ADDITION AND SUBTRACTION IN BASE 5

Addition and subtraction work very similarly in base 5 (or any other base); what changes is the number being regrouped. Instead of carrying or borrowing 10, you carry or borrow 5 (or whatever the base is).

Addition in Base 5

Consider **243 + 124 (base 5)**.

First, represent the numbers:

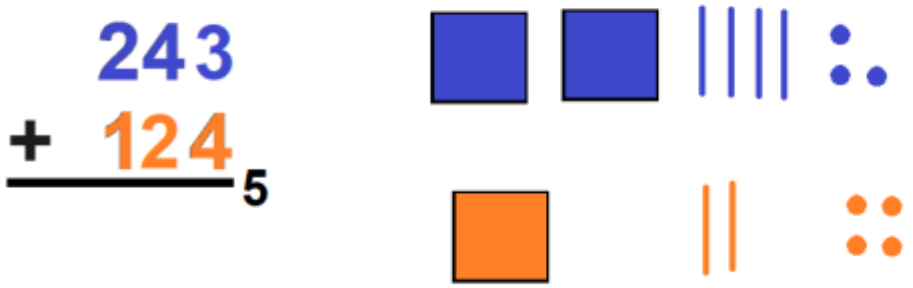

Figure 1: 243 + 124 (base 5) represented with Base 5 blocks

Then, start adding, beginning with the units. We have a total of 7 s. We regroup sets of 5 into the next size block. 5 units = 1 long. So we "carry" a long and keep 2 unit.

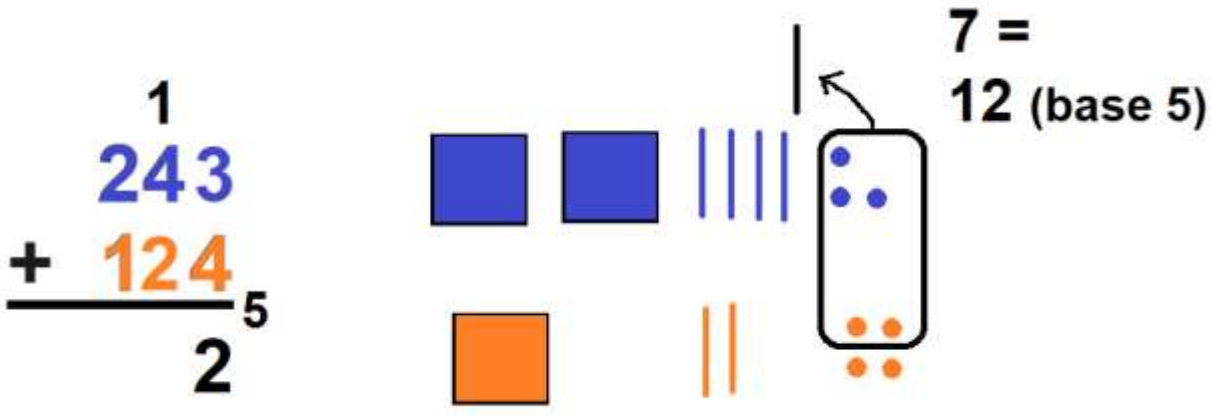

Figure 2: Adding Units

Now we add our longs. We have 4 + 2 + 1, or 7. Again, regroup sets of 5 into the next size. 5 longs = 1 flat. So “carry” a flat and keep 2 longs.

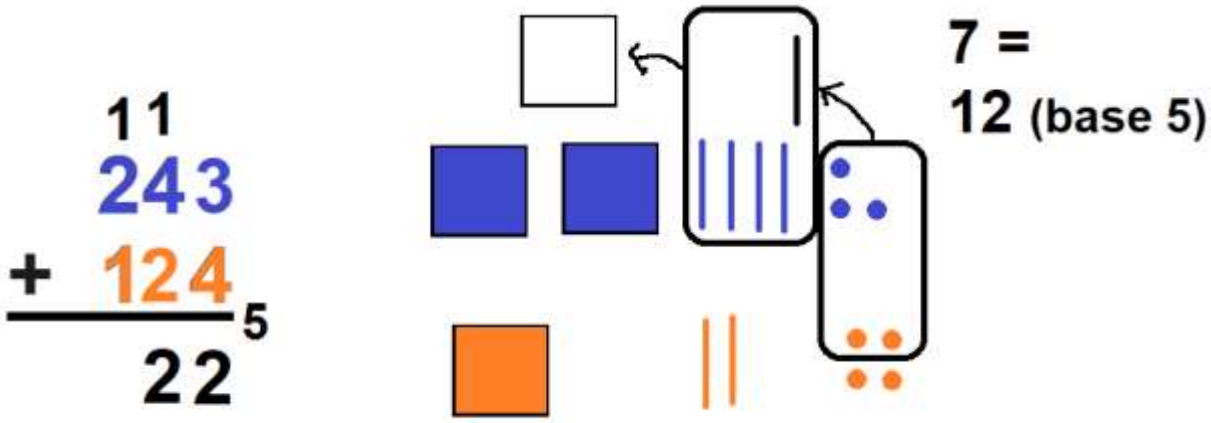

Figure 3: Adding longs

Finally, add our flats. We have 2 + 1 + 1, or 4 flats. This is less than 5 so we don’t need to regroup.

