



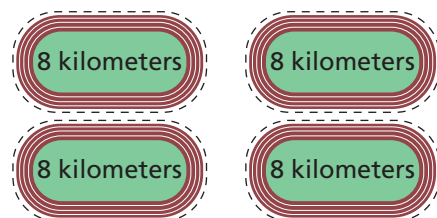
► Fractional Multiplication

Complete.

1. A racetrack is 8 kilometers long. Alex ran around the track 4 times.

8 taken 4 times = _____ kilometers

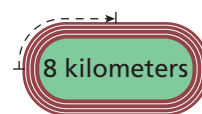
$4 \times 8 =$ _____ kilometers



2. Kento ran around the same track $\frac{1}{4}$ times.

8 taken $\frac{1}{4}$ times = _____ kilometers

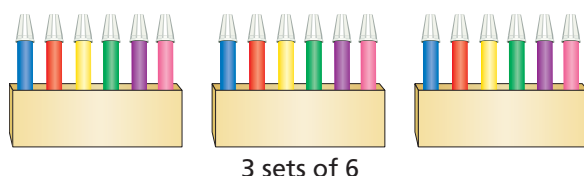
$\frac{1}{4} \times 8 =$ _____ kilometers



3. Markers come in sets of 6. Alta has 3 sets.

6 taken 3 times = _____ markers

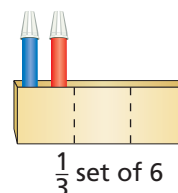
$3 \times 6 =$ _____ markers



4. Isabel has $\frac{1}{3}$ of a set of 6 markers.

6 taken $\frac{1}{3}$ times = _____ markers

$\frac{1}{3} \times 6 =$ _____ markers



► Relate Fractional Multiplication and Whole-Number Division

Complete each equation chain like the one shown.

$$\frac{1}{4} \text{ of } 8 = \frac{1}{4} \times 8 = 8 \div 4 = \frac{8}{4} = 2$$

5. $\frac{1}{3}$ of 9 = _____ = _____ = _____ = _____

6. $\frac{1}{7}$ of 21 = _____ = _____ = _____ = _____

7. $\frac{1}{5}$ of 30 = _____ = _____ = _____ = _____

8. Circle the expression that does *not* mean the same as the others.

$\frac{1}{6} \times 24$ $24 \div 6$ $\frac{24}{6}$ $\frac{6}{24}$ $\frac{1}{6}$ of 24

► Practice With Unit Fractions

9. How many times as many fish did Bill catch as Amy?

10. How many times as many fish did Amy catch as Bill?

11. What is $\frac{1}{3} \times 15$? What is $15 \div 3$? What is $\frac{15}{3}$?

Write two statements for each pair of players.

12. Compare Gina's points and Brent's points.

13. Compare Brent's points and Jacob's points.

14. Compare Jacob's points and Gina's points.

15. Which are the shortest and longest snakes?

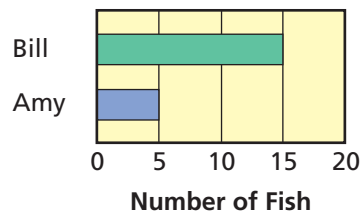
How do you know?

16. If Speedy is 25 inches long, how long is Lola?

17. If Pretzel is 50 inches long, how long is Speedy?

How long is Lola?

Fish Caught at the Lake



Points at the Basketball Game

Player	Points
Gina	32
Brent	8
Jacob	4

Length of Snakes at the Zoo

Snake	Inches
Speedy	n
Lola	$\frac{1}{5} \times n$
Pretzel	$5 \times n$



Dear Family,

In this unit of *Math Expressions*, your child is studying multiplication and division with fractions.

Multiplication tells how many times we are taking a number. For example, when we take $\frac{4}{5}$ of something, we multiply it by $\frac{4}{5}$ to find the answer. In this unit, your child will learn to:

- multiply a whole number by a unit fraction

$$\frac{1}{b} \times w = \frac{w}{b}$$

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

- multiply a whole number by a non-unit fraction

$$\frac{a}{b} \times w = \frac{a \times w}{b}$$

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

- multiply two fractions

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$$

$$\frac{2}{3} \times \frac{5}{7} = \frac{10}{21}$$

Division tells us how many of a certain number are inside another number. For example, when we ask how many times $\frac{4}{5}$ fits inside a number, we divide it by $\frac{4}{5}$ to find out. Using the relationship between multiplication and division, your child will discover how to:

- divide a whole number by a unit fraction

$$w \div \frac{1}{d} = w \times d$$

$$6 \div \frac{1}{5} = 6 \times 5 = 30$$

- divide a fraction by a fraction

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

$$\frac{4}{7} \div \frac{3}{5} = \frac{4}{7} \times \frac{5}{3} = \frac{20}{21}$$

Throughout the unit, students will also practice the fractional operations they have learned previously—comparing, adding, and subtracting. This helps them maintain what they have learned. It also helps them to see how the various fractional operations are alike and how they are different. It is particularly important for your child to realize that comparing, adding, and subtracting fractions require the denominators to be the same. For multiplying and dividing this is not true.

If you have any questions about this unit, please call or write to me.

