

# Multiply and Divide Fractions and Mixed Numbers

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## 2.2 Multiply and Divide Fractions and Mixed Numbers

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[Figure 1]

The grade 8 students are going to plant flowers around the school. Each grade 8 class is given  $6\frac{1}{2}$  flats of flowers. The grade 8 classes are then split into groups and each group is given  $\frac{1}{4}$  of a flat. How many groups of grade 8 students are going out to plant flowers?

In this concept, you will learn to multiply and **divide** fractions and mixed numbers.

### Multiplying and Dividing Fractions

To **multiply two fractions**, simply multiply the numerators to get the **numerator** of the product, and multiply the denominators to get the **denominator** of the product.

Let's look at an example.

$$\text{Multiply: } \frac{2}{7} \times \frac{3}{5}$$

First, multiply the numerators and the denominators.

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

$$\frac{2}{7} \times \frac{3}{5} = \frac{6}{35}$$

The answer is  $\frac{6}{35}$ .

To divide two fractions, you first need to find the **reciprocal** of the **divisor**. That means that you need to flip the second fraction upside down. Then multiply the numerators and multiply the denominators.

Let's look at an example.

Divide:  $4\frac{3}{10} \div \frac{1}{2}$

First, change the **mixed number** to an **improper fraction**.

$$4 \times 10 + 3 = 43$$

$$4\frac{3}{10} = \frac{43}{10}$$

Next, flip the second fraction in **order** to multiply.

Therefore,  $\frac{1}{2}$  becomes  $\frac{2}{1}$ .

Then, multiply.

$$4\frac{3}{10} \div \frac{1}{2} = \frac{43}{10} \times \frac{2}{1}$$

$$= \frac{86}{10}$$

Then, **simplify** your answer as a mixed number.

$$\begin{aligned}\frac{86}{10} &= 8\frac{6}{10} \\ &= 8\frac{3}{5}\end{aligned}$$

The answer is  $8\frac{3}{5}$ .

## Examples

### Example 1

Earlier, you were given a problem about the groups planting flowers around the school.

There are six and one half flats of flowers given to each grade 8 class, and each group in the grade 8 class received  $\frac{1}{4}$  of a flat to plant.

Therefore, you need to divide  $6\frac{1}{2} \div \frac{1}{4}$  in order to find out the number of groups in each grade 8 class.

First, change the mixed number to an improper fraction.

$$\begin{aligned}6 \times 2 + 1 &= 13 \\ 6\frac{1}{2} &= \frac{13}{2}\end{aligned}$$

Next, flip the second fraction in order to multiply.

Therefore  $\frac{1}{4}$  becomes  $\frac{4}{1}$ .

Then, multiply.

$$\begin{aligned}6\frac{1}{2} \div \frac{1}{4} &= \frac{13}{2} \times \frac{4}{1} \\ &= \frac{52}{2}\end{aligned}$$

Then, simplify your answer.

$$\frac{52}{2} = 26$$

The answer is 26.

Therefore, there are 26 groups of grade 8 students in each class.

### Example 2

$$\frac{2}{3} \times \frac{4}{6}$$

First, multiply the numerators and the denominators.

$$\begin{aligned} \frac{2}{3} \times \frac{4}{6} &= \frac{2 \times 4}{3 \times 6} \\ \frac{2}{3} \times \frac{4}{6} &= \frac{8}{18} \end{aligned}$$

Next, **reduce** the fraction.

$$\frac{8}{18} = \frac{4}{9}$$

The answer is  $\frac{4}{9}$ .

### Example 3

$$9\frac{1}{4} \div \frac{1}{3}$$

First, change the mixed number to an improper fraction.

$$\begin{aligned} 9 \times 4 + 1 &= 37 \\ 9\frac{1}{4} &= \frac{37}{4} \end{aligned}$$

Next, flip the second fraction in order to multiply.

Therefore  $\frac{1}{3}$  becomes  $\frac{3}{1}$ .

