

Chapter 12 - Written Methods for Multiplication and Division

Long multiplication- 6 minutes and 5 seconds

Let's have a look at the standard written algorithm for multiplication known as long multiplication. I'm going to use the example two hundred and sixty three multiplied by forty-seven, which is the same multiplication as I did in another video using the grid method. Now when you do this using the grid method, you may recall that there are six separate multiplications involved. In this case, we have two hundred multiplied by forty, sixty multiplied by forty, three multiplied by forty and then two hundred multiplied by seven, sixty by seven and three by seven. And we do each of those separately and add up the six results to find the result of the multiplication. When we do long multiplication, we have the same six multiplications to do but we record them in a much more condensed form. This makes it much more difficult to follow what's going on and to understand the process. We'll also do the multiplications in a slightly different order.

So let's have a look at this using the standard layout, two hundred and sixty three and we're going to multiply that by forty seven. I'm setting these out with the digits in columns or hundreds, ten and units or ones. Now the two hundred and sixty three is going to be multiplied by the forty seven in two steps, we're going to multiply it by forty and we're going to multiply it by seven. Which of those you do first, it really doesn't matter. I'm going to choose to do multiplication by the seven first. So here we go, two hundred and sixty-three, multiplied by seven. Well that actually is just the same as short multiplication if I was doing this two sixty-three by seven on its own, then by short multiplication, I would go seven times three is twenty-one, that's one there and carry two. Unfortunately this two down here is going to get in the way of the next line that I have to record in the long multiplication algorithm. So because of that, I need to find another way of recording what has to be carried-unless I can remember it in my head.

So what I tend to do, is go seven multiplied by three is twenty-one, there's the one unit and I write the two that I'm carrying somewhere some way away from the calculation just so that I don't forget it. Now we can move to multiplying the six by the seven, that's six tens of course. That's forty-two tens plus these two we're carrying which makes forty four, there's the four and I have to carry four and I jot that down over there to remember. Now we have seven times two which is fourteen hundreds plus this four which makes eighteen hundreds all together. Now I move to multiplication by the forty. To multiply by forty of course, involves multiplying by four and multiplying by ten. We can do the multiplication by ten by writing a zero in the unit's position now all we have to is to multiply by four. So four multiplied by three is twelve so that's two in that position there, the tens position and we're carrying one, jot the one down over there. Now that was actually forty multiplied by three. I'm giving the answer hundred and twenty so we're actually carrying a hundred here but it's a bit difficult to keep track of where you are with the tens and the hundreds and the thousands. Right we now move to four multiplied by six which is twenty-four plus this one over here we're carrying, that's twenty-five. So I write a five in the hundreds position and we're carrying two thousands. Last in, we have four multiplied by two, which is actually forty multiplied by two hundred which is actually eight thousand. It's a little bit difficult to remember cos that's what we're doing here. So we have those eight thousands, plus the two that we carried here which makes ten thousand to write in the answer there. So the two steps are finished, we can now add up these two sub totals to get the overall result thirteen carry one plus one, two, here we are, twelve thousand three hundred and sixty-one. Pleased to see it's the same answer we got when we did it by the grid method.