Sincerely,
Your child's teacher



Estimada familia:

En esta unidad de *Math Expressions* su niño está estudiando la multiplicación y la división con fracciones.

La multiplicación nos dice cuántas veces se toma un número. Por ejemplo, cuando tomamos $\frac{4}{5}$ de algo, lo multiplicamos por $\frac{4}{5}$ para hallar la respuesta. En esta unidad su niño aprenderá a:

- multiplicar un número entero por una fracción cuyo numerador es uno $\frac{1}{b} \times w = \frac{w}{b}$ $\frac{1}{3} \times 5 = \frac{5}{3}$
- multiplicar un número entero por una fracción cuyo numerador es diferente de uno $\frac{a}{b} \times w = \frac{a \times w}{b}$ $\frac{2}{3} \times 5 = \frac{10}{3}$
- multiplicar dos fracciones $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$ $\frac{2}{3} \times \frac{5}{7} = \frac{10}{21}$

La división nos dice qué cantidad de cierto número está dentro de otro número. Por ejemplo, cuando preguntamos cuántas veces cabe $\frac{4}{5}$ en un número, dividimos el número entre $\frac{4}{5}$ para saberlo. Al usar la relación entre la multiplicación y la división, su niño va a descubrir cómo:

- se divide un número entero por una fracción cuyo numerador es uno $w \div \frac{1}{d} = w \times d$ $6 \div \frac{1}{5} = 6 \times 5 = 30$
- se divide una fracción entre una fracción $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$ $\frac{4}{7} \div \frac{3}{5} = \frac{4}{7} \times \frac{5}{3} = \frac{20}{21}$

En esta unidad los estudiantes también practicarán las operaciones con fracciones que han aprendido anteriormente: comparaciones, sumas y restas. Esto los ayudará a retener lo que han aprendido. También los ayuda a ver en qué se parecen y en qué se diferencian las operaciones con fracciones. Es importante que su niño se dé cuenta de que para comparar, sumar y restar fracciones, las fracciones deben tener el mismo denominador. En la multiplicación y división esto no se aplica.

Si tiene alguna duda o comentario, por favor comuníquese conmigo.

Atentamente,
El maestro de su niño

► Visualize the Separate Steps

Silver City is 24 miles away. Gus has driven $\frac{1}{4}$ of the distance. Emma has driven $\frac{3}{4}$ of the distance.



1. How many miles has Gus driven? _____

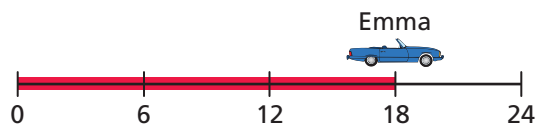
2. How many miles has Emma driven? _____

3. How many times as far as Gus has Emma driven? _____

4. If $\frac{1}{5}$ of a distance is 3 km, how far is $\frac{4}{5}$? _____

5. If $\frac{1}{8}$ of a container weighs 2 lbs, how many pounds is $\frac{3}{8}$ of the container? _____

6. If $\frac{1}{7}$ of a book is 4 pages, how many pages is $\frac{2}{7}$ of the book? _____

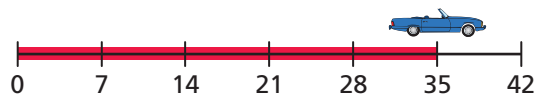


Shady Grove is 40 miles away. Middletown is $\frac{1}{5}$ of the way there and Parkview is $\frac{2}{5}$ of the way.

7. How many miles away is Middletown? _____

8. How many miles away is Parkview? _____

9. Ocean City is 42 miles from home. We have gone 35 miles. What fraction of the distance have we gone? _____



10. Eagle Rock is 72 miles away. When we had gone $\frac{2}{9}$ of the distance, we stopped for gas. How many miles had we traveled? _____

11. Perilous Peak is 80 miles away. We are $\frac{3}{10}$ of the way there. How many more miles do we have to go? _____

12. Windy Bay is 48 miles away. Make up your own fraction word problem with multiplication. Be sure to include a non-unit fraction.

► Practice Multiplication With Fractions

Solve the problem pairs.

13. $\frac{1}{3}$ of 18 = _____

$\frac{2}{3}$ of 18 = _____

14. $\frac{1}{4} \times 32 =$ _____

$\frac{3}{4} \times 32 =$ _____

15. $\frac{1}{9} \times 27 =$ _____

$\frac{4}{9} \times 27 =$ _____

16. $\frac{1}{6} \times 42 =$ _____

$\frac{5}{6} \times 42 =$ _____

17. Circle the one that does *not* mean the same as the others.

$\frac{2}{3} \times 21$

$\frac{2}{3}$ of 21

$(\frac{1}{3}$ of 21) + $(\frac{1}{3}$ of 21)

$\frac{2}{3} + 21$

$\frac{21}{3} + \frac{21}{3}$

$(\frac{1}{3}$ of 21) \times 2

Use the table to answer each question.

18. Which building is the tallest? Which is the shortest?

How do you know?

Building	Number of Stories
Bank	n
Bus station	$\frac{1}{6} \times n$
Sport shop	$\frac{5}{6} \times n$
Hotel	$6 \times n$

Suppose the bus station is 2 stories tall.

19. How many stories does the sport shop have? _____

20. How many stories does the bank have? _____

Suppose the bank is 5 stories tall.

