Multiplication by 9

In the whole number series 9 is the most interesting number therefore the multiplication of 9 is also very interesting. If we have a number to be multiplied by a number consisting of only 9' we use the sub sutra.

" Ekanyunena Purvena"

"By one less than the one before"

Along with our sutra

"**Nikhilam Navatascaramam Dasatah**"

"All from nine and last from ten"

We have categorized the multiplication by 9 in three types. Let us understand all the three types one by one.

First Type:

Where the number of digits in the multiplicand (number to be multiplied) and the multiplier and the same and all the digits of the multiplier are 9's.

Example 1: 342 × 999

341 /	We divide our answer in two parts, the Left Hand Side (L.H.S) and the Right Hand Side (R.H.S) L.H.S: We write one less than the multiplicand 342 – 1 = **341**
341 / **658**	R.H.S: We write the complement of the multiplicand using "All from 9 last from 10" sutra. Complement of 342 = **658** **OR** Subtract each digit of the L.H.S. of the answer(341) individually from 9. (9 - 3 = 6), (9 – 4 = 5), (9 – 1 = 8) = **658** Answer: 342 × 999 **= 341658**

Example 2: 536874 × 9999999

536873 /	We divide our answer in two parts. L.H.S: We write one less than the multiplicand 536874 – 1 = **536873**
536873 / **463126**	R.H.S: We write the complement of the multiplicand using "All from 9 last from 10" sutra Complement of 536874 = **463126** **OR** subtracting each digit of the L.H.S. of the answer from 9 we also get **463126** Answer: 536874 – 9999999 = **536873463126**

Example 3: 2038405 × 9999999

203804 /	We divide our answer in two parts. L.H.S: We write one less than the multiplicand. 2038405 – 1 = **203804**
203804 / **7961595**	R.H.S: Complement of 203485 = **7961595** OR subtracting each digit of the L.H.S. of the answer from 9 we also get **7961595** Answer: 2038405 × 9999999 = **20384047961595**

Rules:

(1) We get the answer in 2 steps.
(2) Left hand side of the answer is one less than the multiplicand (number to be multiplied).
(3) Right hand side is the complement of the multiplicand number or we can subtract each digit of the left hand side of the answer individually from 9.
(4) The most important to remember is that the digits in the multiplicand should be equal to the digits in the multiplier.

Given below are a few more examples solving the sums in straight steps:

Example 4:

5642 × 9999 = 5641 / 4358

Answer: 56414358

Example 5:

71496 × 99999 = 71495 / 28504

Answer: 7149528504

Example 6:

1745213 × 9999999

= 1745212 / 8254787

Answer: 17452128254787

Example 7:

3417629 × 9999999

=3417628 / 6582371

Answer: 34176286582371

When we compare both the methods we find that the Vedic method makes our calculations very short.
475 × 999

Usual Method **Vedic Method**

4 7 5 ×9 9 9 4 2 7 5 4 2 7 5 0 4 2 7 5 0 0 **4 7 4 5 2 5**	475 × 999 = 475 / 525 = **474525**

Exercise 3.3:

Solve the following sums mentally:

SL. No.	Problems	Answer with Quick Steps
1	46 × 99	
2	74 × 99	
3	65 × 99	
4	694 × 999	
5	374 × 999	
6	618 × 999	
7	6842 × 9999	
8	98246 × 99999	
9	6594972 × 999999	
10	68245731 × 99999999	

Second Type:

In this case the numbers of digit in the multiplier are more than the digits in the multiplicand. This is also equally easy as the previous one. We just have to add zero's before the multiplicand and make the number of digits equal to the digits of the multiplier.

Example 1: 23×99

Step 1: 023 × 999	Since the multiplicand had 2 digits and multiplier has 3 digits we make our number 023, so that the digits of the multiplicand are equal to the digits of the multiplier. Now we divide our answer in two parts.
Step 2: **22** /	L.H.S: We write one less than the multiplicand. 23 – 1 = **22**
: 22 / **977**	R.H.S: The complement of 023 = **977** **OR** subtracting each digit of the L.H.S. of the answer from 9 we also get **977** Answer: 23 × 99 = **22977**