pieces in 2.

b. $3 \div \frac{1}{4} \rightarrow$ How many groups of $\frac{1}{4}$ are in 3?



$3 \div \frac{1}{4} =$ 12 Therefore there are 12 $\frac{1}{4}$ pieces in 3.

Dividing Fractions Using an Algorithm

Review: Determine the reciprocals of the following fractions:

a. $\frac{3}{4}$ b. $\frac{3}{1}$ c. $\frac{7}{2}$ d. $\frac{12}{2}$ e. $\frac{5\frac{2}{3}}{3}$ f. $3\frac{1}{2}$ g. $\frac{0}{1}$

$\frac{4}{3}$ $\frac{1}{3}$ $\frac{2}{7}$ $\frac{2}{12}$ $\frac{3}{17}$ $\frac{2}{\frac{1}{2}}$ $\frac{1}{0}$

When you were in 6th grade, you learned how to divide fractions using phrases such as "Keep it, change it, flip it" or "Invert and multiply" or "Multiply by the reciprocal". Therefore you might remember a problem looking like this:

$$\frac{\boxed{2}}{\boxed{3}} \div \frac{\boxed{4}}{\boxed{5}} = \frac{2}{3} \times \frac{5}{4} \rightarrow \frac{10}{12} = \frac{5}{6}$$

K C F

Keep Change Flip

But, have you ever wondered why your teacher told you to multiply by the reciprocal or did you just follow the rules your teacher gave you? Let's explore with a few examples to understand why "multiplying by the reciprocal" is required for division with fractions.

Explore: To understand the reasoning behind dividing fractions, it is easiest to turn our division problem into a compound fraction. Dividing by a fraction is hard, but dividing by **one** is really easy. But how do we turn $\frac{1}{2}$ into one? By multiplying by its reciprocal!

a. $2 \div \frac{1}{2}$ b. $\frac{3}{4} \div \frac{1}{4}$ c. $\frac{1}{2} \div \frac{1}{4}$

$\frac{2}{1} \div \frac{1}{2}$ $\frac{3}{4} \times \frac{4}{1} = \frac{12}{4}$ $\frac{1}{2} \times \frac{4}{1} = \frac{4}{2}$

$\frac{2}{1} \times \frac{2}{1} = \frac{4}{1}$ $= \boxed{3}$ $= 2$

$= 4$

Practice: Divide the following fractions and then check your answer with your answers in problems d - h.

d. $\frac{5}{6} \div \frac{1}{3}$

$$\frac{5}{6} \times \frac{3}{1} = \frac{15}{6}$$

$\frac{11}{2\cancel{5}}\cancel{6}$

e. $\frac{11}{12} \div \frac{1}{6}$

$$\frac{11}{12} \times \frac{6}{1} = \frac{66}{12}$$

$\frac{11}{2}$

f. $\frac{1}{3} \div \frac{3}{4}$

$$\frac{1}{3} \times \frac{4}{3} = \frac{4}{9}$$

g. $\frac{5}{8} \div \frac{3}{4}$

$$\frac{5}{8} \times \frac{4}{3} = \frac{20}{24} = \frac{5}{6}$$

h. $\frac{2}{3} \div \frac{1}{2}$

$$\frac{2}{3} \cdot \frac{2}{1} = \frac{4}{3}$$

How do you think you would divide mixed numbers when you consider how you divided the fractions on the previous page and calculated the reciprocal of the mixed numbers in the review section? Write down what you think:

Practice: Divide the following fractions.

i. $1\frac{2}{3} \div \frac{1}{2}$

$$\frac{5}{3} \div \frac{1}{2}$$

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

j. $3\frac{3}{4} \div 1\frac{1}{2}$

$$\frac{15}{4} \div \frac{3}{2}$$

$$\frac{15}{4} \times \frac{2}{3} = \frac{30}{12} = \frac{5}{2}$$



Division of Fractions within a Context

a. You have 4 cups of lemonade. If each student receives $\frac{2}{5}$ cup, how many students are there? Solve your problem using one model AND an algorithm (to check your work).

$$4 \div \frac{2}{5}$$

$$\frac{4}{1} \div \frac{2}{5}$$

$$\frac{4}{1} \times \frac{5}{2} = \frac{20}{2} = \boxed{10} \text{ students}$$

b. A baker is making mini cakes for a party. She uses $\frac{3}{4}$ cup of oil for each mini cake. How many cakes can she make if she has a bag with 6 cups of sugar? Solve your problem using one model AND an algorithm (to check your work).