21. How many stories tall is the hotel? _____

Suppose the hotel is 36 stories tall.

22. How many stories does the bank have? _____

23. How many stories does the bus station have? _____

24. How many stories does the sport shop have? _____

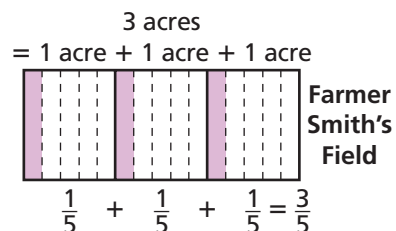
► Visualize Fractional Answers

Farmer Hanson, Farmer Diaz, and Farmer Smith each have 3 acres of land. They each plowed $\frac{1}{5}$ of their land.

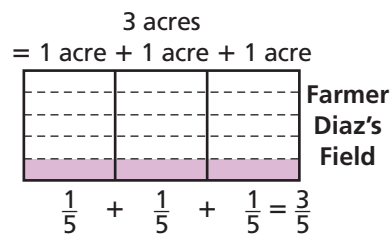
1. Can we tell from the picture how many acres Farmer Hanson plowed? Why or why not?



2. Farmer Smith plowed $\frac{1}{5}$ of each acre. Can we tell from the picture how many acres she plowed? Explain.



3. How can we tell from Farmer Diaz's field that $\frac{1}{5}$ of each acre added together is the same as $\frac{1}{5}$ of the whole field?



4. Why is $\frac{1}{5}$ of 3 acres the same as $3 \times \frac{1}{5}$?

5. Farmer Belinsky has 7 acres of land. He plowed $\frac{1}{8}$ of each acre. How many acres did he plow altogether?

6. Farmer Davis has 4 acres of land. He plowed $\frac{1}{3}$ of the field. How many acres did he plow?

Solve.

7. Tess practices the flute $\frac{1}{6}$ hour each day. This week she practiced 5 days. How many hours did she practice this week?

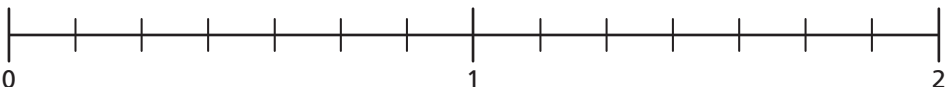
Show your work.


► Multiply by a Non-Unit Fraction

8. Circle the one that does not mean the same as the others.

$$\frac{1}{4} \text{ of } 3 \quad \frac{1}{4} \times 3 \quad 4 \times \frac{1}{3} \quad \frac{1}{4} + \frac{1}{4} + \frac{1}{4} \quad 3 \times \frac{1}{4}$$


Circle the fractions on the number lines to help you multiply.

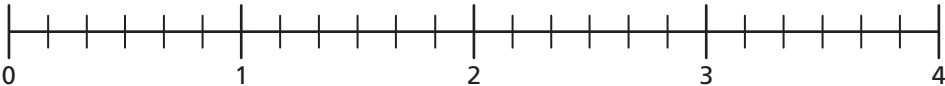
9. $\frac{1}{7} \times 2 =$ _____ 


10. $\frac{3}{7} \times 2 =$ _____ 


11. $\frac{1}{5} \times 3 =$ _____ 

12. $\frac{4}{5} \times 3 =$ _____ 

13. $\frac{1}{6} \times 4 =$ _____ 

14. $\frac{5}{6} \times 4 =$ _____ 

15. $\frac{1}{3} \times 8 =$ _____ 

16. $\frac{2}{3} \times 8 =$ _____ 

► Simplify and Multiply Fractions

Multiply. Simplify first if you can.

1. $\frac{2}{3} \times 30 =$ _____

2. $\frac{2}{5} \times 35 =$ _____

3. $\frac{5}{6} \times 4 =$ _____

4. $\frac{7}{16} \times 8 =$ _____

5. $\frac{7}{20} \times \frac{5}{14} =$ _____

6. $\frac{2}{16} \times \frac{4}{21} =$ _____

7. $\frac{9}{10} \times \frac{7}{10} =$ _____

8. $\frac{7}{15} \times \frac{10}{21} =$ _____

9. $\frac{5}{24} \times \frac{6}{25} =$ _____

10. $\frac{5}{8} \times \frac{32}{45} =$ _____

11. $\frac{8}{49} \times \frac{7}{10} =$ _____

12. $\frac{7}{25} \times \frac{3}{4} =$ _____

13. Circle the fraction that does not mean the same as the others.

$\frac{3}{9}$

$\frac{1}{3}$

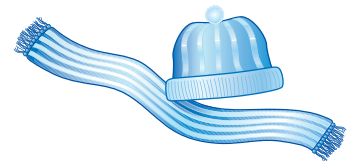
$\frac{8}{24}$

$\frac{10}{30}$

$\frac{6}{18}$

$\frac{9}{36}$

$\frac{20}{60}$



► Problem-Solving Situations

Solve.

14. In the Fireside Ski Shop, $\frac{11}{28}$ of the ski caps have tassels. Of the caps with tassels, $\frac{7}{11}$ are blue. What fraction of the caps in the shop are blue with tassels?

