

**Objectives:**

- Students will memorize the multiplication table, as evidenced by them passing “minute quizzes.”
- Students will convert mixed numbers to improper fractions, as evidenced by them completing a warm-up worksheet where they do so.
- Students will multiply fractions by whole numbers, as evidenced by them completing a homework assignment where they do so.
- Students will multiply mixed numbers by converting them to improper fractions and then multiplying, as evidenced by them completing a homework assignment where they do so.

**Student Materials on Desk Corner:**

- Homework #2-11
- Homework Checker
- Readiness Checker

**Student Materials for Class:**

- Homework Log
- Binder Paper
- Pencils

**Teacher Materials:**

- “Warm-up 2-12” for each student
- “Minute Quiz 2-12” for each student
- “Homework #2-11” answer key and grading roster for TA
- “Homework #2-12” handout for each student

**Homework:**

- Homework #2-12

Time	Activity
Before Bell	<p style="text-align: center;"><b>DO NOW</b></p> <p>As students enter the classroom, shake hands and give them a copy of the <b>warm-up</b>. Remind students that there is a minute quiz, so students need to be seated quietly with a pencil when the bell rings.</p>
5 min	<p style="text-align: center;"><b>MINUTE QUIZ, HOMEWORK COLLECTION, AND WARM-UP</b></p> <p><b>Minute Quiz</b> When the bell rings, quickly go around and put the <b>minute quiz</b> on each student’s desk, facedown. Then, start everyone on the quiz at the same time and give everyone one minute. While students are working on the quiz, stamp the <b>readiness checkers</b> of students who were ready when the bell rang and had their readiness checkers out.</p> <p><b>Homework Collection</b> Instruct the TA go around and collect <b>homework</b> and stamp <b>homework checkers</b>. Give the TA the answer key and have him or her grade the homework that was collected.</p> <p><b>Warm-up</b> After the minute quiz, students should work on the <b>warm-up</b> while you take <b>attendance</b>.</p>
35 min	<p style="text-align: center;"><b>LESSON: MULTIPLYING SPECIAL FRACTIONS</b></p> <p><b>Notes</b> Follow the handwritten Cornell Notes.</p> <p><b>Homework</b> Pass out the “Homework #2-12” handout and have students write down the assignment on their homework logs.</p>
40 min	<p style="text-align: center;"><b>ALEKS</b></p> <p>Students should continue with <b>ALEKS</b>. Use this student work time to <b>return graded homework</b>.</p>

