

## Base Eight

Our counting system, called the “decimal” system, reflects the fact that we have ten digits on our hands. In this “Base ten” system, because we need a zero, “10” indicates a full set of ten, giving us:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10  
11, 12, 13, 14, 15, 16, 17, 18, 19, 20,  
21, 22, etc.

The base-ten “10” means this many things:

XXXX XXXX XX

The 10 is a sort of place marker, showing that we’ve collected one full set of our ten fingers, and we’re starting over, with the full set (of ten) and zero beyond that: 1+0, or 10. 11 indicates this set plus one, twelve a full set plus two, and so on. 20 shows that there are two sets of ten, with zero beyond that.

But what if we only had eight fingers? What if human beings from birth thought of eight things as being a nice tidy set, rather than ten?

As with Base 10, the full set is indicated by a 1 plus a 0. We would not have the digits 8 or 9 to play with, so we would count:

1, 2, 3, 4, 5, 6, 7, 10  
11, 12, 13, 14, 15, 16, 17, 20  
21, 22, etc.

So, in Base 8, “10” means this number of things:

XXXX XXXX

The number “10” still tells us it’s a full set, but because it’s Base Eight, what we’re indicating is a full set of eight things, not ten. We still write this full set “10”, even

though it's eight in number, because it's all the fingers we have. If we add one to our full set, it's still written "11", even though there are nine objects there.

In Base Eight, "12" would mean one set of eight plus 2 more, or ten things, while a Base Eight "13" would be a set of eight+3—what our misshapen ten-fingered hands would count as eleven.

In Base Eight, "20" is two sets of eight, or sixteen, and "21" is how a four-fingered race would write our seventeen.

Then things get interesting when we get to 77—which obviously doesn't mean seventy-seven, but rather seven sets of eight and seven more: therefore sixty-three. But what happens next?

If the highest digit you can use is a 7, then what comes after 77 is...100, right? Just remember that 100 in Base Eight is not a hundred, but sixty-four.

In Base 10, 345 means three [hundreds,] four [tens], and five.

In Base 8, 345 means three [sixty-fours], four [eights], and five.

Now, to do it in Roman numerals...