15. In the shop, $\frac{27}{32}$ of the jackets have zippers. Of the jackets with zippers, $\frac{8}{9}$ have hoods. What fraction of the jackets in the shop have both zippers and hoods?

16. Five of the 16 workers in the shop know how to ski. $\frac{1}{5}$ of those who can ski know how to snowboard. What fraction of the workers can ski and snowboard?

Show your work.

► The Puzzled Penguin

Dear Math Students,

I have a string that is $\frac{3}{4}$ of a yard long. I need to take $\frac{7}{12}$ of it. You can see how I solved the problem at the right.

Now I'm wondering about my answer. When you take a fraction of a fraction, you should get a smaller fraction. But my answer is larger. What mistake did I make? How do I correct it?

Thank you.

Puzzled Penguin

$$\frac{7}{12} \times \frac{3}{4} = \frac{7 \times 3}{\cancel{12 \times 4}} = \frac{21}{3} = 7 \text{ yd}$$

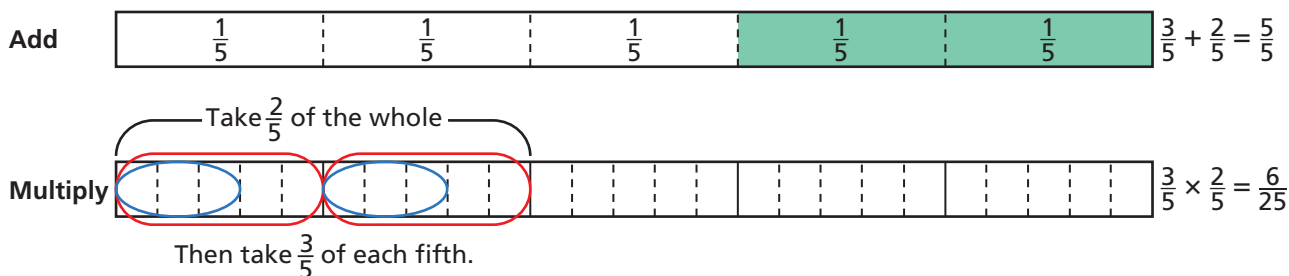


I simplified by changing 12×4 to 3×1 .

17. Write a response to the Puzzled Penguin.

► Compare Multiplication and Addition

These fraction strips show how we add and multiply fractions.



1. Which problem above has the greater answer? How do you know?

2. Tell which of these questions will have the greater answer. Solve each one.

$$\frac{3}{7} + \frac{2}{7} = \underline{\hspace{2cm}} \quad \frac{3}{7} \times \frac{2}{7} = \underline{\hspace{2cm}}$$

3. If the denominators are different, can you still tell which answer will be greater? Circle your answer, then solve to check.

yes no

$$\frac{3}{4} + \frac{1}{6} = \underline{\hspace{2cm}} \quad \frac{3}{4} \times \frac{1}{6} = \underline{\hspace{2cm}}$$

► Compare Fractional and Whole-Number Operations

Circle each expression with an answer less than the first number. Put a box around each with an answer greater than the first number.

4. $a + b$

5. $a - b$

6. $a \times b$

7. $\frac{a}{b} + \frac{c}{d}$

8. $\frac{a}{b} - \frac{c}{d}$

9. $\frac{a}{b} \times \frac{c}{d}$

a and b are whole numbers greater than 1.

All of the fractions are less than 1.

10. How is multiplying fractions different from multiplying whole numbers?

Vocabulary

commutative property

► Word Problems With Mixed Operations

Amber, a very fit snail, moved $\frac{7}{9}$ yard in an hour. She challenged the other snails to try to do better.

Write how far each snail went. Show your work.

11. Willy moved $\frac{4}{5}$ as far as Amber. _____
12. Dusty went $\frac{1}{3}$ of a yard less than Amber. _____
13. Pearl went twice as far as Amber. _____
14. Casey moved $\frac{4}{9}$ of a yard more than Amber. _____
15. Minnie moved half as far as Amber. _____
16. Make up your own question about another snail, Shelly. Ask a classmate to solve it.

► The Commutative Property and Fractions

$\frac{a}{b} \times \frac{c}{d} = \frac{c}{d} \times \frac{a}{b}$ This relationship is known as the **commutative property**. Look at the proof below.

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d} = \frac{c \times a}{d \times b} = \frac{c}{d} \times \frac{a}{b}$$

