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New Performance of Square Numbers III Skipper and Staircase Method

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Abstract: This study considered the square of numbers by Skipper and Staircase method. In the previous research new performance of square of numbers we provoke and illustrate how the number(s) can be squared. As a consequence of the new method called Skipper and Staircase was introduced in the present research.

Key words: Square, method, consequence, introduced, performance

INTRODUCTION

The research presented in this study is the continuation of earlier research which one is recently appeared see (Akinpelu *et al*., 2005) here after referred to as study 1 and the other one (Adetunde, 2006) which had been review referred to as study 2. Study 2, (Akinpleu *et al*., 2005) was subsequently an extension of study 1. Thus in the present paper we extend study 2, by formulating idealized model system of performing a square of numbers called Skipper and Staircase methods. The algorithms adopted here correspond to study 2 (Adetunde, 2006) algorithms.

The solutions of the numerical examples are obtained by using the Pascal triangle coefficient of combination.

MATERIALS AND METHODS

First method: We shall apply the algorithms below for the Skipper's Method.

Step 1: If the number to be square is having two digits take them as a, b. If it is three digits, it should be taken as a, b, c …

Step 2: Square the numbers.

Step 3: Use the Pascal triangle of degree 2 (Binomial expansion coefficient of degree 2).

Step 4: The digits in the Pascal triangle/Binomial expansion coefficient is taken as Tens and units (T and U).

Step 5: Drop the U (units) down after.

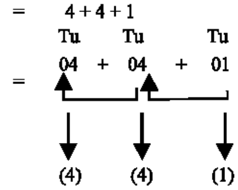
APPLICATION OF THE SKIPPERS'S METHOD [TO TWO DIGITS]

Example 1: Find the square of 21

$(21)^2 = 2^2 + 2(2)(1) + (1)^2$

$= 4 + 4 + 1$

=

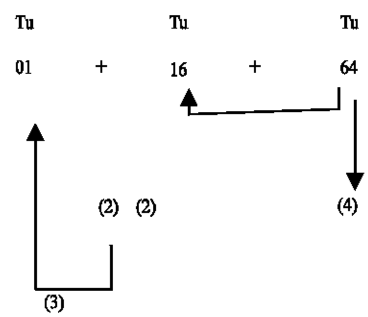


$\Rightarrow (21)^2 = 441$

Example II: Find the square of (18)

$(18)^2 = 1^2 + 2(1)(8) + 8^2$

$1 + 16 + 64$



$18^2 = 324$

Example III: Find the square of (27)

$(27)^2 = 2^2 + 2(2)(7) + 7^2$

$= 4 + 28 + 49$

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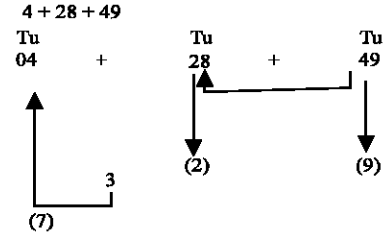
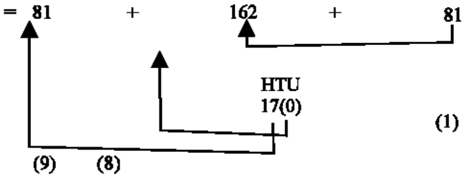


Hence $27^2 = 729$

Example IV: Find the square of 99

$(99)^2 = 9^2 + 2(9\times9) + 9^2$
$= 81 + 162 + 81$
$=$ Tu TU HTU TU
$=$ 81 + 162 + 81

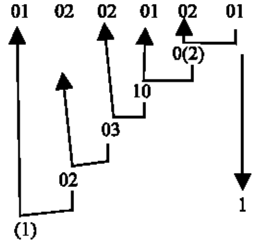


APPLICATION OF THE SKIPPER'S METHOD (TO TWO DIGITS)

$(abc)^2 = (a\oplus b\oplus c)^2 = (x + c)^2 = x^2 + 2xc + c^2$ where $x = a + b$
$\Rightarrow (abc)^2 = (a\oplus b\oplus c)^2 = a^2+2ab+b^2+2c[a+b] +c^2$
$= a^2+2ab+b^2+2ac+2bc +c^2$
$(abc)^2 = a^2+2ab+2ac+b^2+2bc+c^2$

