ADDING AND SUBTRACTING FRACTIONS

Adding Fractions

The idea behind adding fractions is the same as it was for whole numbers. We combine two groups. When the denominators of fractions are the same, it's easy.

Consider $\frac{5}{7} + \frac{3}{7}$

Both bars are split into 7 sections. When you combine 5 shaded sections from 5/7 and 3 shaded sections from 3/7, you get 8 shaded sections. So the answer is 8/7, but that's bigger than the whole (7/7), so you end up with more than one bar shaded. You can see that the answer 8/7 can also be represented as 1 1/7, since there's a whole bar shaded and 1/7 more.

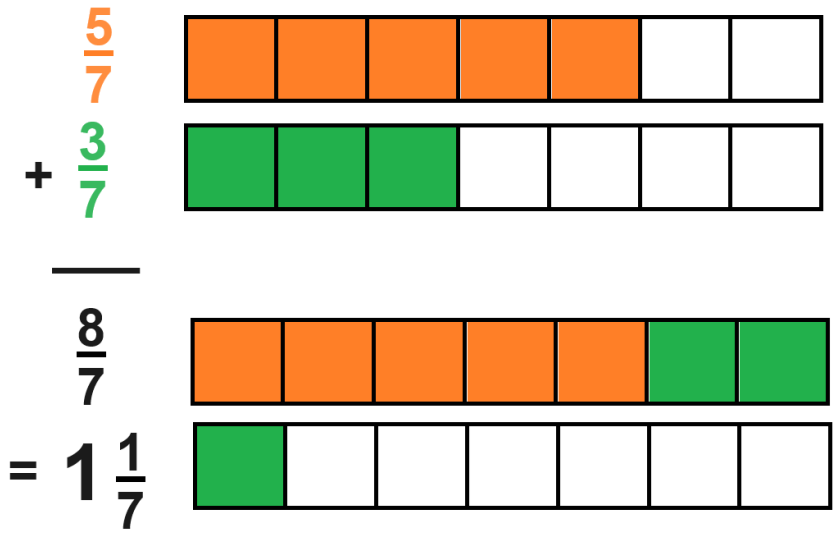

Figure 1: Adding fractions with like denominators

But what happens when the bars aren't split into equal amounts? We could overlap the bars and try to figure out how much is shaded, but that gets messy quickly. How much is shaded?

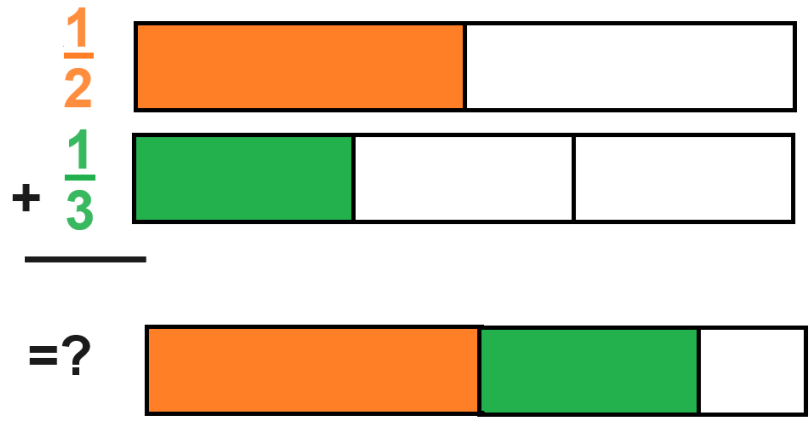

Figure 2: Adding fractions with unlike denominators

If we can figure out a way to make our fractions have pieces of the same size, it would be easy to figure out what the sum is. We can rename our fractions but finding equivalent fractions with pieces of the same size. This is called finding a **common denominator**. It doesn't have the be the *least common denominator*—we just do that because it makes our life easier. We're working with smaller pieces and we're less likely to have to simplify our answer at the end. The big secret is that *any common denominator* will work.

In our example, we have halves and thirds. If we split each of our half sections into three, and each of our third sections into 2, we'll have fractions equivalent to 1/2 and 1/3 that are each split into 6 pieces. ***We find a common denominator so our pieces are the same size. We do this in the model by subdividing each section of our fraction into the same number of sections.***