$$\frac{6}{1} \div \frac{3}{4}$$

$$\frac{6}{1} \times \frac{4}{3} = \frac{24}{3} = \boxed{8} \text{ cakes}$$

Graphic Organizer

Operations with Fractions

Remember to always Simplify, if possible

Addition	Subtraction
<ol style="list-style-type: none"> 1. Find the common <u>denominator</u> 2. Add the <u>Numerator</u> 3. Keep the <u>denominator</u> the same 4. <u>Simplify</u> $\frac{4}{5} + \frac{2}{3}$ $\frac{12}{15} + \frac{10}{15}$ $\frac{22}{15}$	<ol style="list-style-type: none"> 1. Find the common <u>denominator</u> 2. Add <u>Subtract</u> the <u>numerators</u> 3. Keep the <u>denominator</u> the same 4. <u>Simplify</u> $\frac{4}{5} - \frac{2}{3}$ $\frac{12}{15} - \frac{10}{15}$ $\frac{2}{15}$
Multiplication	Division
<ol style="list-style-type: none"> 1. Multiply the <u>numerators</u> 2. Multiply the <u>denominators</u> 3. <u>Simplify</u> $\frac{4}{5} \cdot \frac{2}{3}$ $\frac{8}{15}$	<ol style="list-style-type: none"> 1. <u>Keep, Change, Flip</u> 2. Multiply the <u>numerators</u> 3. Multiply the <u>denominators</u> 4. <u>Simplify</u> $\frac{4}{5} \div \frac{2}{3}$ $\frac{4}{5} \times \frac{3}{2} = \frac{12}{10}$ $= \frac{6}{5}$

Additional Practice

Foundations of Algebra
Day 7: Dividing Fractions

Unit 1: Number Sense & Quantity

Practice

Name: _____

Practice Assignment

0 25 50 75 100

1. Divide the following fractions:

a. $4 \div \frac{2}{3}$
6

b. $\frac{3}{2} \div \frac{1}{6}$
9

c. $\frac{5}{6} \div \frac{1}{2}$
 $\frac{5}{3}$

d. $\frac{7}{8} \div \frac{1}{4}$
 $\frac{7}{2}$

e. $6\frac{1}{2} \div 2\frac{1}{2}$
 $\frac{13}{5}$

f. $5\frac{1}{2} \div 1\frac{1}{4}$
 $\frac{22}{5}$

g. $5\frac{3}{4} \div 1\frac{1}{8}$
 $\frac{46}{9}$
 $\frac{23}{4} \times \frac{8}{9} = \frac{46}{9}$

h. $6 \div 2\frac{1}{3}$
 $\frac{18}{7}$

2. Charles has 6 cups of popcorn. How many friends can he share the popcorn with if each is given $\frac{2}{3}$ cup?

Draw a diagram to represent the problem and then solve it.

$$\frac{6}{1} \div \frac{2}{3}$$

$$\frac{6}{1} \times \frac{3}{2} = \frac{18}{2}$$

$$= 9$$

3. Leia has $\frac{3}{4}$ cup of laundry detergent left in the detergent bottle. Each load of laundry requires $\frac{1}{6}$ cup of detergent. How many loads of laundry can Lea wash? Draw a diagram to represent the problem and then solve it.

Foundations of Algebra

Unit 1: Number Sense & Quantity

Practice

4. Aleena has $\frac{3}{4}$ cup of bananas. A batch of banana muffins requires $\frac{1}{8}$ cup of bananas. How many batches of bananas muffins can Aleena make?

5. Each box of Apple Jacks contains 5 ounces of cereal. How many $\frac{1}{4}$ ounce servings does each box contain? Draw a diagram to represent the problem and then solve it.

TEST REVIEW

Foundations of Algebra

Name: _____

Review Guide

Learning Goal 1.2 - Fractions

What I Need to Know	Things to Remember	Practice	
1. Benchmark Fractions 10. Ordering Fractions	0, ½, 1 The bigger the denominator, the smaller the individual pieces are. Benchmark Fractions are helpful!	a. Determine if the following fractions are close to 0, equal to ½, little less than ½ (< ½), little more than ½ (> ½), or close to 1: $\frac{1}{3}$ $\frac{3}{8}$ $\frac{7}{9}$ $\frac{5}{6}$ $\frac{11}{12}$ $\frac{2}{10}$ $\frac{9}{10}$ $\frac{1}{8}$ $\frac{2}{6}$ $\frac{6}{11}$ $\frac{1}{4}$ $\frac{3}{4}$ $\frac{4}{9}$ $\frac{3}{7}$ $\frac{3}{4}$ $\frac{3}{6}$ a. Order from least to greatest: $\frac{4}{5}$ $\frac{4}{10}$ $\frac{4}{12}$ $\frac{4}{7}$ b. Order from least to greatest: $\frac{5}{9}$ $\frac{7}{13}$ $\frac{2}{7}$ $\frac{10}{11}$	
2. Converting Between Improper and Mixed Numbers		a. Convert to improper fractions: $1\frac{3}{8}$ $7\frac{3}{4}$	b. Convert to mixed numbers: $\frac{27}{8}$ $\frac{13}{5}$
3. Operations with Fractions	Add & Subtract: Common Denominators Multiply: Multiply numerators & denominators Divide: Multiply by the reciprocal (complex fractions)	a. Add or Subtract: $\frac{3}{5} - \frac{1}{3} =$ $\frac{3}{5} + \frac{1}{4} =$ $2\frac{2}{3} - \frac{1}{4} =$ $12\frac{1}{7} - 8\frac{2}{3} =$	b. Multiply or Divide: $\frac{1}{2} \times \frac{4}{5}$ $1\frac{1}{3} \times \frac{3}{8}$ $\frac{2}{5} \div \frac{1}{6} =$ $6\frac{4}{5} \div \frac{1}{2} =$

