Squaring Numbers That End in a "1"

Here is a neat little trick, and of course, why it works.

To square a number that ends in a "1":

(1) First of all square the next lowest number (it will end in a zero).
(2) Second add the number being squared plus the next lowest number.
(3) Add your results of step (1) and step (2).

Here is an example: Square 41, or what is 41^2 ? Next lowest number is 40, so:
(1) First of all square the next lowest number (it will end in a zero). $40^2 = 40 \times 40 = 1600$
(2) Second add the number being squared plus the next lowest number. $41 + 40 = 81$
(3) Add your results of step (1) and step (2). $1600 + 81 = 1681$, or 1 681 or 1,681

Why it works

Well number that end in 1 can look like **T**1, where "**T**" = the ten's digit. Their actual value is (10**T** + 1). Therefore:

$(10\mathbf{T} + 1)^2 = (10\mathbf{T} + 1)(10\mathbf{T} + 1) = 100\mathbf{T}^2 + 10\mathbf{T} + 10\mathbf{T} + \mathbf{1}$ or $100T^2 + 20T + 1$

So, in the case of 41^2, then T = 4 and $100\mathbf{T}^2 + 10\mathbf{T} + 10\mathbf{T} + \mathbf{1} = \mathbf{T}^2(100) + \mathbf{10T} + \mathbf{10T+ 1}$, and this leads to:

$\mathbf{T}^2 = 4 \times 4 = 16$, multiplied by 100 equals 1600, this is the ten's digit squared with "00" attached.
10T = 10 x 4 = 40, which is the number one less than the number we want to square.
10T+ 1 = 10 x 4 + 1 = 41, which is the number that we want to square.

Thus we get 40^2 plus (40 + 41) = 1600 + 81 = 1681

Try it with 81^2, the number one less = 80. $80^2 = 6400$, 80 + 81 = 161, and 6400 + 161 = 6561 or 6,561

121^2, has 120 as its next lowest number. $120^2 = 14400$, and 120 + 121 = 241. Add 14400 + 241 and get 14641.

It works!!

And now you know why….