

Grade 5 · Adding and Subtracting Fractions with Unlike Denominators · Lesson

Common Core 5.NF.A.1, 5.NF.A.2 · mathovore.fr

To add or subtract fractions with unlike denominators, rename each fraction with a common denominator, then add or subtract the numerators and keep the denominator. For example, $\frac{2}{3} + \frac{1}{4} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$. Simplify the result, and estimate with benchmarks 0, $\frac{1}{2}$ and 1 to check it.

Grade 5 Common Core: 5.NF.A.1 · 5.NF.A.2

Key facts:

- Only fractions with the same denominator can be added or subtracted directly.
- A common denominator is a multiple of both denominators, and the smallest one is the least common denominator.
- Renaming a fraction multiplies its numerator and denominator by the same number.
- When subtracting mixed numbers, regroup one whole if the first fraction is smaller.
- Benchmarks 0, $\frac{1}{2}$ and 1 give a quick estimate to check an answer.

How do you add fractions with unlike denominators?

Fractions can be added only when the pieces are the same size. Halves and thirds are different sizes, so first rename both fractions using a common unit. Sixths work for $\frac{1}{2}$ and $\frac{1}{3}$: three sixths plus two sixths make five sixths.



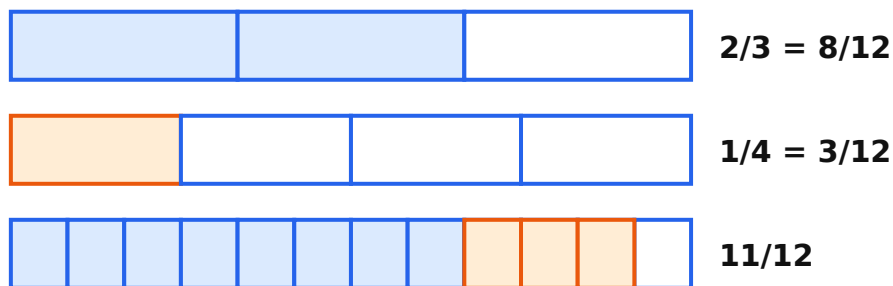
One half and one third, both renamed as sixths: $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$.

Common denominator

A **common denominator** is a number that both denominators divide into evenly. The smallest one is the least common denominator. Multiply the top and bottom of each fraction by the same number to rename it without changing its value.

Here is the method with $\frac{2}{3} + \frac{1}{4}$.

1. Find a common denominator. For 3 and 4, use 12.
2. Rename each fraction: $\frac{2}{3} = \frac{8}{12}$ and $\frac{1}{4} = \frac{3}{12}$.
3. Add the numerators and keep the denominator: $\frac{8}{12} + \frac{3}{12} = \frac{11}{12}$.
4. Simplify or rewrite as a mixed number if needed. Here $\frac{11}{12}$ is already in simplest form.



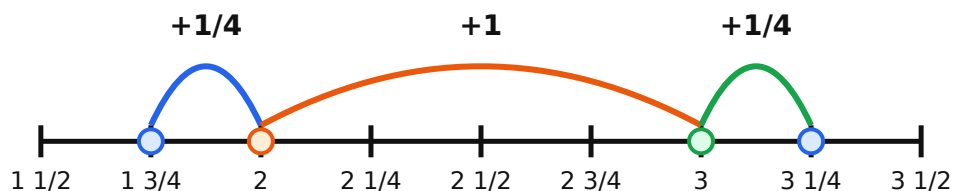
Twelfths are the common unit: $\frac{2}{3} + \frac{1}{4} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$.

How do you subtract fractions with unlike denominators?

Use the same steps, but subtract the numerators. For $\frac{3}{4} - \frac{1}{6}$, rename with 12: $\frac{9}{12} - \frac{2}{12} = \frac{7}{12}$.

How do you add and subtract mixed numbers?

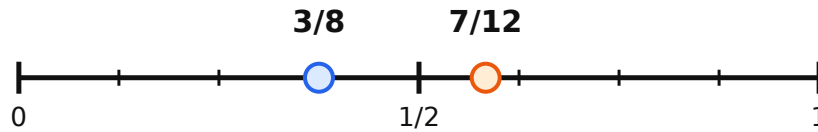
Rename the fraction parts with a common denominator, then combine. When you subtract and the first fraction is too small, regroup one whole. For $3\frac{1}{4} - 1\frac{3}{4}$, rewrite $3\frac{1}{4}$ as $2\frac{5}{4}$. Then $2\frac{5}{4} - 1\frac{3}{4} = 1\frac{2}{4} = 1\frac{1}{2}$.



Jumping from $1\frac{3}{4}$ up to $3\frac{1}{4}$ covers $\frac{1}{4} + 1 + \frac{1}{4} = 1\frac{1}{2}$.

How can you estimate a sum or difference?

Round each fraction to the nearest benchmark: 0, one half, or 1. In the picture, $\frac{3}{8}$ and $\frac{7}{12}$ are both near one half, so the sum is about 1. The exact sum is $\frac{23}{24}$, which agrees.



Both $\frac{3}{8}$ and $\frac{7}{12}$ sit near $\frac{1}{2}$, so their sum is close to 1.

Fraction is close to	Benchmark
$\frac{1}{8}$ or $\frac{1}{10}$	0
$\frac{5}{12}$ or $\frac{4}{7}$	$\frac{1}{2}$
$\frac{7}{8}$ or $\frac{11}{12}$	1

Adding and Subtracting Fractions with Unlike Denominators: frequently asked questions

Why can you not just add the denominators?

The denominator tells the size of the pieces, and adding fractions combines pieces of the same size. Adding tops and bottoms gives $\frac{1}{2} + \frac{1}{3} = \frac{2}{5}$, which is smaller than $\frac{1}{2}$ even though a third was added. The correct sum is $\frac{5}{6}$.

Do you always need the least common denominator?

No. Any common denominator works, such as multiplying the two denominators. The least common denominator keeps numbers smaller, so there is less simplifying at the end.

How do you subtract mixed numbers when the fraction is too small?

Regroup one whole from the whole number part and add it to the fraction as equal parts. For $3\frac{1}{4}$, rewrite it as $2\frac{5}{4}$, then subtract the fractions and the wholes.

How do you write an improper fraction as a mixed number?

Divide the numerator by the denominator. The quotient is the whole number and the remainder is the new numerator. For example, $\frac{17}{12}$ is 1 and $\frac{5}{12}$.

How can benchmark fractions check an answer?

Round each fraction to 0, $\frac{1}{2}$ or 1 and add or subtract the rounded numbers. If $\frac{5}{12} + \frac{6}{11}$ is about $\frac{1}{2} + \frac{1}{2} = 1$, an answer like $\frac{11}{23}$ or 2 cannot be right.