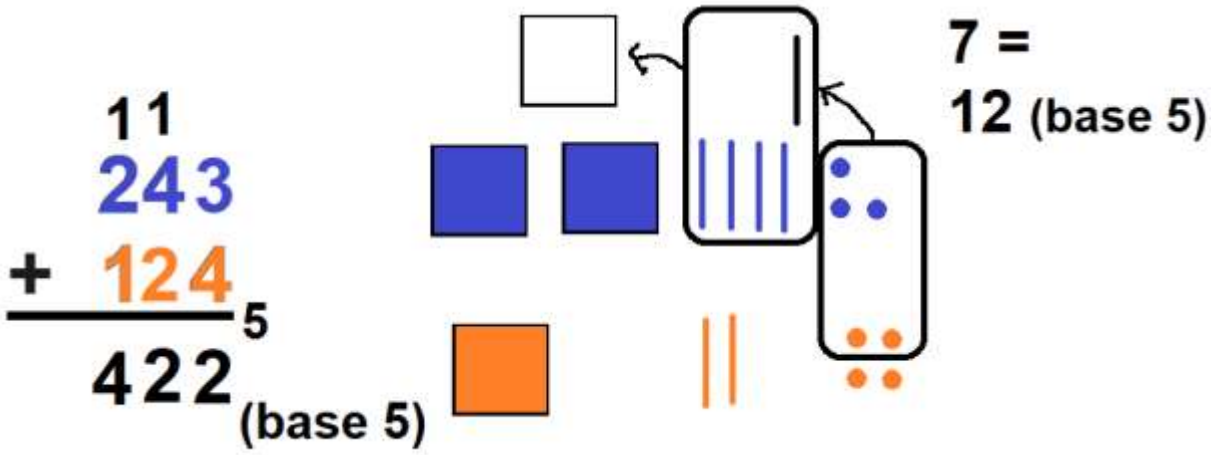

Figure 4: Adding flats

The process is the same, even if there are more place values. In the model, we group sets of 5 and trade up for the next size block. When we write down the problem, this trade up is what we carry, and we write down the number of blocks after the regrouping.

Subtraction in Base 5

Just like before, we take away the second number, regrouping base five blocks to a lower number if needed.

Consider **243 – 144.**

First, represent the top number with base 5 blocks.

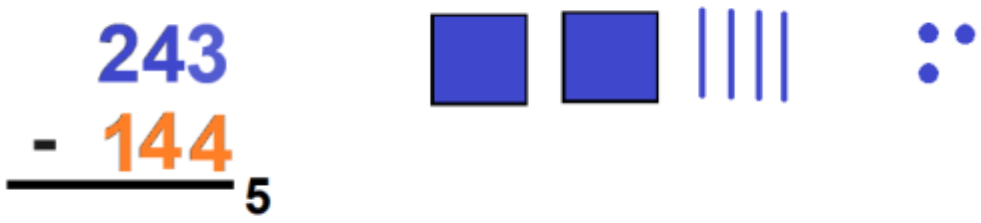

Figure 5: 243-144. Represent 243 in Base 5 blocks

Next, start with units. We want to take away 4 units, but we only have 3. So we "borrow" a long (regrouping) and break it into 5 units. Now we have 13 (base 5), which is 8 units. 8 – 4 = 4.

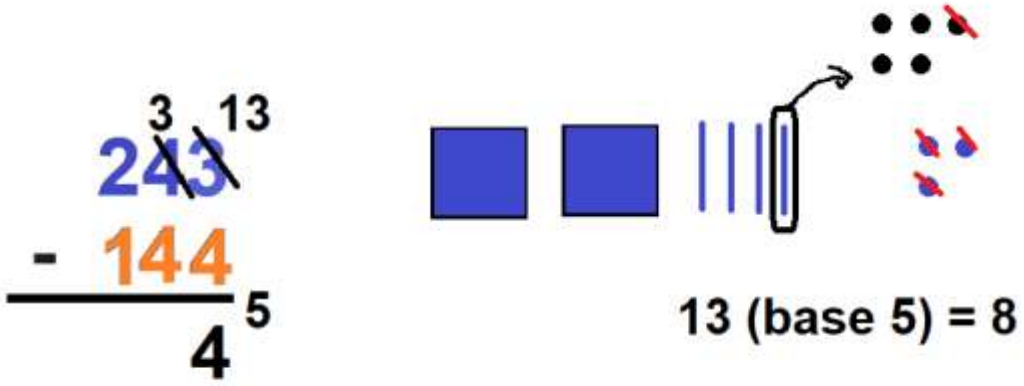

Figure 6: Regrouping and subtracting units

Now we have 3 longs and we want to take away 4. There's not enough, so we regroup again. Trade in one flat for 5 longs. We now have 13, or 8 longs. 8 – 4 = 4.

