

Can I add fractions with different denominators?

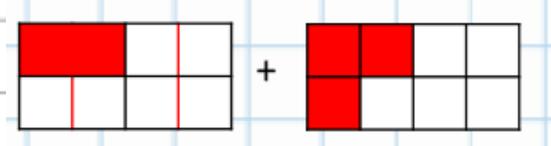
Remember: in order to add or subtract fractions, their denominators need to be the same.

This is where you use your ability to find equivalent fractions - this was covered in the learning set just before half term.

Imagine you are trying to solve $\frac{1}{4} + \frac{3}{8}$

Step 1

Convert both fractions to the same denominator by finding equivalent fractions. To do this, you will need to look at the relationship between the two denominators you have been given. In this case, one denominator (8) is double the other (4) so:

$$\overset{\times 2}{\frac{1}{4}} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8}$$


Step 2

Add the numerators together **but not the denominators!**

$$\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$$

Step 3

Simplify the answer if you can.

$\frac{5}{8}$ cannot be simplified as the only factor they share is 1.

However,

$\frac{12}{20}$ (which is the example answer given in the table below) can be simplified as they share the factor, 4)

$$\overset{\div 4}{\frac{12}{20}} = \frac{3}{5}$$

Now it's your turn - complete the questions in the table below. For a **challenge**, go to page 3.

Question	Convert to same denominator	Answer (simplify if you can)
$\frac{1}{4} + \frac{7}{20} =$	(x5) $\frac{5}{20} + \frac{7}{20} =$	$= \frac{12}{20}$ or $\frac{3}{5}$
$\frac{1}{3} + \frac{1}{6} =$		
$\frac{1}{3} + \frac{2}{9} =$		
$\frac{5}{8} + \frac{1}{4} =$		
$\frac{3}{5} + \frac{1}{10} =$		
$\frac{7}{15} + \frac{1}{5} =$		
$\frac{2}{3} + \frac{5}{24} =$		

Mind-blowing Challenge

What happens when one denominator is not a multiple of the other as they all have been so far?

For example:

$$\frac{3}{5} + \frac{3}{8}$$

5 does not go in to 8 so now you have to find a common multiple of them both. You can either write out the 5 and 8 times tables to find the **LOWEST** common multiple of 5 and 8 or just multiply the denominators to find a common factor ($5 \times 8 = 40$). You just need to be careful when using this method as you won't always find the **LOWEST** common multiple - this will mean that you will need to simplify your answer.

So, let's look at the example above:

$$\frac{3}{5} + \frac{3}{8} \quad \text{find the common multiple (5 x 8 = 40) to give new denominator}$$

\downarrow x8
 \downarrow x5

$$\frac{24}{40} + \frac{15}{40} \quad \text{find the equivalent fractions with the new denominator}$$

$$\frac{24}{40} + \frac{15}{40} = \frac{39}{40} \quad \text{add the numerators (not the denominators) to give answer. Simplify if possible (not possible here)}$$

Question	Convert to same denominator	Answer (simplify if you can)
$\frac{1}{2} + \frac{2}{5}$		
$\frac{1}{6} + \frac{2}{7}$		
$\frac{3}{8} + \frac{2}{7}$		
$\frac{5}{11} + \frac{3}{7}$		
$\frac{3}{5} + \frac{2}{6}$		
$\frac{2}{3} + \frac{1}{5}$		

Answers

Question	Convert to same denominator	Answer (simplify if you can)
$\frac{1}{4} + \frac{7}{20} =$	(x5) $\frac{5}{20} + \frac{7}{20} =$	$= \frac{12}{20}$ or $\frac{3}{5}$
$\frac{1}{3} + \frac{1}{6} =$	(x2) $\frac{2}{6} + \frac{1}{6}$	$= \frac{3}{6}$ or $\frac{1}{2}$
$\frac{1}{3} + \frac{2}{9} =$	(x3) $\frac{3}{9} + \frac{2}{9}$	$= \frac{5}{9}$
$\frac{5}{8} + \frac{1}{4} =$	(x2) $\frac{5}{8} + \frac{2}{8}$	$= \frac{7}{8}$
$\frac{3}{5} + \frac{1}{10} =$	(x2) $\frac{6}{10} + \frac{1}{10}$	$= \frac{7}{10}$
$\frac{7}{15} + \frac{1}{5} =$	(x3) $\frac{7}{15} + \frac{3}{15}$	$= \frac{10}{15}$ or $\frac{2}{3}$
$\frac{2}{3} + \frac{5}{24} =$	(x8) $\frac{16}{24} + \frac{5}{24}$	$= \frac{21}{24}$ or $\frac{7}{8}$

Question	Convert to same denominator	Answer (simplify if you can)
$\frac{1}{2} + \frac{2}{5}$	$\frac{5}{10} + \frac{4}{10}$	$= \frac{9}{10}$
$\frac{1}{6} + \frac{2}{7}$	$\frac{7}{42} + \frac{12}{42}$	$= \frac{19}{42}$
$\frac{3}{8} + \frac{2}{7}$	$\frac{21}{56} + \frac{16}{56}$	$= \frac{37}{56}$
$\frac{5}{11} + \frac{3}{7}$	$\frac{35}{77} + \frac{33}{77}$	$= \frac{68}{77}$
$\frac{3}{5} + \frac{2}{6}$	$\frac{18}{30} + \frac{10}{30}$	$= \frac{28}{30}$
$\frac{2}{3} + \frac{1}{5}$	$\frac{10}{15} + \frac{3}{15}$	$= \frac{13}{15}$