**Solve the following multiplication problems. You have exactly one minute!**

$1 \cdot 8 =$

$1 \cdot 5 =$

$4 \cdot 5 =$

$2 \cdot 9 =$

$12 \cdot 7 =$

$2 \cdot 11 =$

$1 \cdot 3 =$

$9 \cdot 12 =$

$1 \cdot 12 =$

$10 \cdot 8 =$

$6 \cdot 9 =$

$2 \cdot 7 =$

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$6 \cdot 9 =$

$2 \cdot 7 =$

**Solve the following multiplication problems. You have exactly one minute!**

$8 \cdot 12 =$

$9 \cdot 7 =$

$9 \cdot 3 =$

$5 \cdot 8 =$

$6 \cdot 5 =$

$7 \cdot 8 =$

$12 \cdot 6 =$

$7 \cdot 4 =$

$6 \cdot 3 =$

$5 \cdot 9 =$

$1 \cdot 6 =$

$8 \cdot 9 =$

**Solve the following multiplication problems. You have exactly one minute!**

$8 \cdot 12 =$

$9 \cdot 7 =$

$9 \cdot 3 =$

$5 \cdot 8 =$

$6 \cdot 5 =$

$7 \cdot 8 =$

$12 \cdot 6 =$

$7 \cdot 4 =$

$6 \cdot 3 =$

$5 \cdot 9 =$

$1 \cdot 6 =$

$8 \cdot 9 =$

**Solve the following multiplication problems. You have exactly one minute!**

$8 \cdot 12 =$

$9 \cdot 7 =$

$9 \cdot 3 =$

$5 \cdot 8 =$

$6 \cdot 5 =$

$7 \cdot 8 =$

$12 \cdot 6 =$

$7 \cdot 4 =$

$6 \cdot 3 =$

$5 \cdot 9 =$

$1 \cdot 6 =$

$8 \cdot 9 =$

**Solve the following multiplication problems. You have exactly one minute!**

$12 \cdot 6 =$

$9 \cdot 6 =$

$10 \cdot 5 =$

$10 \cdot 6 =$

$8 \cdot 8 =$

$6 \cdot 9 =$

$12 \cdot 2 =$

$12 \cdot 6 =$

$8 \cdot 5 =$

$6 \cdot 10 =$

$6 \cdot 11 =$

$3 \cdot 1 =$

**Solve the following multiplication problems. You have exactly one minute!**

$12 \cdot 6 =$

$9 \cdot 6 =$

$10 \cdot 5 =$

$10 \cdot 6 =$

$8 \cdot 8 =$

$6 \cdot 9 =$

$12 \cdot 2 =$

$12 \cdot 6 =$

$8 \cdot 5 =$

$6 \cdot 10 =$

$6 \cdot 11 =$

$3 \cdot 1 =$

**Solve the following multiplication problems. You have exactly one minute!**

$12 \cdot 6 =$

$9 \cdot 6 =$

$10 \cdot 5 =$

$10 \cdot 6 =$

$8 \cdot 8 =$

$6 \cdot 9 =$

$12 \cdot 2 =$

$12 \cdot 6 =$

$8 \cdot 5 =$

$6 \cdot 10 =$

$6 \cdot 11 =$

$3 \cdot 1 =$

**Convert the following mixed numbers into improper fractions.**

Ex.)  $2\frac{3}{4}$

1)  $3\frac{6}{7}$

2)  $1\frac{1}{2}$

$$2\frac{3}{4} = \frac{2 \cdot 4 + 3}{4} = \frac{8 + 3}{4} = \frac{11}{4}$$

3)  $6\frac{7}{10}$

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

5)  $4\frac{2}{6}$

**Convert the following mixed numbers into improper fractions.**

Ex.)  $2\frac{3}{4}$

1)  $3\frac{6}{7}$

2)  $1\frac{1}{2}$

$$2\frac{3}{4} = \frac{2 \cdot 4 + 3}{4} = \frac{8 + 3}{4} = \frac{11}{4}$$

3)  $6\frac{7}{10}$

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

5)  $4\frac{2}{6}$

## Multiplying Special Fractions

### Section → Multiplying Fractions by Whole Numbers

Recall to multiply two fractions, we write the product of the numerators over the product of the denominators, then simplify.

But, what about  $\frac{2}{3} \cdot 4$ ?

↑ what's the numerator and denominator of a whole number?

Well, 4 looks like



So, each pizza has one giant slice.

Then,  $4 = \frac{4}{1}$ .  
 ↑ one slice in a pizza

$$\text{So, } \frac{2}{3} \cdot 4 = \frac{2}{3} \cdot \frac{4}{1} = \frac{2 \cdot 4}{3 \cdot 1} = \frac{8}{3}$$

Finally, simplify:

$$\begin{array}{r} 3 \overline{)8} \\ \underline{-6} \\ 2 \end{array} \Rightarrow \frac{8}{3} = \boxed{2\frac{2}{3}}$$

Ex: Evaluate  $6 \cdot \frac{3}{4}$ .

$$6 \cdot \frac{3}{4} = \frac{6}{1} \cdot \frac{3}{4} = \frac{6 \cdot 3}{1 \cdot 4} = \frac{18}{4}$$

Now, simplify:

$$\begin{array}{r} 4 \overline{)18} \\ \underline{-16} \\ 2 \end{array} \Rightarrow \frac{18}{4} = 4\frac{2}{4}$$

↑ this can be simplified:  $\frac{2}{4} = \frac{2}{2 \cdot 2} = \frac{1}{2}$

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

Section → Multiplying Mixed Numbers

To multiply mixed numbers, we write them as improper fractions and then multiply like we normally would.

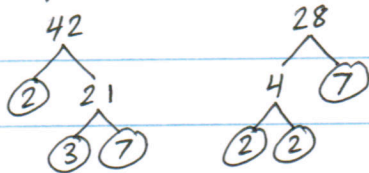
Ex:  $\frac{2}{7} \cdot 5\frac{1}{4} = ?$

convert to improper fraction

$$5\frac{1}{4} = \frac{5 \cdot 4 + 1}{4} = \frac{20 + 1}{4} = \frac{21}{4}$$

$$\frac{2}{7} \cdot \frac{21}{4} = \frac{42}{28}$$

Now, simplify:



$$42 = 2 \cdot 3 \cdot 7$$

$$28 = 2 \cdot 2 \cdot 7$$

$$\frac{42}{28} = \frac{2 \cdot 3 \cdot 7}{2 \cdot 2 \cdot 7} = \frac{3}{2}$$

↑  
improper fraction  
turn into mixed number

$$2 \overline{) 3} \Rightarrow \frac{3}{2} = 1\frac{1}{2}$$

Ex:  $1\frac{1}{2} \cdot 1\frac{5}{9} = ?$

$$\rightarrow 1\frac{5}{9} = \frac{1 \cdot 9 + 5}{9} = \frac{9 + 5}{9} = \frac{14}{9}$$

