Examples of Multiplication

MULTIPLICATION BY 11, 101, 1001, etc.

Example:-1) $32 \times 11 = 352$,

Two extreme digits remain unchanged but the middle digit is obtained by adding the two digits.

3	2 3	 2
3	5	2

Example:-2) $537 \times 11 = 58$ / (10) / 7 = 5907,

Two extreme digits remain unchanged but the middle digit is obtained by adding the two digits. $5 + 3 = 8$, is the second left digit, $3 + 7 = 10$, as it is a two digited number so 0 is placed at the third left digit and 1 is carried forward to add to 8 to make it 9. So, the answer is 5907,

5	3 5	7 3	 7	537×10 537×1
5 5	8 9	10 0	7 7	1 carried forward to add to 8 $= 5907$ $(Answer)$

Example:-3) $8317 \times 11 = 8$ / (11) /4 / 8 / 7 = 91487,

Two extreme digits remain unchanged but the middle digit is obtained by adding the two digits. $8 + 3 = 11$, is the second left digit, $3 + 1 = 4$, as it is a two digited number so 0 is placed at the third left digit and 1 is carried forward to add to 8 to make it 9. So, the answer is 5907,

8	3 8	1 3	7 1	 7	8317×10 8317×1
8	11	4	8	7	$= 91487$, 1 of 11 of second is Carried forward to add to 8.

Example:-4) $57 \times 101 = 5757$,

Taking 100 as the base number group of two digits remain grouped and placed side by side.

5	7	 5	 7	57×100 57×1
5	7	5	7	5757

Example:-5) $634 \times 101 = 63$ / (6+4=10) / 34 = 64034,

Taking 100 as the base number place left side two digits and right side two digits grouped together then adding first and third digits. $6 + 4 = 10$, 1 of 10 is carried forward to add to 63 (left side group of two digits) to get 64 so, the answer becomes 64034,

6	3	4 6	3	4	634 × 100 634 × 1
6	3	10	3	4	=64034, 1 of10 of third column carried forward to add to 3 of second column.

Example:-6) $83462 \times 101 = 83/$ (8+4=12) /3+6=9 / 4+2=6 / 62 = 8429662,
As the base number is 100 so place extreme left side and extreme right side two digits together as given in the question. Then add 1st to 3rd, 2nd to 4th and 3rd to 5th digit. If two digited numbers are obtained in any case carry the tens digit forward to add to the next number.

$8 + 4 = 12$, 1 carried forward to add to 83,

$3 + 6 = 9$, fourth digit of the answer.

$4 + 2 = 6$, fifth digit of the answer.

Last two digits (62) remain grouped so, the answer becomes 6429662. (Answer)

8	3	4 8	6 3	2 4	6	2	83462×100, 83462×1
8	3	12	9	6	6	2	=8429662, 1 of 12 of third column is carried forward to add to 3,

Example:-7) $342 \times 1001 = 342342$,
Taking 1000 as the base number group of three digits of the number remain grouped and placed side by side.

3	4	2 3	4	2		342×1000 342×1
3	4	2	3	4	2	=342342, Multiplication with zero has no meaning so, the number is shifted three places.

Example:-5) $5234 \times 1001 = 523$ / (5+4=9) / 234 = 5239234,
Taking 100 as the base number place left side two digits and right side two digits grouped together then adding first and third digits. $6 + 4 = 10$, 1 of 10 is carried forward to add to 63 (left side group of two digits) to get 64 so, the answer becomes 64034,

5	2	3	4 5	2	3	4	5234×1000, 5234×1

5	2	3	9	2	3	4	=5239234, Multiplication with zero has no meaning so, the number is shifted three places,

Example:-6) $83462 \times 101 = 83/$ (8+4=12) /3+6=9 / 4+2=6 / 62 = 8429662,
As the base number is 100 so place extreme left side and extreme right side two digits together as given in the question. Then add 1st to 3rd, 2nd to 4th and 3rd to 5th digit. If two digited numbers are obtained in any case carry the tens digit forward to add to the next number.

$8 + 4 = 12$, 1 carried forward to add to 83,

$3 + 6 = 9$, fourth digit of the answer.

$4 + 2 = 6$, fifth digit of the answer.

Last two digits (62) remain grouped so, the answer becomes 6429662.

NOTE:- Same process is applicable for all other numbers like 100001, 1000001 etc.

Multiplication by 12, 13, 102, 103, 1002, 1003, 10002 etc.

Example:- 1) 52 × 12 =624,

5	2 10	4	52 × 10, 52× 2=104
5	12	4	=624, 1 of 12 of second column is carried forward to add to 5

Example:-2) 73 × 13 =

7	3 21	9	73 × 10, 73× 3=219
7 **2**	**2**4	9	=949, **2** of **2**1 of second column is carried forward to add to 5

Example:-3) 1342 × 13 =

1	3 4	4 0	2 2	6	1342 × 10 1342 × 3 = 4026
1	7	4	4	6	=17446, Multiplying by 3 shifted one place to the right and added.

Example:-4) 35 × 102 =3570,

3	5	7	0	35 × 100 35 × 2 = 70,
3	5	7	0	=3570, as 100 has two zeros so 70 is shifted two places right and added.

Example:-5) 372 × 102 = 37944,

3	7	2 7	4	4	372 × 100 , 372 × 2 =744,
3	7	9	4	4	=37944, as 100 has two zeros so 744 is shifted two places right and added.

Example:-6) 3486 × 1003 =

3	4	8	6 10	4	5	8	3486 × 1000 3486 × 3 = 10458,
3	4	8	16	4	5	8	=3496458, 1 of 16 is carried forward to add to 8.

