

Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions



Into: Fractions, Multiplication, and Division

Talk About . . .

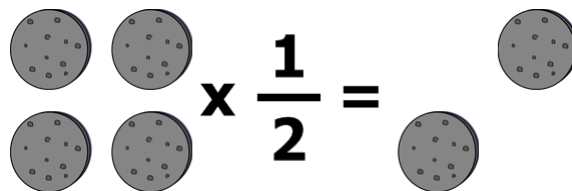
LESSON OBJECTIVE

When you complete this lesson, you will be able:

- To multiply a whole number by a fraction and reduce to lowest form.

• What Are Fractions?.

For example: *Remember, fractions are used when we break up a whole into pieces. Then we can describe pieces of the whole.*



• **The Concept of a Whole.** For example: *In the past, we often used the whole to be 1 whole pizza or 1 whole cookie. But today, we're going to work on different kinds of wholes like a bag of cookies or a room full of people -- that's going to be our whole we're going to break up.*

REVIEW



Is $\frac{3}{6}$ equal to $\frac{1}{2}$?

Make sure you prove your answer both directly (symbolically) and by using pictures:



Find a common denominator for all the fractions below and then order them from least to greatest:

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

Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions



Investigate: How Many Cookies Did You Eat

DIRECTIONS

Get the "little" cookies attached to his handouts.

They are colored on two sides -- use the light side to mean "A Cookie You Ate" and the dark side to mean "A Cookie You Have Left"

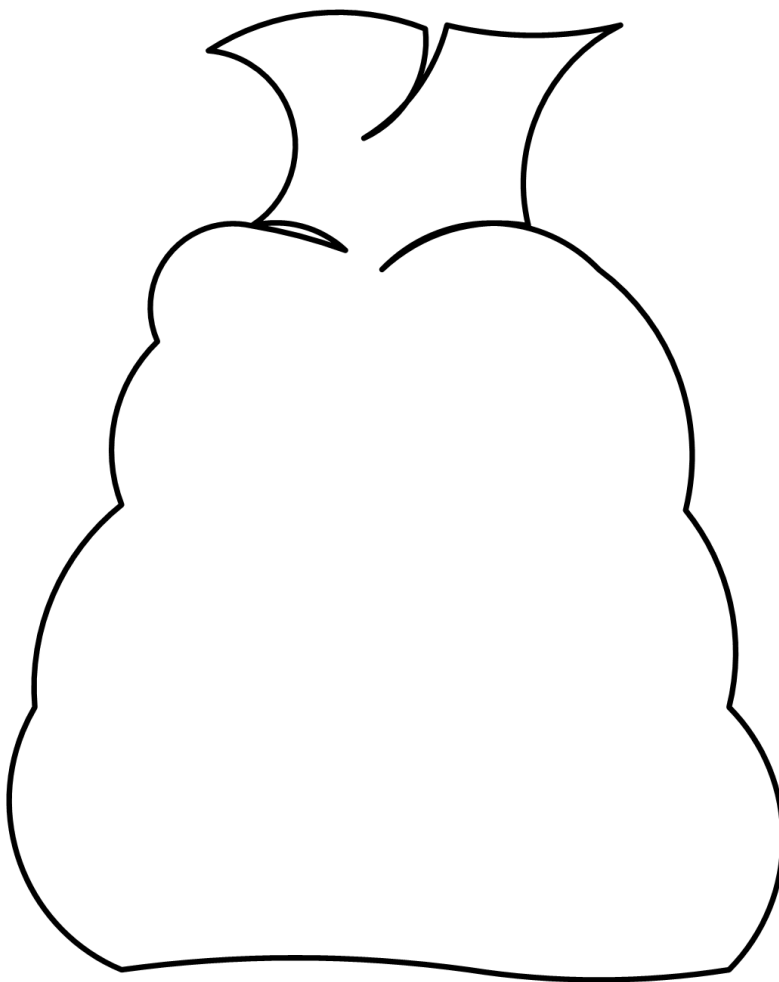
Use this bag and the cookies to solve the problems below:

TUTOR PROMPT

Keep making up examples. Use evenly divisible fractions -- for example for eight cookies use $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$. For six cookies use $\frac{1}{3}$ and $\frac{2}{3}$, etc.