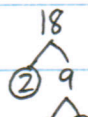
$$\rightarrow 1\frac{1}{2} = \frac{1 \cdot 2 + 1}{2} = \frac{2 + 1}{2} = \frac{3}{2}$$

$$\frac{3}{2} \cdot \frac{14}{9} = \frac{3 \cdot 14}{2 \cdot 9} = \frac{42}{18}$$

Now, simplify:

$$42 = 2 \cdot 3 \cdot 7$$

(from last example)



$$18 = 2 \cdot 3 \cdot 3$$

$$\frac{42}{18} = \frac{2 \cdot 3 \cdot 7}{2 \cdot 3 \cdot 3} = \frac{7}{3}$$

↑ turn into mixed number

$$\begin{array}{r} 2 \\ 3 \overline{) 7} \\ \underline{-6} \\ 1 \end{array} \Rightarrow \frac{7}{3} = \boxed{2 \frac{1}{3}}$$



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*The ideas in this fraction lesson are taken from the ebooks that are sold on this website. Only a few examples of each problem type are shown; you should make more problems of each kind for the student.*

## Multiplying fractions by a whole number

Free fraction lesson plan from [HomeschoolMath.net](http://HomeschoolMath.net)

Color first  $\frac{1}{6}$ . Color another  $\frac{1}{6}$ . Continue till you have colored seven times  $\frac{1}{6}$ .



Color first  $\frac{2}{5}$ . Color another  $\frac{2}{5}$ . Continue till you have colored four times  $\frac{2}{5}$ .



We know that multiplication by a whole number is **repeated addition**:

$$5 \times 4 = 4 + 4 + 4 + 4 + 4 = 20$$

$$3 \times 120 = 120 + 120 + 120 = 360$$

Multiplying a fraction by a whole number works exactly the same:

$$3 \times \frac{1}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \text{---}$$

$$3 \times \frac{2}{9} = \frac{2}{9} + \frac{2}{9} + \frac{2}{9} = \text{---} = \text{---}$$

(simplify the answer)

### Example problem types

1. Write the multiplication problems as addition problems and solve. Give your answer as a mixed number and simplify the fractional parts to lowest terms whenever possible.

$$5 \times \frac{1}{4} =$$

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

$$4 \times \frac{2}{7} =$$

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

2. Do as above, but do the work in your notebook. Can you notice a SHORTCUT to the problems where you don't have to write them as addition?

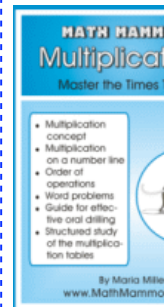
a.  $3 \times \frac{2}{9}$

c.  $5 \times \frac{1}{6}$

e.  $8 \times \frac{1}{9}$

g.  $4 \times \frac{5}{7}$

i.  $6 \times \frac{7}{10}$



Learn...

- Multiplication concepts
- Times tables
- Word problems

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The shortcut is (explain)

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Remember?

To find  $\frac{1}{2}$  of a number you need to \_\_\_\_\_

To find  $\frac{1}{3}$  of a number you need to \_\_\_\_\_

To find  $\frac{1}{4}$  of a number you need to \_\_\_\_\_

A fraction of a number is the same as **that fraction TIMES the number**. In other words, the word 'of' translates into multiplication. For example:

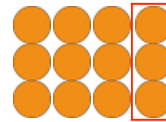
$$\frac{1}{2} \text{ of } 24 = \frac{1}{2} \times 24 = 12 \qquad \frac{1}{7} \text{ of } 35 = \frac{1}{7} \times 35 = 5$$

- Remember you can use division when finding  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{1}{5}$ , etc. of a number!

We know one can do multiplication both ways, or the order doesn't matter. In other words, **multiplication is commutative**. See the examples:

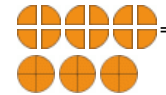
$\frac{1}{4} \times 12$  means **a fourth part of 12** (objects),

which is  $12 \div 4 = 3$ .



$12 \times \frac{1}{4}$  means **12 times  $\frac{1}{4}$** ,

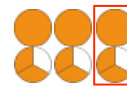
which is 3 wholes.



In other words, **fourth part of 12 is the same as 12 fourth parts.**

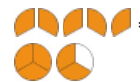
$\frac{1}{3} \times 5$  means **a third part of 5** (objects),

which is  $5 \div 3 = 1 \frac{2}{3}$ .



$5 \times \frac{1}{3}$  means **5 times  $\frac{1}{3}$** ,

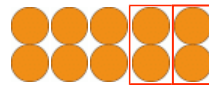
which is  $5/3 = 1 \frac{2}{3}$ .



In other words, **\_\_\_\_\_ part of 5 is the same as \_\_\_\_\_ parts.**

$\frac{2}{5} \times 10$  means **two-fifth parts of 10**,

which is  $(10 \div 5) \times 2 = 4$ .



