Speed Up Your Calculation (Ganit Bodh Series)-03

Division

Type I: To multiply any digit by 11.

Rule: Write left most of the number, then write digit of unit place as it is and then add number successively form right to left taking two by two.

For example: 234 is a number which is to be multiplied by 11. Then, write number as 0234: then to multiply by 11. Since 4 is at unit place so write 4 in rightmost i.e. at unit place of multiplication as 0234×11= .....4, then add number 4+3=7 and put it at tens place. If sum is more than 10, then write unit place number and keep in hand tens place number. Again add 3+2=5 and then add any balance of step II if any and write it at hundred place. If it is more than 10, then keep the number of tens place in hand and process may be continued till last addition is obtained. Finally, it come as 0234×11=2574. Consider some more examples: 2563×11 then it can be written as 02563×11=28193 or, simply you may understand as:

Write 0 in rightmost and left most of the given number and add it. Taking two at time from right side.

Type II:

To multiplying by 10 or any number of from 10^m. With any number write m zero's over the number. For example 546×10^4= 5460000

Type III:

To multiply any number by 5. Write zero over the number and divide it by 2. Definitely, this practice will save much more time.

$$6943\times5 = \frac{69430}{2} = 34715$$

This process can be applied for multiplication of any number by 25, 50 etc. To multiply by 25, write two zero's on the number and divide it by 4 and so on

$$2346\times25 = \frac{234600}{4} = 58650$$

Type IV:

Similarly, to multiply any number by number which is made by 9's only. For example, to multiply any number by 9,99,999 etc, write the number of zero over the number as many as the number of 9's contained in that number by which multiplication is to be done and then subtract the original number. For example, suppose we have to multiply 6394×999. Since it consists of three nine's, so write three zeroes over the number and subtract the only original number itself as:

6394000-6394 = 5387606

Test of divisibility of numbers by prime numbers:

Divisibility by 2: Any number in which last digit is even or zero must be divisible

by 2.

Divisibility by 3: If the sum of digits is divisible by 3, then number must be divisible by 3. For example, divisibility of number 1236945 is to be checked. Here sum of number 1+2+3+6+9+4+5+ = 30 which is divisible by 3. Hence number must be divisible by 3.

To test the divisibility of number by 5: Any number in which last digit i.e. digit at unit place is either zero or 5, must be divisible by 5. 37635 must be divisible by 5 as the digit at unit place is 5.

To test the divisibility of any number by 7: To test the divisibility by 7, multiply digit at unit place by 5 and add with rest of the digits and then repeat the same process until it is confirmed that whatever digit is obtained is divisible by 7. Then the number must be divisible by 7. For example, we have to check that 252 is divisible by 7. We multiply digits at unit place i.e. 2 by 5 and add with 25 as 25+2×5 = 35. Since 35 is divisible by 7. Hence number is divisible by 7.

Divisibility by 11: If the difference of the sum of alternate digits is zero or one, then the number must be divisible by 11.

5038 = (8+0) – (5+3) = 0

9416 = (9+1) – (4 + 6) = 0

Hence number must be divisible by 11.

Divisibility by 13: Multiply unit place digit by 4 and add it to the remaining number. If sum is divisible by 13, number must be divisible by 13. For example, 689 can be proceeded as 68+9×4 = 68+36 = 104 $\Rightarrow$ 10+4×4=26 which is divisible by 13.

Divisibility by 17: Multiply unit place digit by 12 and add it to the remaining number.

Divisibility by 53: Multiply digit at unit place by 16 and add it to the rest.

1643 = 164 + 16 × 3 = 164 + 48

= 212 = 21 + 2 × 16

= 53

Hence this is divisible by 53.

Divisibility by 59: Multiply digit at unit place by 6 and add it to the rest.

3599 $\Rightarrow$ 359 + 9 × 6= 359 + 54 = 413

= 41 + 3×6

= 41+ 18

= 59

Hence this is divisible by 59.

Divisibility by 67: Multiply digit at unit place by 47 and add into rest.

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4757 $\Rightarrow$ 475 + 7×47= 475 + 329 = 804
= 80 + 4× 47 = 268
4221 = 422 + 1×47= 422 + 47 = 469
which is divisible by 67.
Hence number must be divisible by 67.

Divisibility by 73: Multiply digit at unit place by 22and add into rest number. If the number is divisible by 73, original number will be also divisible by 73. For example:

3942 = 394 + 2×22 = 438
= 43 + 176
= 219
Which is divisible by 73.
Hence number must be divisible by 73.

Divisibility by 79: Multiply digit at unit place by 8 and add it into rest as

5609 = 560 + 9×8
= 560 + 72 = 632
$\Rightarrow$ 63 + 2 × 8 = 63 + 16 = 79
3318 = 331 + 8 × 8
= 331 + 64 = 395
$\Rightarrow$ 395 = 39 + 5 × 8 = 39 + 40 = 79
Hence number must be divisible by 31.

Divisibility by 83: Multiply digit at unit place by 25 and add into rest as

3486 = 348 + 6 × 25
= 348 + 150 = 498
498 = 49 + 8 × 25 + 49 + 200
= 249
Which is divisible by 83
Hence number must be divisible by 83.

Divisibility by 97: Multiply digit at unit place by 68 and add it to rest as

3104 = 310 + 4 × 68 = 310 + 272
= 582 58 + 2 × 68 = 194
which is divisible by 97.
Hence number must be divisible by 97.

To be countinue.....

See tomorrow....