Problem Step 1 Step 2 Step 3

17. Explain why each step is true.

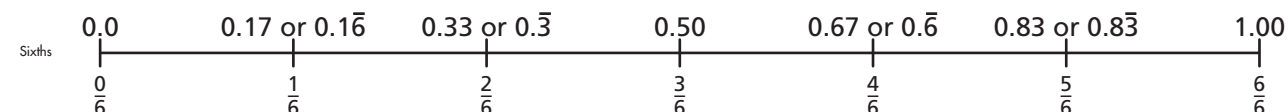
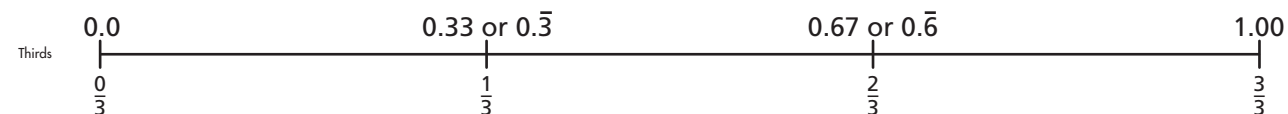
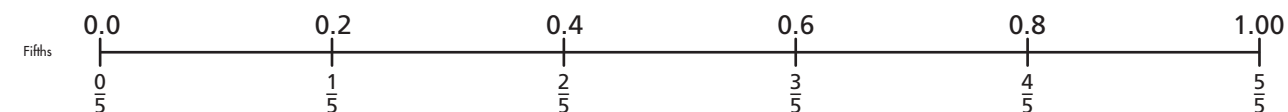
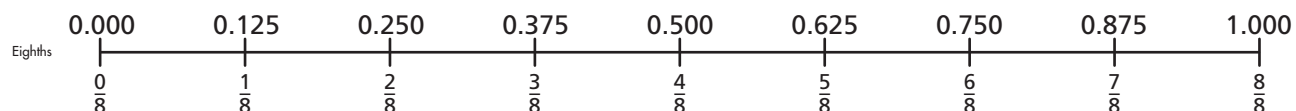
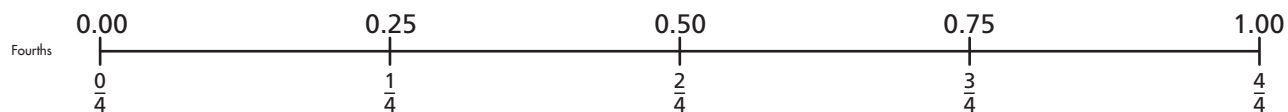
Step 1 _____

Step 2 _____

Step 3 _____

► Investigate Decimal Patterns

These number lines show decimal equivalents for some common fractions. Discuss patterns you see.



► Problems With Fractions and Decimals

Some problems use both fractions and decimals. Converting the fractions to decimals can sometimes make it easier to compare or work with the numbers.

Solve.

Show your work.

1. Malcolm made $\frac{2}{7}$ of his free throws this year. His friend Darius made 0.31 of his free throws. Who has a better free-throw record this year?

2. Zoe made \$1,000 last year and saved $\frac{7}{8}$ of it. This year she also made \$1,000 and saved \$890. How much more did she save this year?

3. Berta needs $\frac{7}{8}$ of a pint of whipped cream to make a dessert. She has 0.9 of a pint. How much whipped cream will be left over?

4. The bolts that hold the cables on Trudi's bike measure about 0.12 inches across. She has a set of wrenches in these sizes, measured in fractions of an inch:

$$\frac{5}{32}, \frac{1}{8}, \frac{3}{16}, \frac{1}{4}, \frac{3}{32}$$

Which wrench should she use?

5. Trudi also needs to tighten the axle bolts, which measure 0.4 inches across. Does she have a wrench large enough?



► Explore Fractional Shares

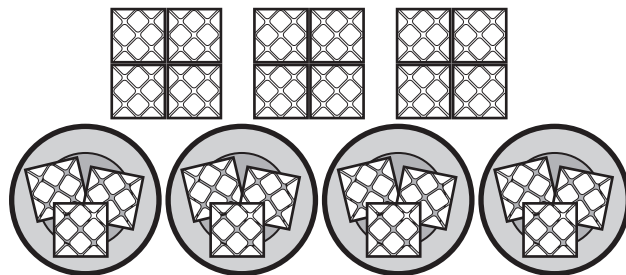
There are 4 people in the Walton family, but there are only 3 waffles. How can the Waltons share the waffles equally?

Divide each waffle into 4 pieces.

Each person's share of one waffle is $\frac{1}{4}$.

Since there are 3 waffles, each person gets 3 of the $\frac{1}{4}$ s, or $\frac{3}{4}$ of a waffle.

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



1. Suppose there are 5 people and 4 waffles.

What is each person's share of 1 waffle? _____

What is each person's share of 4 waffles? _____

Complete the equation: $4 \div 5 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

2. Suppose there are 10 people and 7 waffles.

What is each person's share of 1 waffle? _____

What is each person's share of 7 waffles? _____

Complete the equation: $7 \div 10 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

Complete.

3. $5 \div 6 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

4. $4 \div 9 = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

Give your answer in the format of an equation.

5. How can you divide 7 waffles equally among 8 people?

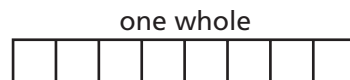
6. How can you divide 39 waffles equally among 5 serving plates?

7. Discuss why these equations are true for any whole numbers n and d .

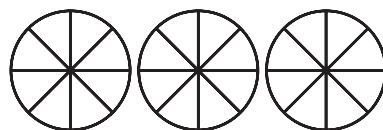
$$n \div d = \underbrace{n \times \frac{1}{d}}_{n \text{ unit fractions}} = \frac{n}{d}$$

► **Divide by a Unit Fraction**

8. How many $\frac{1}{8}$ s are there in 1? Write a division equation to show this.



9. How many $\frac{1}{8}$ s are there in 3? Write a division equation to show this.



10. Why can you also use the multiplication equation $3 \times 8 = 24$ to show how many $\frac{1}{8}$ s are in 3?

11. How many $\frac{1}{4}$ s are there in 5? Write a division and a multiplication equation to show this.



12. Complete the equation. w and d are whole numbers.

$w \div \frac{1}{d} =$

Write a division equation. Use multiplication to solve each word problem.

