Here is another Maths4Fun simple problem......

Don't spend all your time adding them up???????? find a formula?
Enjoy
Cheers Ken
_____

Question

Alice created a list of all 3-digit numbers (ie from 100 to 999).
For each of the numbers she worked out the product of the digits, and then added all the products together.
What was the total she arrived at?
Instead of writing them all down can you find a calculation?

Solution

Of course in any number if any one of the digits is a 0 then then the product will be 0 so cannot add to the total.
Consider the numbers starting with "a" and "b".
The sum of the products of their digits is   a x b x (0 + 1 + 2 … + 9) = a x b x 45.
Now consider the numbers beginning with "a".
The sum of the product of the digits will be the sum of   a x b x 45 with "b" taking all values from 0 to 9.
So, the total is: a x 45 x 45.
Finally letting "a" take all values from 1 to 9 will end with the grand total of 45 x 45 x 45
= **91125.**