Multiplying By 14443:

A. Multiplying by 14443 is very difficult but once you know the method, with practice, it will become easier.

B. Before giving the method there are some definitions you should be familiar with.

1. (n MOD 9) means the remainder when n is divided by 9. See *Divisibility Rules*

   Ex [1] 32 MOD 9 = 5.

2. (n DIV 9) means how many times 9 will divide into n evenly.

   Ex [1] 32 DIV 9 = 3.

C. These should also be memorized: If (n MOD 9) =

1 => m = 44
2 => m = 88
3 => m = 33
4 => m = 77
5 => m = 22
6 => m = 66
7 => m = 11
8 => m = 55
9 => m = 99

'm' represents the middle number of the answer.

D. The answers follow this form: f m l, where 'f' represents the first numbers, 'm' represents the middle numbers, and 'l' represents the last numbers. Also, 'f'+'l'='m'.

Ex [1] 29 x 14443 = 418847 where 41 + 47 = 88.

*Note that (29 MOD 9) = 2 so 'm' = 88.

E. However, there are some circumstances where 'f' + 'l' does not equal 'm'.

Ex [1] 48 x 14443 = 693264 where 69 + 64 ≠ 32. Instead 69 + 64 = 133. As it turns out, if the first numbers, 'f', are greater than the middle numbers, 'm', then 'f' + 'l' = 100 + 'm' and the middle number is 'm' – 1.

F. All that is left is to get the first numbers, 'f', and 'l' can then be derived. To get 'f' then you need to do the following:

'f' = n + [4(n DIV 9) + {(n MOD 9)* ÷ 2 – 1}] *if (n MOD 9) is odd then add 1 before dividing by 2.

G. Here are the steps:

1. Determine the middle number by using (n MOD 9) in step C.
2. Find the first number, 'f', and write it down.
3. If the first number is less than the middle number, 'm', then write 'm'.
4. If the first number is greater than the middle number, 'm', then write 'm' – 1.
5. If the first number is less than the middle number, 'm', then subtract 'f' from 'm' to get the last numbers 'l': m – f = l.
6. If the first number is greater than the middle number, 'm', then subtract 'f' from 100 + 'm' to get the last numbers 'l': (100 + m) – f = l.

H. Examples:

Ex [1] 32 x 14443 =_____.

a) 32 MOD 9 = 5, so the middle numbers are 22.
b) 32 DIV 9 = 3, so 4(3) + 2 = 14 because (5+1) ÷ 2 – 1 = 2.
c) 32 + 14 = 46, so the first 2 digits are 46. Write 46. Since 46 is greater than 22, the middle digits are 21. Write 21.
d) Since 46 is greater than 22, the last digits are: 122 – 46 = 76. Write 76.
e) Solution is : 46 21 76 or 462,176.

Ex [2] 26 x 14443 =_____.

a) 26 MOD 9 = 8, so the middle numbers are 55.
b) 26 DIV 9 = 2, so 4(2) + 3 = 11 because 8 ÷ 2 – 1 = 3.
c) 26 + 11 = 37 so the first 2 digits are 37. Write 37. Since 37 is less than 55, the middle digits are 55. Write 55.
d) Since 37 is less than 55, the last digits are: 55 – 37 = 18. Write 18.
e) Solution: 37 55 18 or 375,518.

Ex [3] 81 x 14443 =_____.

a) 81 MOD 9 = 0, so the middle numbers are 99.
b) 81 DIV 9 = 9, so 4(9) + (-1) = 35 because 0 ÷ 2 – 1 = (-1).
c) 81 + 35 = 116, so these are the first **3 digits**. Write 116. Since 116 is greater than 99 the middle digits are 98. Write 98.
d) Since 116 is greater than 99, the last digits are: 199-116 = 83. Write 83.
e) Solution: 116 98 83 or 1,169,883.

I. If (n MOD 7) = 0 then the problem becomes much easier. Since 14443 = 101101 ÷ 7, you can divide by 7 and multiply by 101101.

Ex [1] 14443 x 84 =_____.

a) 84 ÷ 7 = 12.

b) 12 x 101101 = 1213212.

c) The answer is 1213212.