13. Olivia made 9 sandwiches and cut each one into fourths. How many fourths does she have?

14. The 10 members of a hiking club will walk 9 miles. Each person will carry the food pack for an equal distance. How far will each hiker carry the food pack?

15. Damon has a 6-pound bag of cat food. He feeds his cat $\frac{1}{8}$ pound every day. How many days will the bag last?

16. Jodie has a box of 12 chocolates. She and her 7 friends will share them equally. How many chocolates will each person get? Give your answer as a simplified mixed number.

Show your work.

► Add, Subtract, Compare, and Multiply Fractions

The fraction box to the right shows the same two fractions compared, added, subtracted, and multiplied.

Complete the fraction box.

	$\frac{1}{3}$ and $\frac{1}{6}$
>	$\frac{1}{3} > \frac{1}{6}$ or $\frac{2}{6} > \frac{1}{6}$
+	$\frac{1}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$
-	$\frac{1}{3} - \frac{1}{6} = \frac{2}{6} - \frac{1}{6} = \frac{1}{6}$
×	$\frac{1}{3} \times \frac{1}{6} = \frac{1}{18}$

1.

	$\frac{2}{5}$ and $\frac{7}{10}$
>	
+	
-	
×	

2.

	$\frac{3}{5}$ and $\frac{4}{7}$
>	
+	
-	
×	

3. How are adding, subtracting, and comparing fractions alike?

4. How is multiplication different from the other operations?

Dear Math Students,

One of my friends said that he would give $\frac{1}{2}$ of his sandwich to me and $\frac{1}{2}$ of his sandwich to my sister. My sister said, "But then you won't have any left for yourself." This doesn't make sense to me. I know that $\frac{1}{2} + \frac{1}{2} = \frac{2}{4}$. My friend should have plenty left for himself. Did I do something wrong? What do you think?

Puzzled Penguin



5. Write a response to the Puzzled Penguin.

► **Word Problems With Mixed Operations**

Solve. Answer first in unsimplified form and then in the simplest form.

6. Yesterday Mr. Swenson made $2\frac{3}{4}$ quarts of strawberry jam and $1\frac{1}{8}$ quarts of raspberry jam. How much more strawberry jam did he make than raspberry?

7. Today Mr. Swenson is making $\frac{2}{5}$ of a quart of grape jelly. He will give $\frac{1}{2}$ of this amount to his neighbor. How many quarts will the neighbor get?

8. Mr. Swenson is also making $2\frac{1}{6}$ quarts of cherry jelly and $3\frac{1}{12}$ quarts of orange jelly. He will mix the two kinds together. How much of this mixed jelly will he have?

9. Yesterday Mr. Swenson made $\frac{7}{10}$ of a quart of blueberry jam. His family ate $\frac{1}{10}$ of it. How much of the blueberry jam is left?

10. Suppose Mr. Swenson has jars that hold $\frac{5}{6}$ of a quart, jars that hold $\frac{3}{4}$ of a quart, and jars that hold $\frac{2}{3}$ of a quart. Which size holds the most? Which size holds the least? How do you know?

11. Suppose Mr. Swenson has jars in these sizes:
 $\frac{3}{4}$ quart, $\frac{2}{5}$ quart, $\frac{5}{8}$ quart, $\frac{4}{5}$ quart, $\frac{3}{10}$ quart

Give the size of these jars in decimal numbers.

► Divide a Whole Number by a Fraction

Solve. Use the number lines to help you.

A mountain trail is 6 miles long. A group of runners will race to the top of the mountain.

- The runners expect to see a marker every $\frac{1}{4}$ mile. How many markers will they see? Write the division equation and the answer.

Think: How many $\frac{1}{4}$ s are there in 6? Look at the number line.



- The runners expect a water station every $\frac{3}{4}$ mile. Write the division equation and the answer. How many water stations will there be?

Think: How many $\frac{3}{4}$ s are there in 6? Use the number line.



- How many times as great is your first answer as your second answer? Explain why.

- Explain why you can solve $6 \div \frac{3}{4}$ in two steps: $6 * 4 = 24$ and then $24 \div 3 = 8$.

► Divide a Fraction by a Fraction

Solve.

5. Alison has $\frac{2}{3}$ of an hour to write postcards. It takes her $\frac{1}{6}$ of an hour to write each one. How many can she write? Write the division equation and the answer.

Think: How many $\frac{1}{6}$ s are in $\frac{2}{3}$? Use the number line.



► Solve Multiplication Equations

Find the unknown factor. Rewrite the equation as a division.

Division Equation

6. $\frac{2}{3} \times \underline{\hspace{2cm}} = \frac{8}{15}$

$\frac{8}{15} \div \frac{2}{3} = \underline{\hspace{2cm}}$

7. $\frac{5}{7} \times \underline{\hspace{2cm}} = \frac{15}{56}$

8. $\frac{5}{6} \times \underline{\hspace{2cm}} = \frac{15}{24}$

9. $\frac{2}{5} \times \underline{\hspace{2cm}} = \frac{6}{20}$

10. $\frac{5}{8} \times \underline{\hspace{2cm}} = \frac{20}{72}$

These products have been simplified. Use the unsimplified fraction to divide.