Then, multiply.

$$\begin{aligned} 9\frac{1}{4} \div \frac{1}{3} &= \frac{37}{4} \times \frac{3}{1} \\ &= \frac{111}{4} \end{aligned}$$

Then, simplify your answer as a mixed number.

$$\frac{111}{4} = 27\frac{3}{4}$$

The answer is  $27\frac{3}{4}$ .

#### Example 4

$$\frac{1}{4} \times \frac{5}{6}$$

First, multiply the numerators and the denominators.

$$\begin{aligned} \frac{1}{4} \times \frac{5}{6} &= \frac{1 \times 5}{4 \times 6} \\ \frac{1}{4} \times \frac{5}{6} &= \frac{5}{24} \end{aligned}$$

The answer is  $\frac{5}{24}$ .

#### Example 5

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

First, change the mixed number to an improper fraction.

$$\begin{aligned} 2 \times 2 + 1 &= 5 \\ 2\frac{1}{2} &= \frac{5}{2} \end{aligned}$$

Next, flip the second fraction in order to multiply.

Therefore  $\frac{1}{3}$  becomes  $\frac{3}{1}$ .

Then, multiply.

$$\begin{aligned} 2\frac{1}{2} \div \frac{1}{3} &= \frac{5}{2} \times \frac{3}{1} \\ &= \frac{15}{2} \end{aligned}$$

Then, simplify your answer as a mixed number.

$$\frac{15}{2} = 7\frac{1}{2}$$

The answer is  $7\frac{1}{2}$ .

## Review

Multiply the following fractions. Be sure to simplify your answer when necessary.

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

2.  $\frac{3}{4} \times \frac{5}{6} = \underline{\hspace{2cm}}$

3.  $\frac{1}{6} \times \frac{1}{3} = \underline{\hspace{2cm}}$

4.  $\frac{5}{6} \times \frac{10}{12} = \underline{\hspace{2cm}}$

5.  $\frac{7}{8} \times \frac{1}{3} = \underline{\hspace{2cm}}$



6.  $\frac{8}{9} \times \frac{1}{3} = \underline{\hspace{2cm}}$

7.  $\frac{10}{11} \times \frac{2}{5} = \underline{\hspace{2cm}}$

8.  $\frac{9}{10} \times \frac{4}{6} = \underline{\hspace{2cm}}$

9.  $\frac{4}{7} \times \frac{1}{2} = \underline{\hspace{2cm}}$

Divide the following fractions. Be sure to convert any answers of improper fractions to mixed numbers.

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

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

12.  $\frac{8}{9} \div \frac{1}{2} = \underline{\hspace{2cm}}$

13.  $\frac{15}{16} \div \frac{1}{2} = \underline{\hspace{2cm}}$

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

15.  $\frac{5}{10} \div \frac{1}{2} = \underline{\hspace{2cm}}$

16.  $\frac{6}{8} \div \frac{3}{4} = \underline{\hspace{2cm}}$

17.  $\frac{6}{7} \div \frac{1}{2} = \underline{\hspace{2cm}}$

18.  $\frac{10}{12} \div \frac{1}{3} = \underline{\hspace{2cm}}$

## Review (Answers)

To see the review answers, return to the [Table of Contents](#) and select 'Other Versions' or 'Resources'.

## Resources

**Example: Multiply and simplify.**


$\frac{2}{3} \times \frac{6}{7}$ $\frac{\cancel{2}^2 \cdot \cancel{6}^2}{\cancel{3}^1 \cdot 7} = \frac{4}{7}$	$\frac{14}{15} \times \frac{36}{7}$ $\frac{\cancel{14}^2 \cdot \cancel{36}^4}{\cancel{15}^3 \cdot \cancel{7}^1} = \frac{32}{5}$
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$$\begin{array}{r} 36 \\ \wedge \quad \wedge \\ 6 \cdot 6 \\ \wedge \quad \wedge \\ 3 \cdot 3 \cdot 2 \cdot 2 \end{array}$$

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