Chapter 11 - Mental Strategies for Multiplication and Division

Multiplication by Doubling 5 minutes and 39 seconds

In this video, I'm going to explain how we can use doubling to multiply by any whole number. Let's take an example where we have twenty-seven and we need to multiply this by forty-two. We can imagine for example we need to find the cost of twenty-seven items costing forty-two pence each. Well, this is how we do this, doing nothing other than doubling and then a little bit of addition at the end. It assumes you're good at doubling of course. Now one item costs forty-two pence, jot that down there. And then we use doubling to find the cost of two items-eighty-four. Four items, double eighty-four to get one sixty-eight or eight items, we would double one sixty-eight to get three hundred and thirty-six pence and then doubling that, sixteen items would cost six hundred and seventy-two pence.

Now if we double that again, we would get the cost of thirty-two items which is more than we need, we only need twenty-seven. So that's the point where we stop. We now find a selection of those numbers down the left hand column, one, two, four, eight and sixteen. A selection of those that adds up to twenty-seven. Now let's have a look, we need the sixteen and the eight, which makes twenty-four. If we included the four, that would give us twenty-eight which is too many so we cross the four out. Sixteen and eight is twenty-four, plus the two makes twenty-six, plus the one makes twenty-seven. So that selection there, one, two, eight and sixteen adds up to twenty-seven. So if we add up the numbers in the right hand column, we will find the cost of twenty-seven items at forty-two pence each. Two add four is six, add six is twelve, plus two-fourteen. Err…one carried that's five, thirteen and another ten, twenty-three, carry two, three, four, five and six makes eleven. The total cost is one thousand, one hundred and thirty-four pence which is eleven pounds thirty-four. Now the brilliant thing about this is that any whole number can be made up by a selection of those powers of two those numbers we have there in the left hand column, one, two, four, eight, sixteen, thirty-two, sixty-four, a hundred and twenty-eight and so on and so on and there's a unique way of doing it.

I'll show you with another example, we'll just get rid of those numbers first, right, here we go, I'm going to do a more complicated one now. Thirty-five multiplied by two hundred and fifty-three, ok, we use the same approach, what would one be? One two hundred and fifty-three, is two hundred and fifty-three. Double that and we get two of them, five hundred and six. Double that, to get four as being one thousand and twelve. That's easy to double to find eight, two thousand and twenty-four, so eight two hundred and fifty-threes is two thousand and twenty-four. Double that, to find sixteen of them, four thousand and forty-eight. Double that to get thirty-two which is eight thousand and ninety-six. Now that's the point where we stop because if we double thirty-two, we get sixty-four which is more than we need. We only need thirty-five two hundred fifty threes. So we stop here, we now find the combination of numbers on the left that makes thirty-five. That's fairly easy, it's thirty-two and two and one. We don't need the sixteen or the eight or the four. So those numbers one, two and thirty-two add up to thirty-five and by adding up the other numbers, we now find what thirty-five two hundred and fifty threes would be equal to. Three add six, add six, is fifteen, carry one. Six and nine-fifteen, carry one, three, eight and we have eight thousands, so here we have the answer to our multiplication-eight thousand, eight hundred and fifty-five. It's as easy as that.