$10 \times \frac{2}{5}$  means **10 times  $\frac{2}{5}$** ,

which is 4 wholes.



In other words, \_\_\_\_\_ part of 10 is the same as \_\_\_\_\_ parts.

The usual way of writing these is

$$\frac{1}{4} \times 12 = \frac{1 \times 12}{4} = \frac{12}{4} = 3 \quad \text{compare with} \quad 12 \times \frac{1}{4} = \frac{12 \times 1}{4} = \frac{12}{4} = 3$$

$$\frac{1}{3} \times 5 = \frac{1 \times 5}{3} = \frac{5}{3} = 1 \frac{2}{3} \quad \text{compare with} \quad 5 \times \frac{1}{3} = \frac{5 \times 1}{3} = \frac{5}{3} = 1 \frac{2}{3}$$

$$\frac{2}{5} \times 10 = \frac{2 \times 10}{5} = \frac{20}{5} = 4 \quad \text{compare with} \quad 10 \times \frac{2}{5} = \frac{10 \times 2}{5} = \frac{20}{5} = 4$$

### 3. Multiply.

a.  $5 \times \frac{7}{9}$       b.  $10 \times \frac{5}{12}$       c.  $\frac{4}{9} \times 7$       d.  $\frac{14}{25} \times 3$       e.  $16 \times \frac{1}{12}$

4. This morning one of the kids is sick, so Mom only wants to make  $\frac{2}{3}$  of the recipe. How much does she need of each ingredient? (dl stands for *deciliter*)

#### Pancakes

4 dl water  
2 eggs  
3 dl whole wheat flour  
(pinch of salt)  
50 g butter for frying

5. For a coming get-together, Alison needs to multiply the coffee recipe. Assume that half of the guests drink one serving, and the other half drink two servings. Find how much **coffee** she needs, if she has  
a) 30 guests    b) 50 guests    c) 80 guests.

#### Coffee (5 servings)

3  $\frac{1}{2}$  cups water  
 $\frac{1}{4}$  cup coffee

### Next lesson: Multiplying fractions, part 2

The ideas in this fraction lesson are taken from the [Fractions 2 ebook](#). Only a few examples of each problem type are shown; you should make more problems of each kind for the student.

[Understanding fractions](#)

[Part of whole group](#)

[Mixed numbers](#)

[Mixed number to fraction](#)

[Fraction to mixed number](#)

[Adding like fractions](#)

[Equivalent fractions](#)

[Adding unlike fractions](#)

[Adding mixed numbers](#)

[Subtracting mixed numbers](#)

[Subtracting mixed numbers 2](#)

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[Measuring in inches](#)

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Find the product of the following fractions and whole numbers by converting the whole numbers into fractions, multiplying, and simplifying.

Ex.)  $\frac{3}{4} \cdot 5$

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

Convert the whole number into a fraction and multiply:

$$\frac{3}{4} \cdot 5 = \frac{3}{4} \cdot \frac{5}{1} = \frac{3 \cdot 5}{4 \cdot 1} = \frac{15}{4}$$

Now, simplify:

$$4 \overline{) 15} \Rightarrow \frac{15}{4} = 3 \frac{2}{4} = 3 \frac{2}{2 \cdot 2} = 3 \frac{1}{2}$$
$$\begin{array}{r} 4 \overline{) 15} \\ \underline{-12} \\ 3 \end{array}$$

2)  $5 \cdot \frac{2}{15}$

3)  $\frac{3}{24} \cdot 7$

4)  $\frac{5}{10} \cdot 4$

5)  $\frac{3}{25} \cdot 8$

**Multiply the following mixed numbers by converting them to improper fractions, multiplying the numerators and denominators separately, and simplifying.**

Ex.)  $1\frac{1}{2} \cdot 3\frac{2}{5}$

6)  $2\frac{1}{4} \cdot 4\frac{2}{3}$

Convert the mixed numbers into improper fractions and multiply:

$$\begin{aligned} 1\frac{1}{2} \cdot 3\frac{2}{5} &= \frac{1 \cdot 2 + 1}{2} \cdot \frac{3 \cdot 5 + 2}{5} \\ &= \frac{2+1}{2} \cdot \frac{15+2}{5} = \frac{3}{2} \cdot \frac{17}{5} = \frac{51}{10} \end{aligned}$$

Now, simplify:

$$\begin{array}{r} 10 \overline{) 51} \Rightarrow \frac{51}{10} = 5\frac{1}{10} \\ \underline{-50} \\ 1 \end{array}$$

7)  $\frac{6}{7} \cdot 4\frac{1}{5}$

8)  $3\frac{1}{4} \cdot \frac{2}{5}$

9)  $3\frac{1}{3} \cdot 4\frac{1}{2}$

10)  $1\frac{1}{4} \cdot 2\frac{4}{5}$