Adding and Subtracting Fractions with Different Denominators

KS3 MATHS Ages 11-14 ⏰ 3 min read

Why Can't We Just Add Fractions Straight Away?

When you add or subtract fractions, the bottom numbers (called **denominators**) have to be the same. If they're different, you can't just add the top numbers together. It's like trying to add apples and oranges — they're different things, so you need to convert them to something you can actually compare.

Think about it: **1/2** (half a pizza) and **1/4** (a quarter of a pizza) are different sizes. If you just add 1 + 1 = 2 on top and 2 + 4 = 6 on the bottom, you'd get **2/6**, which is wrong! The pieces aren't the same size.

Think of it like mixing different types of coins. You can't add **2 pounds** and **3 pence** without converting them to the same unit first. You need to turn the pounds into pence, so **200 pence + 3 pence = 203 pence**.

Finding the Common Denominator

To solve this, you need to find a **common denominator** — a bottom number that both fractions can use. The easiest way is to find the **least common multiple (LCM)** of the two denominators.

For example, with **1/2** and **1/4**: The denominators are **2** and **4**. The LCM of **2** and **4** is **4**, because **4** is the smallest number that both **2** and **4** divide into evenly.

Converting Your Fractions

Once you know your common denominator, convert each fraction. To convert **1/2** to have a denominator of **4**, multiply both the top and bottom by **2**: **1/2 = 2/4**. Now both fractions have the same denominator!

Now you can add them: **2/4 + 1/4 = 3/4**. Same rule works for subtraction: **2/4 - 1/4 = 1/4**.

Think of it like converting different sized LEGO bricks to the same size. You can't compare a big brick to a small brick, but if you break the big one into **4** small pieces, suddenly you can count and compare them all using the same unit.

Practice Makes Perfect

The key is remembering that whatever you do to the bottom number, you must do to the top number. This keeps the fraction's value the same — you're just expressing it differently. Once both fractions use the same denominator, adding and subtracting becomes as simple as adding or subtracting the top numbers!