

Grade 5 - Multiplying Fractions and Mixed Numbers - Lesson

Common Core 5.NF.B.4a, 5.NF.B.6 · maths-pdf.fr/en/

To multiply fractions, multiply the numerators, multiply the denominators, and simplify. To multiply a fraction by a whole number, write the whole number over 1. For mixed numbers, first change them to improper fractions. An area model shows why: the overlap of the shaded parts is the product.

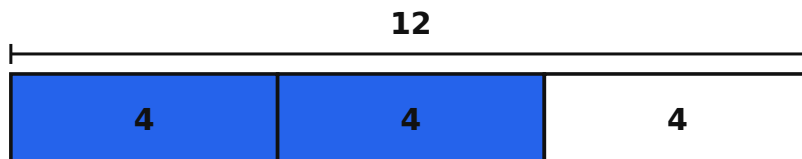
Grade 5 · Common Core State Standards: 5.NF.B.4a, 5.NF.B.6

Key facts

- A fraction of a number means fraction times that number.
- Fraction times fraction: multiply numerators, multiply denominators, then simplify.
- Write a whole number as a fraction over 1 before multiplying.
- Change mixed numbers to improper fractions, multiply, then write the answer as a mixed number.
- An area model shows the product as the overlap of shaded parts.

How do you multiply a fraction by a whole number?

Finding a fraction of a number means multiplying. To find $\frac{2}{3}$ of 12, split 12 into 3 equal parts. Each part is 4. Take 2 of the parts: $\frac{2}{3} \times 12 = 8$.



2/3 of 12: split 12 into 3 parts of 4, then take 2 parts. That is 8.

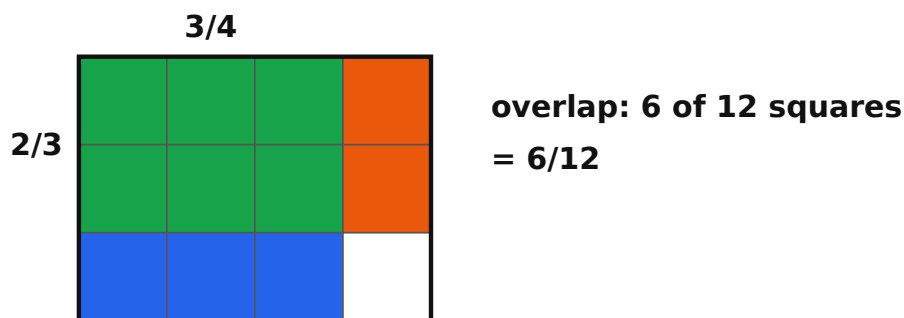
Fraction times a whole number

Write the whole number as a fraction over 1. Then $\frac{a}{b} \times n = \frac{a \times n}{b}$. For example, $3 \times \frac{2}{5} = \frac{6}{5} = 1\frac{1}{5}$.

How do you multiply two fractions?

Use an area model. Draw a square for 1 whole. Cut the width into the parts of the first fraction

and the height into the parts of the second fraction. Shade both. The overlap shows the product. Here $\frac{3}{4} \times \frac{2}{3}$ has an overlap of 6 squares out of 12, so the product is $\frac{6}{12} = \frac{1}{2}$.



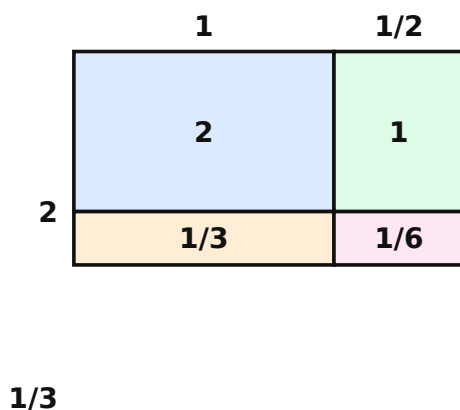
$\frac{3}{4}$ of the width and $\frac{2}{3}$ of the height. The overlap is 6 of 12 squares, which is $\frac{1}{2}$.

Fraction times fraction

Multiply the numerators. Multiply the denominators. Simplify. $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$

How do you multiply mixed numbers?

One way is to split each mixed number into wholes and a fraction. For $1\frac{1}{2} \times 2\frac{1}{3}$, the rectangle has four parts with areas 2, 1, $\frac{1}{3}$, and $\frac{1}{6}$. The total is $3\frac{1}{2}$.

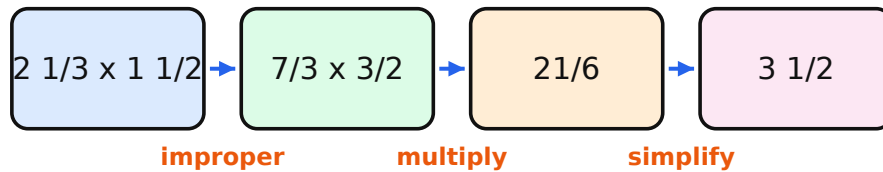


Add the four areas: $2 + 1 + \frac{1}{3} + \frac{1}{6} = 3\frac{1}{2}$.

What are the steps for multiplying mixed numbers?

1. Estimate the product with whole numbers.
2. Write each mixed number as an improper fraction.
3. Multiply the numerators and multiply the denominators.
4. Simplify and write the answer as a mixed number.
5. Compare with the estimate.

Worked example: Find $2\frac{1}{3} \times 1\frac{1}{2}$. The estimate is $2 \times 2 = 4$, so the answer should be a little less than 4. Then $\frac{7}{3} \times \frac{3}{2} = \frac{21}{6} = 3\frac{1}{2}$.



Change mixed numbers to improper fractions, multiply, then simplify.

When you multiply by a fraction less than 1, the product is smaller than the other factor. When you multiply by a number greater than 1, the product is larger.

Questions about multiplying fractions and mixed numbers

Why is a fraction times a fraction smaller than both factors?

You take a part of a part. For example, $\frac{1}{2}$ of $\frac{1}{3}$ is only $\frac{1}{6}$. Each fraction less than 1 shrinks the amount, so the product is smaller than either factor.

Do I need a common denominator to multiply fractions?

No. Common denominators are needed to add or subtract. To multiply, just multiply the numerators and multiply the denominators.

How do I multiply a whole number by a fraction?

Write the whole number as a fraction over 1, then multiply across. For example, 5 times $\frac{3}{4}$ is $\frac{5}{1}$ times $\frac{3}{4}$, which is $\frac{15}{4}$, or $3\frac{3}{4}$.

How do I multiply mixed numbers?

Change each mixed number to an improper fraction, multiply the numerators and denominators, and simplify. Then write the result as a mixed number.

What does "of" mean in a fraction word problem?

The word "of" usually means multiply. Three fourths of 20 means $\frac{3}{4}$ times 20, which is 15.