

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

Common Core 5.NF.A.1, 5.NF.A.2 · maths-pdf.fr/en/

To add or subtract fractions with unlike denominators, find a common denominator, rename each fraction as an equivalent fraction with that denominator, then add or subtract the numerators. Simplify the result and write improper fractions as mixed numbers. Compare with benchmark fractions such as 0, $\frac{1}{2}$, and 1 to check that the answer is reasonable.

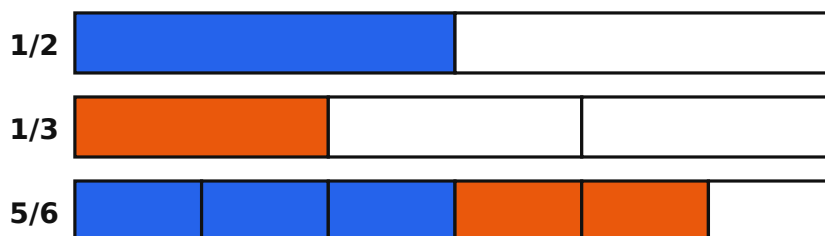
Grade 5 · Common Core State Standards: **5.NF.A.1, 5.NF.A.2**

Key facts

- Fractions must have the same denominator before they can be added or subtracted.
- The least common denominator is the smallest number both denominators divide into.
- Only the numerators are added or subtracted. The denominator stays the same.
- To subtract mixed numbers, regroup one whole as a fraction when needed.
- Benchmarks 0, $\frac{1}{2}$, and 1 help check that an answer makes sense.

How do you add fractions with different denominators?

Fractions can only be added when their parts are the same size. Halves and thirds are different sizes, so first rename both fractions with the same denominator. Sixths work for both: $\frac{1}{2} = \frac{3}{6}$ and $\frac{1}{3} = \frac{2}{6}$.



Sixths let us add halves and thirds: $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$.

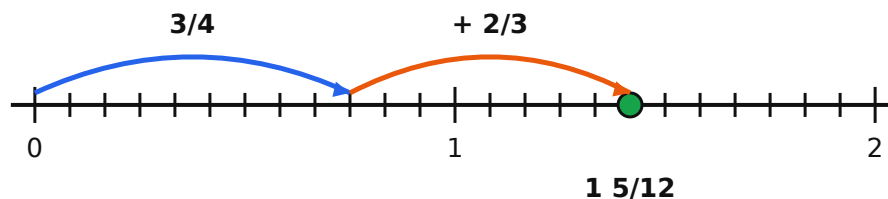
Common denominator

A common denominator is a number that both denominators divide into evenly. The least common denominator (LCD) is the smallest one. Rename each fraction to an equivalent fraction with that denominator before adding or subtracting.

What are the steps for adding and subtracting fractions?

1. Estimate with benchmark fractions: 0, $\frac{1}{2}$, and 1.
2. Find a common denominator.
3. Rename each fraction as an equivalent fraction.
4. Add or subtract the numerators. Keep the denominator.
5. Simplify. Write an improper fraction as a mixed number.
6. Compare with the estimate.

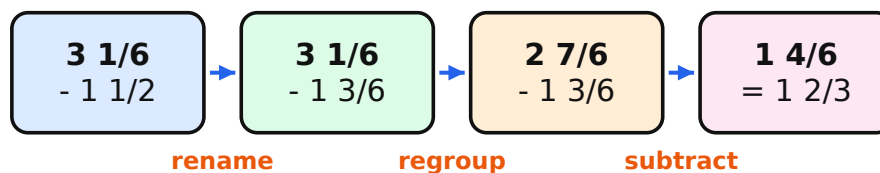
Worked example: Find $\frac{3}{4} + \frac{2}{3}$. Both fractions are more than $\frac{1}{2}$, so the sum is more than 1. The LCD of 4 and 3 is 12. Rename: $\frac{3}{4} = \frac{9}{12}$ and $\frac{2}{3} = \frac{8}{12}$. Add: $\frac{9}{12} + \frac{8}{12} = \frac{17}{12} = 1\frac{5}{12}$. The answer is more than 1, so it matches the estimate.



Start at $\frac{3}{4}$ and hop $\frac{2}{3}$ more. You land at $\frac{17}{12}$, which is $1\frac{5}{12}$.

How do you subtract mixed numbers?

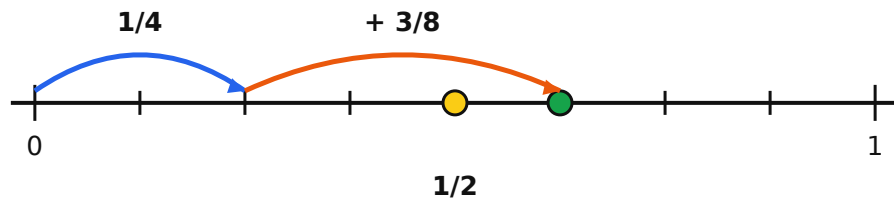
Rename the fractions with a common denominator. If the first fraction is too small, regroup one whole as a fraction. Look at $3\frac{1}{6} - 1\frac{1}{2}$. Write $1\frac{1}{2}$ as $1\frac{3}{6}$. Since $\frac{1}{6}$ is less than $\frac{3}{6}$, regroup: $3\frac{1}{6} = 2\frac{7}{6}$. Now subtract the wholes and the fractions: $2\frac{7}{6} - 1\frac{3}{6} = 1\frac{4}{6} = 1\frac{2}{3}$.



Rename with sixths, regroup one whole, then subtract and simplify.

How can benchmark fractions check an answer?

Round each fraction to 0, $\frac{1}{2}$, or 1 before you calculate. For $\frac{1}{4} + \frac{3}{8}$, the fraction $\frac{1}{4}$ is close to 0 and $\frac{3}{8}$ is close to $\frac{1}{2}$, so the sum is a little under $\frac{1}{2}$ plus a bit more. The exact sum is $\frac{5}{8}$, which is just past $\frac{1}{2}$. That is reasonable.



Benchmarks 0, $\frac{1}{2}$, and 1 show that $\frac{5}{8}$ is a sensible sum for $\frac{1}{4} + \frac{3}{8}$.

Questions about adding and subtracting fractions with unlike denominators

Why do fractions need a common denominator?

The denominator tells the size of each part. Parts of different sizes cannot be counted together. A common denominator makes all parts the same size, so the numerators can be added or subtracted.

Do you have to use the least common denominator?

No. Any common denominator works, such as multiplying the two denominators. The least common denominator gives smaller numbers and less simplifying at the end.

What do you do when the sum is an improper fraction?

Rewrite it as a mixed number. For example, $\frac{17}{12}$ is $\frac{12}{12}$ plus $\frac{5}{12}$, so it equals $1 \frac{5}{12}$. Both forms are correct, but a mixed number is easier to picture.

When do you regroup in subtraction?

Regroup when the fraction part of the first mixed number is smaller than the fraction part of the second. Take 1 whole from the whole number and rewrite it as a fraction such as $\frac{6}{6}$.

How do benchmark fractions help?

Rounding each fraction to 0, $\frac{1}{2}$, or 1 gives a quick estimate. If the exact answer is far from the estimate, there is probably a mistake in the calculation.