Example I

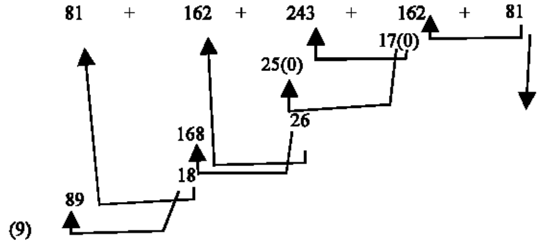
$(111)^2 = 1^2+2(1\times1)+2(1\times1)+1^2+2(1\times1)1^2$
$= 01+02+02+01+02+01$
Tu Tu Tu Tu Tu Tu
01 02 02 01 02 01



$(111)^2 = 12.321$

Example II

$(999)^2 = (9\oplus9\oplus9)^2 = 9^2+2(9x9)+2(9x9)+9^2+2(9x9)+9^2$
$= 81+162+162+162+81+162+81$
Tu HTu HTu HTu Tu
81 + 162 + 243 + 162 + 81



$(999)^2 = 998,001$

SKIPPER'S METHOD FOR FOUR DIGITS

Illustration of the Skippers Method for four Digits

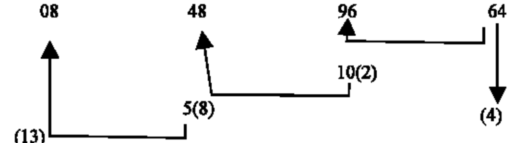
$(abcd)^2 = (x+y)^2$ where $x = a+b$ and $y = c+d$
$\therefore (abcd)^2 = (x+y)^2 = x^2+2xy+y^2$
$= a^2+2ab^2+b^2+2[ac+ad+bc+bd]+c^2+2cd+d^2$
$= a^2+2ab^2+b^2+2ac+2ad+2bc+2bd+c^2+2cd+d^2$
$= 01+02+01+02+02+02+02+01+02+01$
Tu Tu Tu Tu Tu Tu Tu
01 02 03 04 03 02 01

$(1111)^2 = 1,234,321$

APPLICATION OF THE STIRCASE METHOD CUBE OF A NUMBER [TWO DIGITS]

Example I: Find the cube of 24

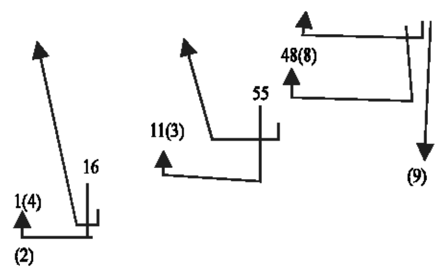
Soln
$(24)^3 = 2^3+3(2^2x4^1)+3(2^1x4^2)+4^3$
$= 08+48+96+64$
Tu + Tu + Tu + Tu
08 48 96 64



Hence $(24)^3 = 13824$

Example II: Find the cube 29

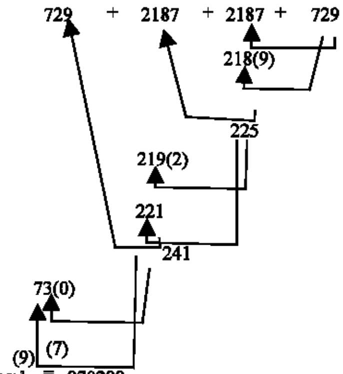
$(29)^3 = 2^3+3(2^2\times9^1)+3(2^1\times9^2)+9^3$
$= 8+108+486+729$
Tu HTu HTu HTu
$=$ 08 + 108 + 486 + 729



$\therefore (29)^3 = 24389$

Example III: Find the cube of 99

Soln:
$(99)^3 = 9^3+3(9^2x9)+3(9x9^2)+9^3$
HTu HTu HTu HTu
$=$ 729 + 2187 + 2187 + 729



$(99)^3 = 970299$

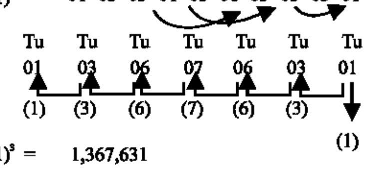
STAIRCASE METHOD: [FOR THREE DIGITS]

$$(abc)^3 = (a \oplus b \oplus c)^2 = (x+c)^3 = x^3+3x^2c+3xc^2+c^3 \text{ where } x = a \oplus b$$

$$= (a+b)^3+3c(a^2+2ab+b^2)+3c^2(a+b)+c^3$$

$$a+3a^2b+3ab^2+b^2+3ac^2+6abc+3b^2c+3ac^2+3bc^2+c^2$$

$$(111)^3 = 01+03+03+01+03+06+03+03+03+01$$



$$(111)^3 = 1{,}367{,}631$$

CONCLUSION

We can easily conclude that with both Skipper's and Staircase's method, one can find the square, cubic or n^{th} power of any number.

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