

Grade 6 · Dividing Fractions · Lesson

Common Core 6.NS.A.1 · mathovore.fr

Dividing fractions asks how many equal groups fit, or how large each group is. To divide by a fraction, multiply by its reciprocal: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$. Change mixed numbers to improper fractions first, then simplify, so $\frac{5}{6}$ divided by $\frac{2}{3}$ equals $\frac{5}{4}$.

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Key facts:

- Two numbers are reciprocals if their product is 1; flip a fraction to find its reciprocal.
- To divide by a fraction, multiply by its reciprocal.
- Rewrite mixed numbers as improper fractions before dividing.
- Dividing by a fraction less than 1 gives a larger quotient.
- Check a quotient by multiplying it by the divisor.

What does it mean to divide fractions?

Division answers the question "how many groups?" or "how much in each group?" The expression $\frac{1}{2} \div \frac{1}{4}$ asks how many fourths fit into one half. Two fourths make one half, so the answer is 2.



One half is 2 pieces of one fourth, so $\frac{1}{2} \div \frac{1}{4} = 2$.

Reciprocal

Two numbers are **reciprocals** if their product is 1. To find the reciprocal of a fraction, flip the numerator and denominator: the reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$, because $\frac{2}{3} \times \frac{3}{2} = 1$. A whole number n has the reciprocal $\frac{1}{n}$.

How do you divide by a fraction?

Dividing by a fraction is the same as multiplying by its reciprocal.

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



Three wholes cut into halves give 6 pieces, so $3 \div \frac{1}{2} = 6$.

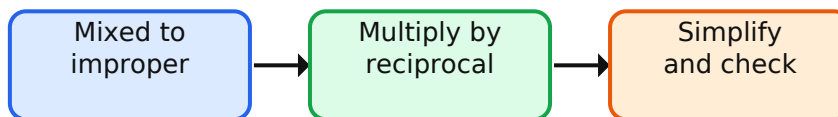
This works because dividing by $\frac{1}{2}$ asks how many halves are in a number, and every whole has 2 halves. So $3 \div \frac{1}{2} = 3 \times 2 = 6$.

How do you divide fractions step by step?



The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$, and their product is 1.

1. Rewrite any mixed number as an improper fraction.
2. Change the division to multiplication and flip the second fraction.
3. Multiply the numerators and multiply the denominators. Simplify first if you can.
4. Write the answer in simplest form and check that it makes sense in the story.



Three moves for dividing fractions.

Example. Evaluate $\frac{5}{6} \div \frac{2}{3}$.

$$\frac{5}{6} \times \frac{3}{2} = \frac{15}{12} = \frac{5}{4} = 1\frac{1}{4}$$

Check: $\frac{2}{3} \times 1\frac{1}{4} = \frac{2}{3} \times \frac{5}{4} = \frac{10}{12} = \frac{5}{6}$, which matches the start.

How do you divide mixed numbers and solve word problems?

Change each mixed number first. For $2\frac{1}{4} \div 1\frac{1}{2}$, write $\frac{9}{4} \div \frac{3}{2} = \frac{9}{4} \times \frac{2}{3} = \frac{18}{12} = 1\frac{1}{2}$.

Use division when a story asks how many equal groups fit, or how big one group is. Maya has $\frac{3}{4}$ pound of trail mix and puts $\frac{1}{8}$ pound in each bag. The number of bags is $\frac{3}{4} \div \frac{1}{8} = \frac{3}{4} \times 8 = 6$ bags. If instead $\frac{2}{3}$ of a pizza is shared equally among 4 friends, each gets $\frac{2}{3} \div 4 = \frac{2}{3} \times \frac{1}{4} = \frac{1}{6}$ of the pizza.

Dividing Fractions: frequently asked questions

Why do you flip the second fraction when dividing?

Dividing by a fraction asks how many of that fraction fit in a number. Dividing by one half gives twice as many, which is the same as multiplying by 2, the reciprocal of one half.

What is a reciprocal?

A reciprocal is the number you multiply by to get 1. The reciprocal of $\frac{3}{5}$ is $\frac{5}{3}$, and the reciprocal of 6 is $\frac{1}{6}$.

How do you divide a whole number by a fraction?

Write the whole number as a fraction over 1 and multiply by the reciprocal. For example, 4 divided by $\frac{2}{3}$ is 4 times $\frac{3}{2}$, which is 6.

How do you divide mixed numbers?

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

Does dividing always make the answer smaller?

No. Dividing by a fraction less than 1 makes the answer larger. For instance, 3 divided by $\frac{1}{2}$ equals 6, because there are 6 halves in 3.