The bag of cookies is "the whole" in these problems. So, in this problem, you "ate $\frac{3}{4}$ of the bag of cookies."

Reinforce the similarity between breaking up a circle and breaking up this "bag of cookies" which is our "whole amount" in this problem.



Let's say you eat **three-fourths** of the bag of cookies. Show that with the cutouts.



How many cookies did you eat?

How many cookies do you have left?

How **much of the bag** of cookies did you eat?



In these problems, what is "the whole?"

Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions



How To: Multiply By A Fraction

Take the following problem: You buy a bag of cookies. Each bag contains 8 cookies. You then eat three-fourths of a bag of cookies. How many cookies did you eat?

Let's look at how to solve this using pictures and by multiplying by a fraction:

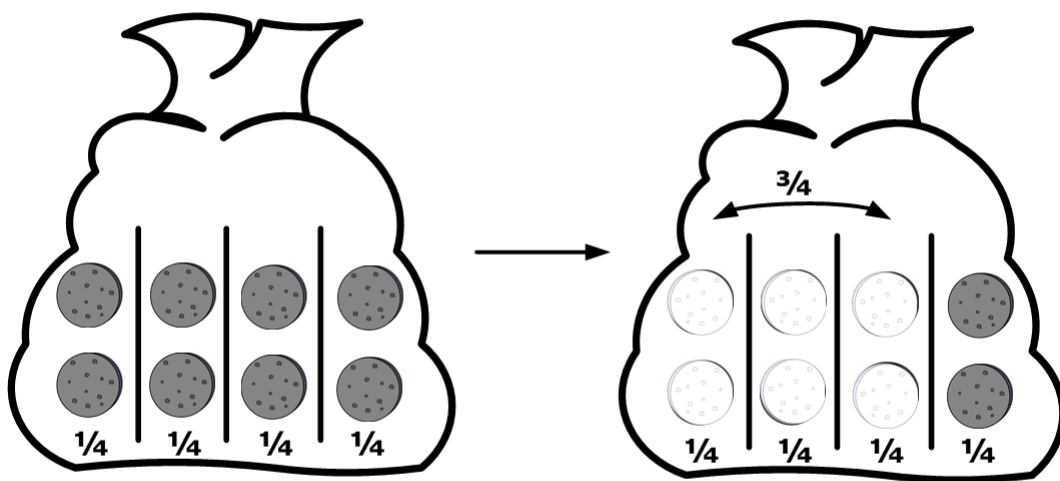
TUTOR PROMPT

Point out the use of the word "of". We need three-fourths of a bag.

$\frac{3}{4}$ of 8 cookies

TUTOR PROMPT

Point out -- "How much is $\frac{1}{4}$ of a bag? -- it's 2 cookies. So how many fourths do we have? three-fourths. So we ate $2 \times 3 = 6$ cookies.



TUTOR PROMPT

Show them there's more than one way to solve a problem. First, multiply to get $\frac{24}{4}$. Then reduce to get $\frac{6}{1} = 6$.

$$8 \times \frac{3}{4} = \frac{\cancel{8}^2}{1} \times \frac{3}{\cancel{4}_1} = \frac{6}{1} = 6$$

Cancel!



At the start of your birthday party there are ten people at your house. By 7pm, two-fifths of them have gone home. How many people went home?

Solve this with pictures and by multiplying by a fraction.

Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions

 Compute It

Q1 **$9 \times \frac{1}{3} =$**

Q2 **$10 \times \frac{1}{5} =$**

NOTE TO TUTOR

At times, use the cookies to represent the problem.

Also, at times represent the problem using pictures. Sometimes draw a picture for your students and vice versa.