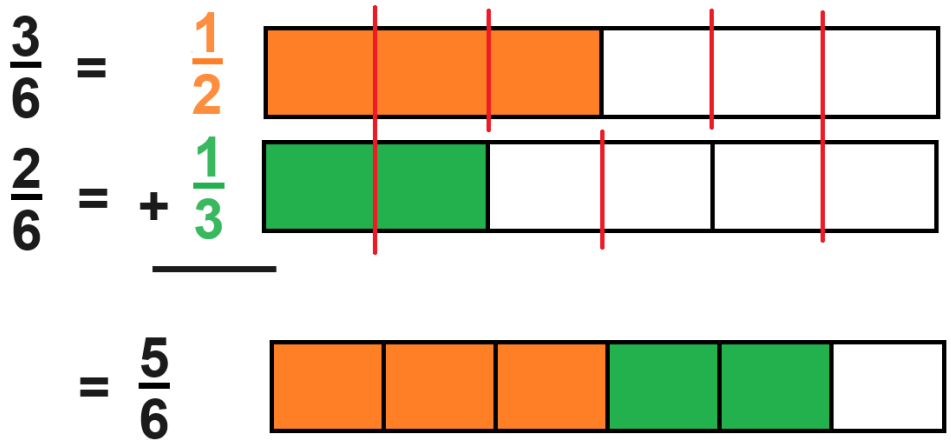

Figure 3: Find a common denominator by subdividing

Subtracting Fractions

The idea behind subtracting fractions is the same as it was with whole numbers, too. We have the first number and we want to take away the second. Like with addition, it's not a problem if the denominators are same. That means the pieces are the same size, too.

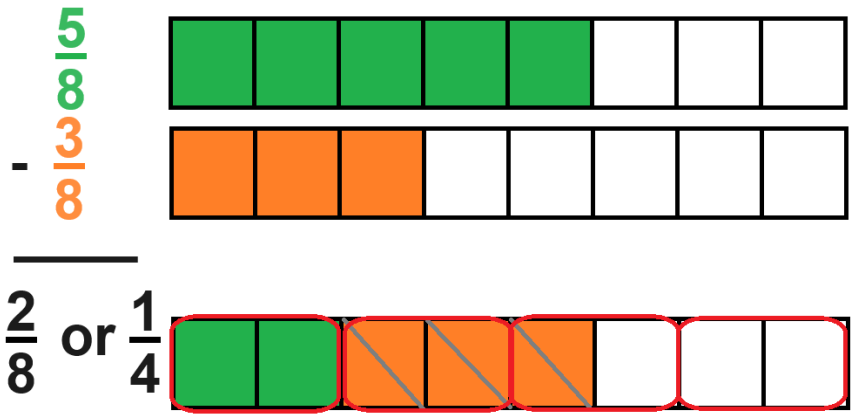

Figure 4: Subtracting fractions with like denominator

Note that at the end, we were able to group our eighths into sets of 2 and reduce 2/8 to the equivalent and simpler fraction 1/4.

If the denominators are different, we again find a common denominator so that the pieces are the same size. In the model this is seen by subdividing the sections into the same number of pieces for both fractions.

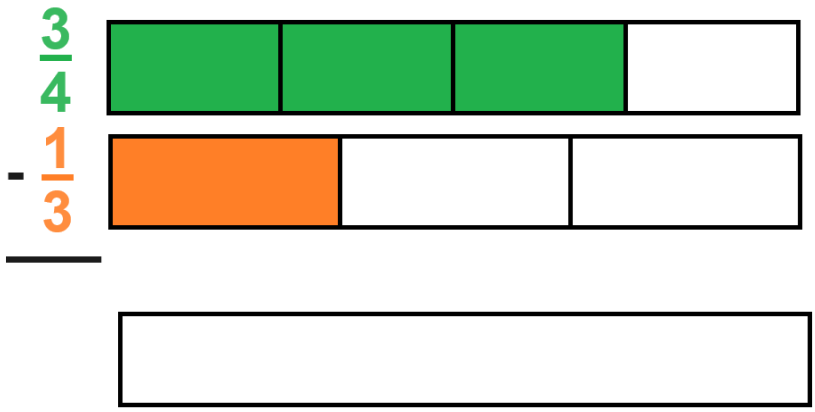

Figure 5: Subtracting fractions with unlike denominators

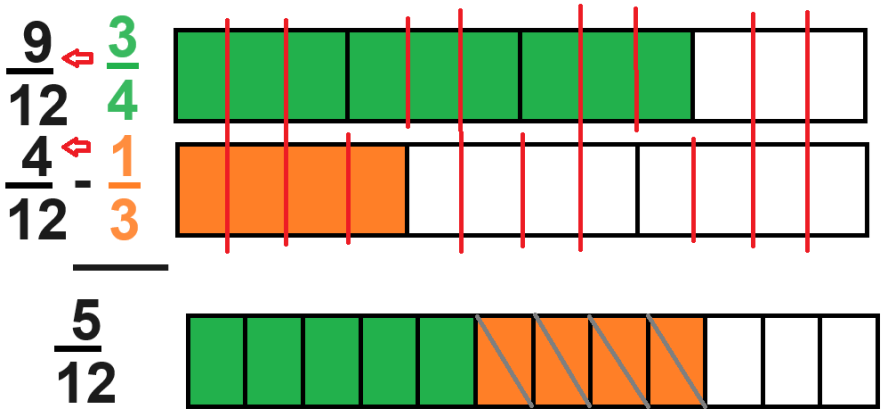

Figure 6: Finding a common denominator