

## Vedic Mathematics

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## Last Two Classes

- We learnt how to multiply using two sutras namely ekadhikena Purvena and Nikhilam

In particular, you know what the answers for  $39 * 31$ ,  $48 * 42$ ,  $78 * 82$ ,  $645 * 655$  (using ekadhikena sutra) and  $53 * 52$ ,  $89 * 92$ ,  $104 * 122$  (using nikhilam method).

## Outline of this class

- How to compute decimal expansions of  $1/19$ ,  $1/29$ , ...  $1/89$  etc using Ekadhikena Purvena
- Division Using two sutras using nikhilam and urdhva-tiryagbhyam .  
How to divide  $111$  by  $89$   $1234$  by  $888$ ,  $16384$  by  $128$ .

## Sutra

### 1. Ekadhikena Purvena

By one more than the previous one.

The preposition “by” means the operations this sutra concerns are either multiplication or division ( In the case of addition/subtraction preposition to/from is used.). In this case it is useful for both of them.

## Examples

$$1/19 =$$

$$1/29 =$$

## What is the method?

Two methods: division and multiplication:

Multiplication: Start with 1 as the last digit.

1

Multiply the last digit by 2 (I.e., one more than 1 (1 being the first digit in 19) and that is the previous digit. 21

Repeat the previous step: 421

Continuing 68421

1

## Crucial steps!!

68421

1

Multiply 6 by 2 and add 1.

368421

11

Continuing we get

47368421

1 11

## Continue

1/19=. 0 5 2 6 3 1 5 7 8 9 4 7 3 6 8 4 2 1

1/29=

.0 3 4 4 8 2 7 5 8 6 2 0 6 8

9 6 5 5 1 7 2 4 1 3 7 9 3 1

1/39=

## Method 2

Division Method for computing  $1/19$

Divide 1 by 2 (one more than 1 in 19).

Place the quotient in line 1 and remainder in line 2

0 5 2

1 1

Treat the last remainder quotient as one number and divide by 2 and repeat.

## Continuing

$1/19 =$

.052631578947368421

$1/29 =$

.034482758620689655172413  
7931

## Divisions

Nikhilam Method:

Examples:

$12/9 = 1 \ 2$

1

1 | 3 Quotient : 1 Remainder: 3

$53/9 = 5 \ 3$

5 Quotient: 5 Remainder 8

## More Examples

What is the quotient and remainder when

12031 is divided by 9?

1 2 0 3 1

1 3 3 6

Quotient is 1 3 3 6 Remainder 7

## More Examples

18 over 9

225 over 9

136 over 9

237 over 9

## Examples

1011649 divided by 9

111/89

1234 / 888

111/73