

# Grade 6 - Dividing Fractions by Fractions - Lesson

Common Core 6.NS.A.1 · maths-pdf.fr/en/

This **divide fractions lesson** for 6th Grade covers dividing fractions by fractions (Common Core 6.NS.A.1), with a free PDF to print.

**To divide by a fraction, multiply by its reciprocal:  $a/b$  divided by  $c/d$  equals  $a/b$  times  $d/c$ . For example,  $5/6$  divided by  $2/3$  is  $5/6$  times  $3/2$ , which is  $15/12$ , or  $1\frac{1}{4}$ . The quotient tells how many groups of the divisor fit in the dividend, and visual models such as fraction strips show why.**

**Grade 6** · Common Core State Standards: **6.NS.A.1**

## Key facts in this divide fractions lesson

### Key facts

- Dividing by a fraction means multiplying by its reciprocal.
- Reciprocals multiply to 1:  $2/3$  and  $3/2$ .
- Write mixed numbers as improper fractions before dividing.
- Dividing by a fraction less than 1 gives a quotient greater than the dividend.
- Check a quotient by multiplying it by the divisor.

## What question does a fraction quotient ask?

A quotient answers "how many of these fit into that?" Take  $\frac{3}{4} \div \frac{1}{8}$ : count how many pieces of size one eighth you can cut from an amount of three fourths. Lay the strips side by side and you can see the count is six.

### Reciprocal

Flip a fraction upside down to get its **reciprocal**. The pair multiply to 1. So  $\frac{a}{b}$  pairs with  $\frac{b}{a}$ , and a whole number  $n$  pairs with  $\frac{1}{n}$ .

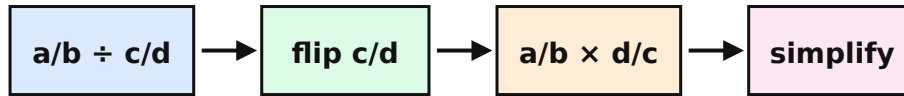


$3/4$  contains 6 pieces of size  $1/8$ , so  $3/4$  divided by  $1/8$  is 6.

## What is the rule for dividing by a fraction?

Turn the division into a multiplication by the divisor's reciprocal.

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



To divide, multiply by the reciprocal.

1. Convert any mixed number to an improper fraction.
2. Leave the dividend alone and swap the divisor for its reciprocal.
3. Change the sign from division to multiplication and multiply across.
4. Reduce the result, and rename it as a mixed number when that reads better.

**Worked example:**  $\frac{7}{9} \div \frac{2}{3} = \frac{7}{9} \times \frac{3}{2} = \frac{21}{18} = \frac{7}{6} = 1\frac{1}{6}$ .

## Why does flipping work?

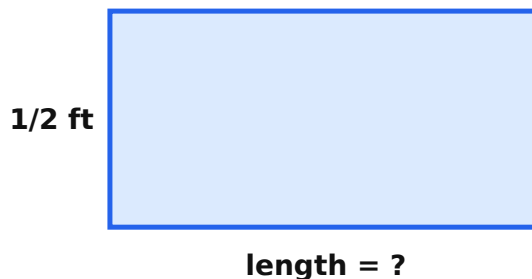
Think of  $3 \div \frac{1}{2}$  as hops of length one half along a number line from 0 to 3. Every unit contains two hops, so three units contain  $3 \times 2 = 6$  hops. Dividing by one half is the same as doubling.



How many halves fit in 3? Six jumps, so 3 divided by  $\frac{1}{2}$  is 6.

## Where do fraction quotients show up?

Choose division when a total is shared out evenly or when you want the number of portions. A rectangular garden bed with area  $\frac{3}{4} \text{ ft}^2$  and a width of  $\frac{1}{2} \text{ ft}$  has a length of  $\frac{3}{4} \div \frac{1}{2} = \frac{3}{2}$  feet.



If area = length x width, then length = area divided by width.

Division also finds a factor you do not know. If  $\frac{3}{5} \times ? = \frac{2}{3}$ , divide the product by the known factor:  $\frac{2}{3} \div \frac{3}{5} = \frac{2}{3} \times \frac{5}{3} = \frac{10}{9}$ .

Verify any quotient by multiplying it by the divisor; you must land back on the dividend, as in  $\frac{3}{2} \times \frac{1}{2} = \frac{3}{4}$ . When the divisor is smaller than 1, expect a quotient that is larger than the dividend.

## Divide fractions lesson: questions and answers

### How do you divide a fraction by a fraction?

Multiply the first fraction by the reciprocal of the second. For  $\frac{3}{4}$  divided by  $\frac{1}{8}$ , compute  $\frac{3}{4}$  times 8, which is 6.

### What is a reciprocal?

A reciprocal swaps the numerator and denominator. The reciprocal of  $\frac{2}{5}$  is  $\frac{5}{2}$ , and the product of a number and its reciprocal is 1.

### Why is the quotient bigger when you divide by a fraction less than 1?

Smaller pieces fit more times into the same amount. There are 6 pieces of size  $\frac{1}{8}$  in  $\frac{3}{4}$ .

### How do you divide a fraction by a whole number?

Write the whole number as a fraction over 1 and multiply by its reciprocal. For  $\frac{4}{5}$  divided by 2, compute  $\frac{4}{5}$  times  $\frac{1}{2}$ , which is  $\frac{2}{5}$ .

### How do you divide mixed numbers?

Change each mixed number to an improper fraction, then multiply by the reciprocal. For  $1 \frac{1}{2}$  divided by  $\frac{3}{4}$ , compute  $\frac{3}{2}$  times  $\frac{4}{3}$ , which is 2.

## How to use this divide fractions lesson

Read the definitions first, then follow the worked method line by line and redo the example on paper without looking. When every step makes sense, move on to the worksheet, then check yourself with the quiz.

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