Q3 **$\frac{1}{4} \times 16 =$**

Q4 **$15 \times \frac{2}{3} =$**

Q5 **$\frac{3}{5} \times 10 =$**

Q6 **$8 \times \frac{0}{2} =$**

Q7 **$\frac{3}{7} \times 14 =$**

Q8 **$14 \times \frac{7}{7} =$**

Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions



Investigate

Q: Soran buys 8 pounds of hamburger at the store. That night, he uses one-third of his hamburger for dinner. How many pounds of hamburger did Soran use for dinner?

Make sure to draw a picture to represent the problem. Then solve:

NOTE TO TUTOR

Make sure your student writes out the multiplication problem " $8 \times \frac{1}{3} =$ ".



A roll of carpet contains 14 square yards. To cover a hall wall in his house, Joe needs one-fifth a roll of carpet. How many square yards of carpet does he need?

Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions



How To: Use Fraction Multiplication Strategies

There are **many ways** to multiply fractions.

Here's a common strategy used by many people:

- 1 First, write both numbers as fractions and line up the two numbers.
- 2 Then, cross cancel out anything you can.
- 3 Multiply the numerator and the denominators.
- 4 Reduce the fraction to a mixed number in lowest form.

Cancel by 2!

$$8 \times \frac{5}{6} = \frac{\cancel{8}^4}{1} \times \frac{5}{\cancel{6}_3} = \frac{20}{3} = 6 \frac{2}{3}$$

REMEMBER!!! Sometimes you can't cancel anything.

Change Improper Fraction to Mixed Number

Now let's try some practice:

Q9 $8 \times \frac{5}{6} =$

Q10 $15 \times \frac{3}{10} =$

But remember, the most important thing is that **you understand** what's going on. You can use any strategy you want, as long as everything is making sense.

These are just steps many people use because **they are usually the fastest**.

REMEMBER!

It's more important that you understand what's going on and can draw a picture to represent the problem than remember these steps.

You might forget the steps, but if you understand what's going on you'll always get to the right solution, even if it takes a little longer.

Q11 $11 \times \frac{1}{2} =$

Q12 $15 \times \frac{5}{6} =$

Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions

 Compute It

Q13 **9** x $\frac{1}{2}$ =

Q14 **10** x $\frac{1}{3}$ =

Q15 **12** x $\frac{1}{5}$ =

Q16 **5** x $\frac{2}{3}$ =

Q17 **14** x $\frac{2}{3}$ =

Q18 **9** x $\frac{5}{6}$ =



You buy a ten-gallon bucket of paint and use one-third of the bucket.
How many gallons of paint did you use?

Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions



Closure

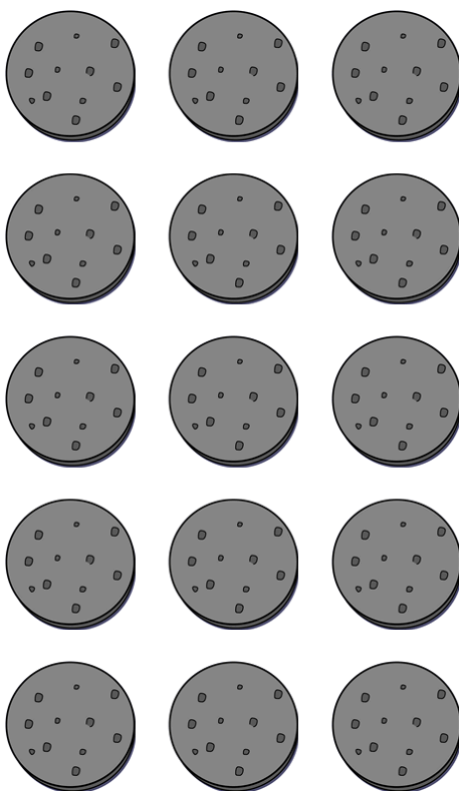
What did we learn about today?

What do you find hard about multiplying fractions?

Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions

-- cutouts --



Handout #1

FRAC-MW: Multiplying Whole Numbers and Fractions

-- cutouts --