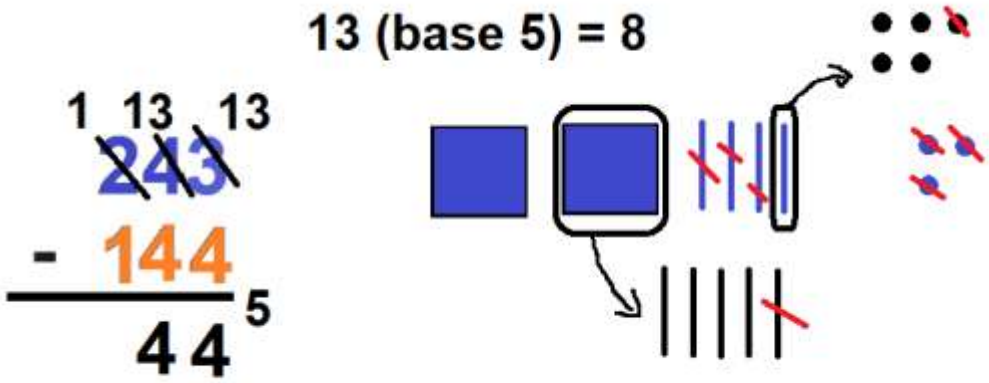

Figure 7: Regrouping and subtracting longs

Finally, we want to take away one long. We have one, so we subtract and have none left.

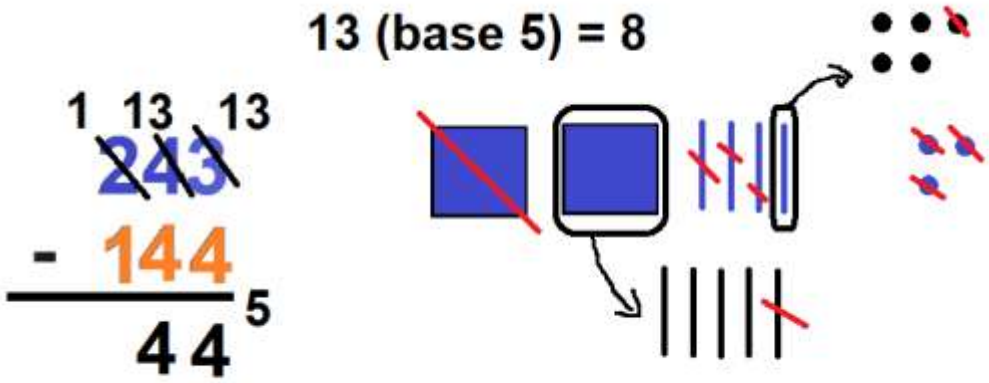

Figure 8: Subtracting flats

Adding or Subtracting in Other Bases

The only thing that changes when working in other bases is the number you regroup with. You either borrow or carry the number of the base.

Consider **134 + 253 (base 6).** First represent the numbers: 135 is 1 flat, 3 longs and 5 units, and 25 is 2 flats, 5 longs and 3 units. Add the units. 5+3=8. Trade in 6 units for a long. Carry 1 and keep 2. Add the longs. 1+3+5=9. Trade in 6 longs for a flat. Carry 1 and keep 3. Add the flats. 1+1+2=4, which is less than 6 so no regrouping necessary.

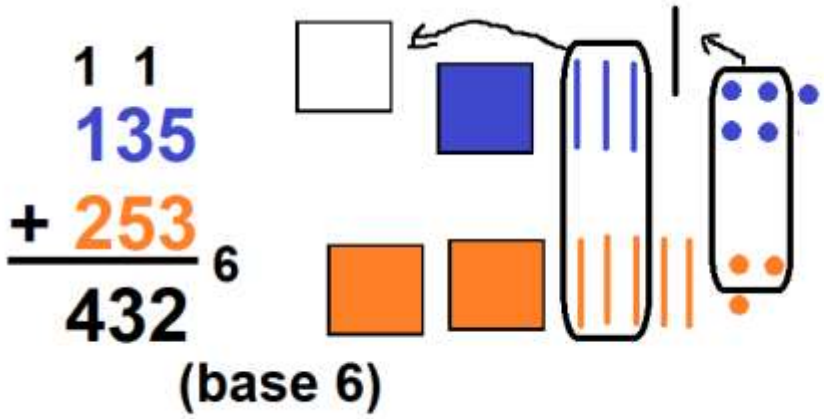

Figure 1: 135 + 253 (base 6)