Example:-7) 29374 × 10004 =

2	9	3	7	4 11	7	4	9	6	29374 × 10000 29374 × 4 = 117496,
2	9	3	8	5	7	4	9	6	= 293857496, as 10000 has four zeros so, 117496 is shifted four places to right.

MULTIPLICATION BY 9, 99, 999 …..etc. (Eka nyunena purvena)

Example:- 1) 56× 99 = 5544,

Step:-1) 56 – 1=55, (One less than the previous, 56)

Step:-2) 99 – 55 = 44,

Example:- 2) 763× 999 = 762237,

Step:-1) 763 – 1=762, (One less than the previous, 763)

Step:-2) 999 – 762 = 237,

Example:- 3) 538× 9999 = 5379462,

Step:-1) 538 – 1=537, (One less than the previous, 538)

Step:-2) 9999 – 537 = 9462,

Example:- 4) 83492× 999999 = 83491916508,

Step:-1) 83492 – 1=83491, (One less than the previous, 83492)

Step:-2) 999999 – 83491 = 916508,

WHEN MULTIPLICAND HAS MORE DIGITS THAN MULTIPLIER.

Example:- 5) 3284× 999 = 3284000 – 3284 = 3283716 ,

Step:-1) As the multiplicand has more digits so, place three zeros equal to the number of nines in multiplier.

Step:-2) Now subtract the number (multiplicand) from the number in step 1.

Multiplication by 8, 98, 97, etc.

Example:- 1) $3 \times 8 = (3 - 1 = 2) / (8 - 2 \times 2 = 4) = 24,$

Using eka nyunena purvena

Step:- 1) One less than the multiplicand: $(3 - 1 = 2)$ gives the left side digit of the answer.

Step:-2) As 8 (multiplier) is two less than the base number 10 so, multiply the above obtained number with 2 and subtract from 8 to get4 which gives the right side digit of the answer.

Example:- 2) $34 \times 98 =$

$(34 - 1 = 33) / (98 - 2 \times 33 = 98 - 66 = 32) = 3332,$

Using eka nyunena purvena

Step:- 1) One less than the multiplicand: $(34 - 1 = 33)$ gives the left side digits of the answer.

Step:-2) As 98 (multiplier) is two less than the base number 100 so, multiply the above obtained number 33 with 2 and subtract from 98 to get 32 which gives the right side digits of the answer.

Example:- 3) $364 \times 998 =$

$(364 - 1 = 363) / (998 - 2 \times 363 = 998 - 726 = 272) = 363272,$

Using eka nyunena purvena

Step:- 1) One less than the multiplicand: $(364 - 1 = 363)$ gives the left side digits of the answer.

Step:-2) As 98 (multiplier) is two less than the base number 1000 so, multiply the above obtained number 363 with 2 and subtract from 998 to get 272 which gives the right side digits of the answer.

Example:- 4) $68 \times 98 =$

$(68 - 1 = 67) / (98 - 2 \times 67 = 98 - 134 = -36) = 67 / (-36) = 6664,$

Using eka nyunena purvena

Step:- 1) One less than the multiplicand: $(68 - 1 = 67)$ gives the left side digits of the answer.

Step:-2) As 98 (multiplier) is two less than the base number 100 so, multiply the above obtained number 67 with 2 and subtract from 98 which gives a negative number (-36) , as negative number is not permissible so subtract36

from the base number 100 to get 64 which gives the right side digits of the answer.

SQUARE OF NUMBERS.

EKADHIKENA PURVENA.

Example:-1) $15^2 = 1 \times 2 \,/\, 5^2 = 225$,
Step:-1) One more than the previous number (1) of 5 is multiplied with it.
One more than 1 is 2 multiplied with it, $1 \times 2 = 2$,
Step:-2) Write 25, square of 5 against it to get the answer.
Example:-2) $25^2 = 2 \times 3 \,/\, 5^2 = 625$,
Step:-1) One more than the previous number (2) of 5 is multiplied with it.
One more than 2 is 3 multiplied with it, $2 \times 3 = 6$,
Step:-2) Write 25, square of 5 against it to get the answer.
Example:-3) $125^2 = 12 \times 13 \,/\, 5^2 = 15625$,
Step:-1) One more than the previous number (12) of 5 is multiplied with it.
One more than 12 is 13 multiplied with it, $12 \times 13 = 156$,
Step:-2) Write 25, square of 5 against it to get the answer.

SQUARE OF ANY TWO DIGITED NUMBER.
Using $(a+b)^2 = a^2 + 2ab + b^2$,
Example:-1) $32^2 = 3^2 \,/\, 2 \times 3 \times 2 \;/\; 2^2$ = 9 / 12 / 4 =1024, (Answer)
Step:-1) Write the numbers as shown above.
Step:-2) As the middle number 12 has two digits so, carry the ten's place digit 1 to add to 9 to get 10, so the answer is 1024,
Example:-2) $47^2 = 4^2 \,/\, 2 \times 4 \times 7 \;/\; 7^2$ = 16 / 56 / 49 =2209, (Answer)
Step:-1) Write the numbers as shown above.
Step:-2) As each number has two digits so, carry the ten's place digit of each number to add to the next number to get the answer is 2209,
Example:-3) $68^2 = 6^2 \,/\, 2 \times 6 \times 8 \;/\; 8^2$ = 36 / 96 / 64 =4624, (Answer)
Step:-1) Write the numbers as shown above.
Step:-2) As each number has two digits so, carry the ten's place digit of each number to add to the next number to get the answer is 4624,