11. $\frac{2}{5} \times \underline{\hspace{2cm}} = \frac{6}{20} = \frac{3}{10}$

12. $\frac{3}{4} \times \underline{\hspace{2cm}} = \frac{15}{24} = \frac{5}{8}$

► Unsimplify to Make the Product Divisible

$\frac{2}{3} \div \frac{5}{7} = ?$ We cannot divide the top by 5 or the bottom by 7.

We need to unsimplify $\frac{2}{3}$ so we can divide: $\frac{2}{3} \times \left(\frac{5}{5} \times \frac{7}{7}\right)$

1. Why do you multiply by $\frac{5}{5}$ and $\frac{7}{7}$?

Now let's divide: $\frac{2 \times 5 \times 7}{3 \times 5 \times 7} \div \frac{5}{7} = \frac{(2 \times 5 \times 7) \div 5}{(3 \times 5 \times 7) \div 7}$

2. In the numerator, $5 \div 5 = 1$.

Divide and write the simplified numerator: _____

3. In the denominator, $7 \div 7 = 1$.

Divide and write the simplified denominator: _____

4. Complete the new equation. $\frac{2 \times \underline{\hspace{1cm}}}{3 \times \underline{\hspace{1cm}}} = \underline{\hspace{1cm}}$

5. What happened to the divisor $\frac{5}{7}$ in step 4?

Unsimplify the product to complete each division.

6. $\frac{3}{8} \div \frac{2}{5} = \underline{\hspace{1cm}} \quad \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

7. $\frac{4}{9} \div \frac{3}{8} = \underline{\hspace{1cm}} \quad \underline{\hspace{1cm}} = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

8. $\frac{2}{9} \div \frac{3}{10} = \underline{\hspace{1cm}} \quad \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

9. $\frac{2}{7} \div \frac{4}{3} = \underline{\hspace{1cm}} \quad \underline{\hspace{1cm}} = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$



► Understand Division by Inversion

You can unsimplify and divide in one step.

Unsimplify and divide.

Multiply

$$\frac{2}{3} \div \frac{5}{7} = \frac{2 \times \overbrace{5 \times 7}^1}{3 \times \underbrace{5 \times 7}_1} \div \frac{5}{7} = \frac{2}{3} \times \frac{7}{5} = \frac{14}{15}$$

10. How is the final multiplication related to the original division?

11. Complete the algebra equation.

$$\frac{a}{b} \div \frac{c}{d} = _ \times _$$

12. Use the algebra equation to help you divide.

$$\frac{4}{9} \div \frac{3}{5} = \underline{\hspace{2cm}}$$

13. Solve the equation by unsimplifying the factor.

$$\frac{4}{9} \div \frac{3}{5} = \underline{\hspace{2cm}}$$

14. What do you notice about the answers to exercises 12 and 13?

► Practice Fractional Division

Complete these fractional divisions using any method.

15. $\frac{1}{10} \div \frac{2}{3} = \underline{\hspace{2cm}}$

16. $\frac{5}{12} \div \frac{5}{6} = \underline{\hspace{2cm}}$

17. $\frac{2}{9} \div \frac{3}{4} = \underline{\hspace{2cm}}$

18. $2\frac{1}{4} \div \frac{3}{4} = \underline{\hspace{2cm}}$

19. $\frac{15}{16} \div \frac{5}{4} = \underline{\hspace{2cm}}$

20. $\frac{15}{32} \div \frac{3}{4} = \underline{\hspace{2cm}}$

► Solve Fraction Word Problems

The Skyline Skateboard Factory times its workers to see how fast they work. The table shows the time it takes each worker at the factory to make one skateboard. Use the table to solve each problem.

Worker	Time
Kristy	$\frac{3}{5}$ hours
Arturo	$\frac{2}{3}$ hours
Cleta	$\frac{5}{6}$ hours
Tim	$\frac{3}{4}$ hours

- Tim worked for $3\frac{3}{4}$ hours. How many skateboards did he make?


- Today Kristy worked for $3\frac{1}{3}$ hours. How many skateboards and part-skateboards did she make?

- Cleta usually works 5 hours a day. How many skateboards and part-skateboards can she make in a day?

- Yesterday Arturo worked $5\frac{1}{3}$ hours. How many skateboards and part-skateboards did he make?

- Who is the fastest worker at the Skyline Skateboard Factory?

Show your work.

-  **6. On the Back** Write a real-world word problem with a solution that involves dividing $3\frac{1}{3}$ by $\frac{3}{5}$. Solve your problem.

► Solve Word Problems With Multiplication and Division

Decide whether you need to multiply or divide. Then solve each problem.

1. A turtle crawls $3\frac{1}{3}$ yards in an hour. How far will it crawl in 2 hours?

How far will the turtle crawl in $\frac{3}{4}$ of an hour?

2. Emily has $\frac{3}{5}$ of a ton of sand. She will move it by wheelbarrow to the garden. Her wheelbarrow holds $\frac{1}{10}$ of a ton. How many trips will she make?