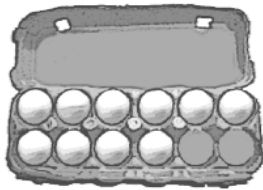
<p>5. Operations with Fractions (Word Problems)</p>		<p>a. A stack of board is 21 inches high. Each board is $1\frac{3}{4}$ inches thick. How many boards are there?</p>	<p>b. DJ Gabe is going to serve $\frac{1}{3}$ of a whole pizza to each guest at his party. If he expects 24 guests, how many pizzas will he need?</p>
<p>6. Decimals on a Number Line</p>		<p>c. $3\frac{1}{3}$ feet are cut off a board that is $12\frac{1}{4}$ feet long. How long is the remaining part of the board?</p>	<p>d. $\frac{3}{8}$ of the corn in the US is grown in Iowa. $\frac{1}{4}$ of it is grown in Nebraska. How much of the corn supply is grown in the two states?</p>
<p>14. Using Visuals to Solve Problems.</p>		<p>a. Draw a picture to solve the following: Out of 18 cookies, $\frac{2}{3}$ are chocolate chip. How many of the cookies are chocolate chip?</p>	<p>b. The New York Rangers hockey team won $\frac{3}{4}$ of their games last season. If they lost 21 games, how many games did they play in the entire season?</p>

Learning Goal 1.2 Goal: Fractions

Name: _____

Date: _____

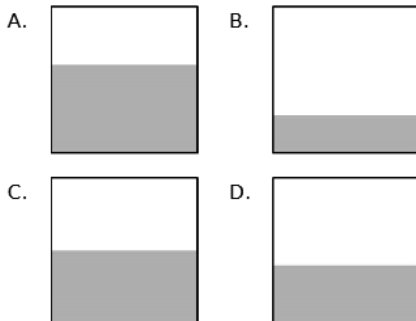
1. Mary used some of the eggs from the carton below to make breakfast.



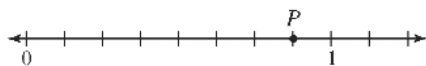
What portion of the eggs did Mary use to make breakfast?

- A. $\frac{2}{12}$ B. $\frac{2}{10}$ C. $\frac{2}{6}$ D. $\frac{10}{12}$

2. About $\frac{2}{5}$ of the wetlands in the continental United States are in Louisiana. Which square's shaded area models Louisiana's portion of the wetlands?

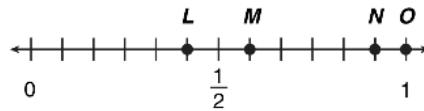


3. What fraction is best represented by point *P* on this number line?



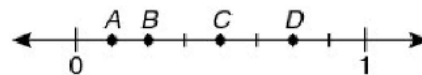
- A. $\frac{1}{8}$ B. $\frac{1}{5}$ C. $\frac{3}{4}$ D. $\frac{7}{8}$

4. Which point is located at $\frac{7}{12}$ on the number line below?



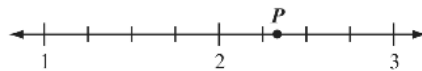
- A. *L* B. *M* C. *N* D. *O*

5. Which point shows the fraction $\frac{1}{4}$ on the number line?



- A. Point A B. Point B
C. Point C D. Point D

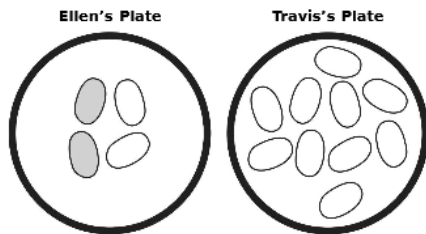
6. The location of point *P* is shown on the number line below.



Which of the following numbers is best represented by point *P*?

