

Adding and subtracting mixed numbers

We can add and subtract mixed numbers, each of which is the sum of a whole number and a fraction.

When we need to add or subtract mixed numbers, we deal with the whole numbers separately from the fractions, and we find a common denominator for the fractions.

Two methods

Essentially, we'll follow these steps to add or subtract mixed numbers:

1. Add or subtract the whole number parts.
2. Check whether the fraction parts have a common denominator, and find one if not.
3. Set up equivalent fractions when needed.
4. Add or subtract the numerators of the fractions while keeping the denominator the same.
5. Simplify the fraction into a mixed number if the result is an improper fraction.

Alternatively, we can add or subtract mixed numbers by first converting the mixed numbers into improper fractions, and then adding or



subtracting the improper fractions using the rules we learned earlier for fraction addition and subtraction.

Let's try an example of addition of mixed numbers.

Example

Find the sum.

$$6\frac{3}{7} + 2\frac{1}{4}$$

First, we'll separate the whole numbers from the fractions.

$$(6 + 2) + \left(\frac{3}{7} + \frac{1}{4}\right)$$

Next, we'll find a common denominator for the fractions.

$$(6 + 2) + \left[\frac{3}{7} \left(\frac{4}{4}\right) + \frac{1}{4} \left(\frac{7}{7}\right)\right]$$

$$(6 + 2) + \left(\frac{12}{28} + \frac{7}{28}\right)$$

Now we'll add the whole numbers and the fractions separately.

$$8 + \frac{19}{28}$$

As a mixed number, the answer is



$$8\frac{19}{28}$$

We can also convert this to an improper fraction.

$$8\frac{19}{28} = \frac{(28 \times 8) + 19}{28}$$

$$8\frac{19}{28} = \frac{224 + 19}{28}$$

$$8\frac{19}{28} = \frac{243}{28}$$

Let's try an example of subtraction with mixed numbers.

Example

Find the difference.

$$6\frac{3}{7} - 2\frac{1}{4}$$

First, we'll separate the whole numbers from the fractions.

$$(6 - 2) + \left(\frac{3}{7} - \frac{1}{4} \right)$$

Next, we'll find a common denominator for the fractions.



$$(6 - 2) + \left[\frac{3}{7} \left(\frac{4}{4} \right) - \frac{1}{4} \left(\frac{7}{7} \right) \right]$$

$$(6 - 2) + \left(\frac{12}{28} - \frac{7}{28} \right)$$

Now we'll subtract the whole numbers and the fractions separately.

$$4 + \frac{5}{28}$$

As a mixed number, the answer is

$$4\frac{5}{28}$$

We can also convert this to an improper fraction.

$$4\frac{5}{28} = \frac{(28 \times 4) + 5}{28}$$

$$4\frac{5}{28} = \frac{112 + 5}{28}$$

$$4\frac{5}{28} = \frac{117}{28}$$

Let's try another example of mixed number subtraction.

Example

Simplify the expression.



$$3\frac{1}{7} - 1\frac{1}{4}$$

We'll subtract the whole numbers separately from the fractions.

$$3\frac{1}{7} - 1\frac{1}{4}$$

$$3 - 1 + \frac{1}{7} - \frac{1}{4}$$

$$2 + \frac{1}{7} - \frac{1}{4}$$

To subtract the fractions, we have to find the lowest common denominator (LCD), which is the least common multiple of the denominators.

$$2 + \frac{1}{7} \left(\frac{4}{4} \right) - \frac{1}{4} \left(\frac{7}{7} \right)$$

$$2 + \frac{4}{28} - \frac{7}{28}$$

$$2 - \frac{3}{28}$$

To change this to a mixed number, we need to change the expression so that it's addition instead of subtraction. We can change the 2 into the equivalent $1 + 1$.

$$1 + 1 - \frac{3}{28}$$



Make a common denominator with the 1 and the fraction.

$$1 + 1\left(\frac{28}{28}\right) - \frac{3}{28}$$

$$1 + \frac{28}{28} - \frac{3}{28}$$

$$1 + \frac{25}{28}$$

$$1\frac{25}{28}$$

