Chapter 12 - Written Methods for Multiplication and Division

Grid method multiplication 8 minutes 56 seconds

The grid method for multiplication, is a method for multiplying together whole numbers, it's a very accessible method, it makes sense it's easy for children to understand and to apply, it's a perfectly adequate method for multiplying up two say three digit numbers by two digit numbers and in practice any multiplication more complicated than that, well any sensible person would use a calculator. A pre requisite for using the grid method is that you know how to deduce a multiplication fact about multiples of ten from the product of two single digit numbers. So for example if you already know four multiplied by three, you should be able to deduce the value of four multiplied by thirty or forty multiplied by thirty or four hundred multiplied by thirty and so on. With ever increasing multiples of the original numbers four and three. So for example four multiplied by three we know is twelve. When we come to four multiplied by thirty, then the thirty is three multiplied by ten, so we're looking at four multiplied by three multiplied by ten, which is twelve multiplied by ten which is a hundred and twenty. When we look at forty multiplied by thirty we can break that down to four multiplied by ten multiplied by three multiplied by ten. The umm….associative law of multiplication allows us to group these in any way we like so we can multiply the four by the three first that gives us twelve. Multiplied by ten times ten which is a hundred twelve hundreds. The result is twelve hundred. Similarly with four hundred times thirty we can break the four hundred down into four multiplied by a hundred and the thirty into three multiplied by ten, multiply the four by the three first to get twelve and then the hundred by ten to get a thousand so the result is twelve thousand.

Well if we know a result like four multiplied by three if we're going to use the grid method, we need to be able to deduce these products of various multiple of four and three, multiples of ten that is. Notice the umm…pattern here with the zeroes, there's a zero added to the three there, to make it into thirty because we've multiplied the three by ten and we multiply the result by ten which involves a zero following the twelve, to give us a hundred and twenty.

In the second example, we have multiplied by ten twice because we have two zeroes there forty and thirty, so the result will be twelve multiplied by ten twice, two zeroes there, twelve hundred and we see the same pattern here, we have three zeroes involved in the multiplication, the four multiplied by a hundred and the three multiplied by ten and we get three zeroes in the result. We can use that pattern to work out the products of multiples of ten very quickly.

Right, here we go with the grid method then and I'm starting with a very simple example, sixty-three multiplied by seven. Here's the grid we're going to use and I'm breaking the sixty-three down into two parts… (clears throat)…into sixty and three. Now I have to multiply each of those parts by seven. So I'm using the distributive law for multiplication. Distributing it across the addition of sixty and three, multiplying each of those parts by seven giving me four hundred and twenty for seven sixty's and twenty-one for seven threes. We just add those up to get the result four hundred and forty one. That's the product we require.

Now here's a more different example with two, two digit numbers multiplied together. Set up my grid, here we go, now this time we have sixty and three multiplied by forty and seven. So we have four multiplications to do here. The sixty times seven and the sixty times…sorry…and the three times seven we've already done in the previous example, four hundred and twenty and twenty one. And we know that they add up to four hundred and forty one. Now let's multiply the sixty by the forty that gives us two thousand four hundred. That's six fours are twenty four with a further two zeroes to turn that into two thousand four hundred. Three multiplied by forty is a hundred and twenty. Write that in there, now we can add up the two thousand four hundred and the hundred and twenty gives a total of two thousand five hundred and twenty and those two totals at the bottom, now have to be added together to find the…the overall total which is two thousand nine hundred and sixty-one. That's the answer to the multiplication, but notice that we had a choice of ways of doing this. I've chosen there to add the forty column and then the second column and then to add up the results. But we could equally have added the two numbers in the sixty row to get two thousand eight hundred and twenty and the two numbers in the three row to get a hundred and

forty-one and then added those up to get the same result, two thousand nine hundred and sixty one.

My third example, two hundred and sixty-three multiplied by forty-seven. Now we're going to have six multiplications to do, because we have to break the two hundred and sixty-three down into three parts, two hundred, sixty and three each of those has to multiplied by forty and seven. Well we…we've already done some of this in the previous examples, so we can write those products in. The extra bit this time is that we have to multiply two hundred by forty which is eight thousand multiply two hundred by seven which is fourteen hundred. This time I'm choosing to add the rows first so eight thousand added to fourteen hundred gives me nine thousand four hundred. I can do that mentally, two thousand four hundred added to four hundred and twenty gives me two thousand eight hundred and twenty. And then in the third row here, a hundred and twenty added to twenty one is a hundred and forty one. And then I can add up those three subtotals to get the overall result twelve thousand three hundred and sixty one. With an example as complicated as this, it may be well worthwhile just adding the columns as well to check that we've got this right. So adding the column for forty-eight thousand plus two thousand four hundred plus a hundred and twenty, we get ten thousand five hundred and twenty. Adding the column for seven we get one thousand, eight hundred and forty-one. And if we add those together, we can check that we do get twelve thousand three hundred and sixty one.

Here's the grid method, easy to understand, straightforward. Just requires a bit of systematic setting out carefully and careful addition to get the right result. Twelve thousand, three hundred and sixty-one.