- A. $2\frac{1}{3}$ B. $2\frac{1}{2}$ C. $2\frac{2}{3}$ D. $3\frac{2}{3}$

7. Ellen and Travis drew pictures of grapes on paper plates. The pictures are shown below.



Ellen shaded some of the grapes on her plate. Travis wants to shade the same fraction of grapes on his plate. How many of the grapes on Travis's plate should be shaded?

- A. 2 B. 4 C. 5 D. 8
8. What is $\frac{12}{60}$ expressed in lowest terms?
- A. $\frac{1}{8}$ B. $\frac{1}{6}$ C. $\frac{1}{5}$ D. $\frac{1}{4}$
9. In Edward's class, $\frac{18}{24}$ of the students like swimming better than they like running. What is $\frac{18}{24}$ in **simplest** form?
- A. $\frac{2}{3}$ B. $\frac{3}{4}$ C. $\frac{6}{8}$ D. $\frac{9}{12}$
10. Johannah collects posters. She has 3 animal posters, 4 posters of sports teams, and 2 posters of musical bands. What fraction of her posters is of sports teams?
- A. $\frac{2}{9}$ B. $\frac{3}{9}$ C. $\frac{4}{9}$ D. $\frac{5}{9}$

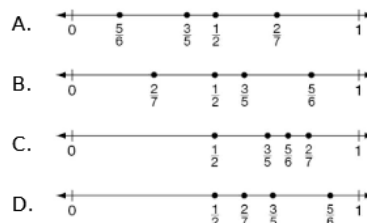
11. Wally eats breakfast $\frac{1}{3}$ of the mornings he goes to school. Which is another way to describe this?

- A. Wally eats breakfast 12 out of 20 school mornings.
 B. Wally eats breakfast 8 out of 16 school mornings.
 C. Wally eats breakfast 6 out of 8 school mornings.
 D. Wally eats breakfast 5 out of 15 school mornings.

12. Amal, Trina, Josie, and Mya each have the same number of folders. The list below shows the fraction of each girl's folders that is yellow.

- $\frac{1}{2}$ of Amal's folders are yellow
- $\frac{2}{7}$ of Trina's folders are yellow
- $\frac{5}{6}$ of Josie's folders are yellow
- $\frac{3}{5}$ of Mya's folders are yellow

Which number line correctly shows the fraction of each girl's folders that is yellow?



13. The picture below shows four fractions and a number line. Wilson's homework is to place a point on the number line for the location of each of the fractions.



If Wilson places the fractions correctly, which fraction will be closest to 0 on the number line?

- A. $\frac{1}{6}$ B. $\frac{1}{3}$ C. $\frac{1}{2}$ D. $\frac{1}{4}$

14. Which of the following is equivalent to the expression below?

$$\frac{2}{5} + \frac{1}{4}$$

- A. $\frac{2}{20}$ B. $\frac{3}{20}$ C. $\frac{9}{20}$ D. $\frac{13}{20}$

15. Which of the following is equivalent to the expression below?

$$3\frac{1}{4} + 1\frac{1}{2}$$

- A. $4\frac{1}{4}$ B. $4\frac{3}{4}$ C. $5\frac{1}{4}$ D. $5\frac{3}{4}$

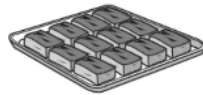
16. Which of the following is equivalent to the expression below?

$$5\frac{1}{4} - 2\frac{1}{2}$$

- A. $2\frac{1}{2}$ B. $2\frac{3}{4}$ C. $3\frac{1}{4}$ D. $3\frac{1}{2}$

17. Wendall baked a pan of 12 brownies, as shown below.

**Wendall's
Brownies**



Wendall gives $\frac{5}{8}$ of the brownies to Stefanie. How many brownies did Stefanie get?

- A. 5 brownies B. 6 brownies
C. 10 brownies D. 11 brownies

18. Adanna exercises for $\frac{1}{2}$ hour every day. For how many total hours does Adanna exercise in 5 days?

- A. $\frac{2}{5}$ hour B. $2\frac{1}{2}$ hours
C. 4 hours D. 10 hours

19. Dan's Sporting Goods received a shipment of 120 sweatshirts.

- Half of the sweatshirts were size large.
- One-fourth of the large sweatshirts were red.

What was the total number of sweatshirts in the shipment that were both size large and red?

- A. 15 B. 20 C. 30 D. 75

20. A farmer mows one-fifth of an acre each day. If his property has three acres, how many days will it take to mow it all?

- A. 3 days B. 5 days
C. 8 days D. 15 days

21. A dog's food bowl holds 2 cups of dog food. Pete uses a scoop that holds $\frac{1}{3}$ of a cup of dog food.

How many scoops will it take for Pete to fill the dog bowl?

- A. 6 B. 5 C. 4 D. 3