

### **Algebra Magic – Instant Product**

Ask for a two digit number from the audience, e.g. 52.

I choose a two digit number, e.g. 58.

I instantly multiply the numbers in my head and write the answer: 3,016.

### **The secret**

My number has the same 10s digit as the original number, and the units digit is the ‘tens-complement’.

So for 67 the second number is 63. For 72, it's 78 etc.

I then multiply the "Tens" value by one more than itself for the first two digits of the answer and the two "units" values by each other for the last two digits of the answer.

eg.  $73 \times 77$  goes like this:  $7 \times 8 = 56$  and  $3 \times 7 = 21$  SO  $73 \times 77 = 5621$ .

I always "do" several and let the kids look for a pattern. After four or five examples, someone usually can do the trick.

That really fires up the Primary students.

### **Why it works**

Two digit numbers are of the form  $(10a+b)$ .

So first number (chosen by the audience) is  $(10a+b)$ . The second HAS to be  $(10a+(10-b))$ .

$$\begin{aligned} & (10a+b)(10a+(10-b)) \\ &= 100a^2 + 100a - 10ab + 10ab + 10b - b^2 \\ &= 100a(a + 1) + b(10 - b) \\ &= 10a[10(a+1)] + b(10 - b) \end{aligned}$$