3. Tawanna runs $2\frac{7}{10}$ miles every day. She stops every $\frac{9}{10}$ of a mile to rest. How many stops does she make?

4. Roberto has a recipe that calls for $\frac{3}{4}$ cup of flour. He wants to use only $\frac{1}{2}$ of the recipe today. How much flour will he need?

5. A picnic jug holds $\frac{5}{8}$ of a gallon of lemonade. Each paper cup holds $\frac{1}{12}$ of a gallon. How many paper cups, and parts of cups, can be filled?

6. On the White Gate Chicken Farm $\frac{7}{8}$ of the eggs usually hatch. This year only $\frac{2}{3}$ as many eggs hatched. What fraction of the eggs hatched this year?

► Compare Fractional and Whole-Number Results

In the equations below, a and b are whole numbers greater than 1. $\frac{n}{d}$ is a fraction less than 1. Answer the questions about the equations.

Multiplication

7. $a \times b = c$

Will c be greater than or less than a ? _____ Why?

8. $a \times \frac{n}{d} = c$

Will c be greater than or less than a ? _____ Why?

Division

9. $a \div b = c$

Will c be greater than or less than a ? _____ Why?

10. $a \div \frac{n}{d} = c$

Will c be greater than or less than a ? _____ Why?

Circle the greater answer. Do not try to calculate the answer.

11. $4,826 \times 581$ $4,826 \div 581$

12. $\frac{27}{83} \times \frac{13}{72}$ $\frac{27}{83} \div \frac{13}{72}$



► Predict the Size of the Result

Decide what operation to use, predict the size of the result, then solve the problem.

13. Lucy spends 4 hours a week baby-sitting. Her sister Lily spends $\frac{7}{8}$ as much time baby-sitting. Does Lily baby-sit for more or less than 4 hours?

Now find the exact amount of time that Lily baby-sits.

14. Yoshi has a rope 30 feet long. He must cut it into pieces that are each $\frac{5}{6}$ of a foot long. Will he get more or fewer than 30 pieces?

Now find the exact number of pieces that Yoshi will get.

15. Carlos can throw a ball 14 yards. His friend Raul can throw $\frac{3}{7}$ of that distance. Is Raul's throw longer or shorter than 14 yards?

Now find the exact length of Raul's throw.

16. An apple orchard covers 12 acres. There is a watering spout for every $\frac{1}{4}$ of an acre. Are there more or fewer than 12 watering spouts?

Now find the exact number of watering spouts in the orchard.

► Choose the Operation

Decide what operation to use. Then solve. Simplify your answers.

- Hala can ride her bike $7\frac{1}{2}$ miles in an hour. How far will she ride in 3 hours? How far will she ride in $\frac{2}{3}$ of an hour?
- Eryn's pet rabbit eats $\frac{5}{12}$ of a pound of food every day. If Eryn buys rabbit food in 5-pound bags, how often does she buy a new bag of rabbit food?
- Jason practices the trumpet for $1\frac{2}{3}$ hours every day. He stops every $\frac{1}{3}$ of an hour to rest. How many stops does he make?
- Jonathan can throw a baseball $10\frac{1}{3}$ yards. His brother Joey can throw a baseball $13\frac{1}{12}$ yards. How much farther can Joey throw the ball?
- Kim bought $\frac{3}{8}$ of a pound of sunflower seeds and $\frac{3}{16}$ of a pound of thistle seed for her bird feeder. How much seed did she buy in all?
- Cassandra's fish bowl holds $\frac{9}{10}$ of a gallon of water. It is now $\frac{2}{3}$ full. How much water does it have?

► Estimate Answers

- Marcus plays basketball for 9 hours each week. His friend Luis spends $\frac{5}{6}$ as much time playing basketball. Who plays more basketball?
- How much time does Luis spend playing basketball?
- Stacey's long jump is 10 feet. That is $\frac{5}{6}$ of a foot longer than Ron's jump. Does Ron jump more or less than 10 feet?
- How long was Ron's jump?

► Practice Fractional Operations

Answer in the simplest form.

11. $\frac{7}{15} \div \frac{2}{3} =$ _____

12. $\frac{5}{12} \div \frac{3}{8} =$ _____

13. $\frac{1}{8} + \frac{5}{6} =$ _____

14. $\frac{4}{9} \div 8 =$ _____

15. $\frac{4}{7} - \frac{1}{3} =$ _____

16. $\frac{5}{8} \times \frac{5}{12} =$ _____

17. $\frac{3}{5} - \frac{6}{35} =$ _____

18. $\frac{2}{5} \times 5 =$ _____

19. $\frac{1}{6} + \frac{2}{9} =$ _____

20. $\frac{2}{3} - \frac{1}{12} =$ _____

21. $\frac{7}{8} \times \frac{2}{5} =$ _____

22. $3 - \frac{4}{5} =$ _____

► Summarize

a is a whole number greater than 1.

$\frac{n}{d}$ is a fraction less than 1.

Write whether c is greater than ($>$) or less than ($<$) a .

23. $a \times \frac{n}{d} = c$ c a

24. $a \div \frac{n}{d} = c$ c a

25. $a + \frac{n}{d} = c$ c a

26. $a - \frac{n}{d} = c$ c a