RD SHARMA

Solutions

Class 8 Maths

Chapter 3

Ex 3.3

1.) Find the squares of the following numbers using column method. Verify the result finding the square using the usual multiplication.

(i) 25

Here a = 2, b = 5

Step: 1 Make 3 columns and write the values of a^2, 2 x a x b, and b^2 in these columns.

Column I	Column II	Column III
a^2	2 x a x b	b^2
4	20	25

Step: 2 Underline the unit digit of b^2 (in Column III) and add its tens digit, if any, with 2 x a x b (in column II)

Column I	Column II	Column III
a^2	2 x a x b	b^2
4	20 + 2	25
	22	

Step: 3 Underline the unit digit in Column II and add the number formed by the tens and other digits if any, with a^2in Column I.

Column I	Column II	Column III
a^2	2 x a x b	b
4 + 2	20 + 2	25
6	22	

Step 4: Underline the number in Column I.

Column I	Column II	Column III
a^2	2 x a x b	b^2
4 +2	20 + 2	25
6	22	

Step: 5 write the underlined digits at the bottom of each column to obtain the square of the given number.

In this case, we have:

$25^2 = 625$

Using Multiplication:

25 x 25 = 625

This matches with the result obtained by the column method:

(ii) 37

Here, a = 3, b = 7

Step: 1 Make 3 columns and write the values of a^2, 2 x a x b, and b^2 in these columns.

Column I	Column II	Column III
a^2	2 x a x b	b^2
9	42	49

Step: 2 Underline the unit digit of b^2 (in Column III) and add its tens digit, if any, with 2 x a x b (in Column II)

Column I	Column II	Column III
A^2	2 x a x b	B^2
9 +4	42 + 4	49
13	46	

Step: 3 Underline the unit digit in Column II and add the number formed by tens and others digits if any, with a^2 in Column I.

Column I	Column II	Column III
A^2	2 x a x b	B^2
9 + 4	42 + 4	49
13	46	

Step 5: Write the underlined digits at the bottom of each column to obtain the square of the given number.

In this case, we have:

$37^2 = 1369$

Using multiplication:

37 x 37 = 1369

This matches with the result obtained using the column method.

(iii) 54

Here, a= 5, b= 4

Step 1: make 3 columns and write the values of a^2, 2 x a x b and b^2 in these columns.

Column I	Column II	Column III
a^2	2 x a x b	b^2
25	40	

Step: 2 Underline the unit digit of b^2 (in Column III) and add its tens digit, if any, with 2x a x b (in Column II)

Column I	Column II	Column III
a^2	2 x a x b	b^2
25	40 +1	1<u>6</u>
	41	

Step: 3 Underline the digit in Column II and add the number formed by the tens and other digits if any, with a^2in Column I.

Column I	Column II	Column III
a^2	2 x a x b	b^2
25 +4	40 +1	1<u>6</u>
29	4<u>1</u>	

Step: 4 underline the number in Column I.

Column I	Column II	Column III
a^2	2 x a x b	b^2
25 +4	40 +1	1<u>6</u>
<u>29</u>	4<u>1</u>	

Step: 5 write the underlined digits at the bottom of each column to obtain the square of the given number.

In this case, we have:

$54^2 = 2916$

Using multiplication:

54 x 54 = 2916

This matches with the result obtained using the column method.

(iv) 71

Here, a = 7, b = 1

Step: 1 Make 3 columns and write the values of a^2, 2 x a x b and b^2 in these columns.

Column I	Column II	Column III
a^2	2 x a x b	b^2
49	14	1

Step: 2 Underline the unit digit of b^2 (in column III) and add its ten digit, if any with 2 x a x b (in column II)

Column I	Column II	Column III
a^2	2 x a x b	b^2
49	14 + 0	1
	14	

Step: 3 Underline the unit digit in Column II and add the number formed by the tens and other digits, if any, with a^2 in column I.

Column I	Column II	Column III
a^2	2 x a x b	b^2
49 + 1	14 + 0	1
50	14	

Step: 4 underline the number in column I.

Column I	Column II	Column III
a^2	2 x a x b	b^2
49 + 1	14 + 0	1
50	14	

Step: 5 write the underlined digits at the bottom of each column to obtain the square of the given number:

In this case, we have:

$71^2 = 5041$

Using multiplication:

71 x 71 = 5041

This matches with the result obtained using the column method.

(v) 96

Here, a = 9, b = 6

Step: 1 Make 3 columns and write the values of a^2 , 2 x a x b and b^2 in these columns.

Column I	Column II	Column III
a^2	2 x a x b	b^2
81	108	36

Step: 2 Underline the unit digit of b^2 (in column III) and add its tens digit, if any with 2 x a x b (in column II)

Column I	Column II	Column III
a^2	2 x a x b	b^2
81	108 + 3	3<u>6</u>
	111	

Step: 3 Underline the unit digit in Column II and add the number formed by the tens and other digits if any, with a^2 in column I.

Column I	Column II	Column III
a^2	2 x a x b	b^2
81 + 11	108 + 3	3<u>6</u>
92	11<u>1</u>	

Step: 4 underline the number in Column I

Column I	Column II	Column III
a^2	2 x a x b	b^2
81 + 11	108 + 3	3<u>6</u>
<u>92</u>	11<u>1</u>	

Step: 5 write the underlined digits at the bottom of each column to obtain the square of the given number.

In this case, we have:

$96^2 = 9216$

Using multiplication:

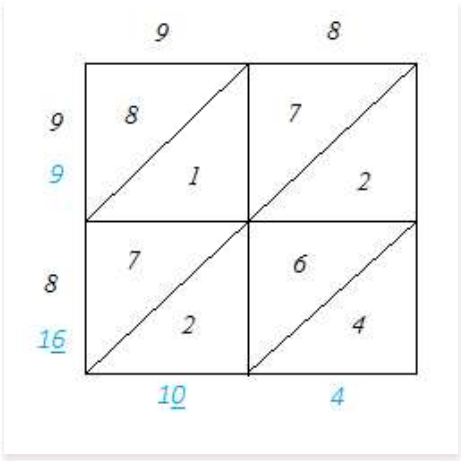
96 x 96 = 2916

This matches with the result obtained using the column method.

2.) Find the squares of the following numbers using diagonal method:

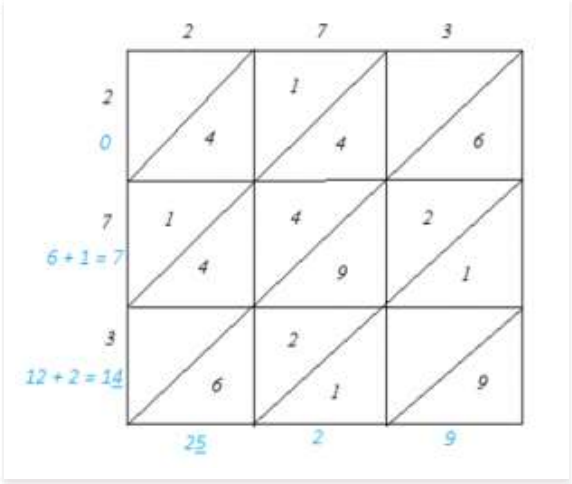
(i) 98

$\therefore 98^2 = 9604$



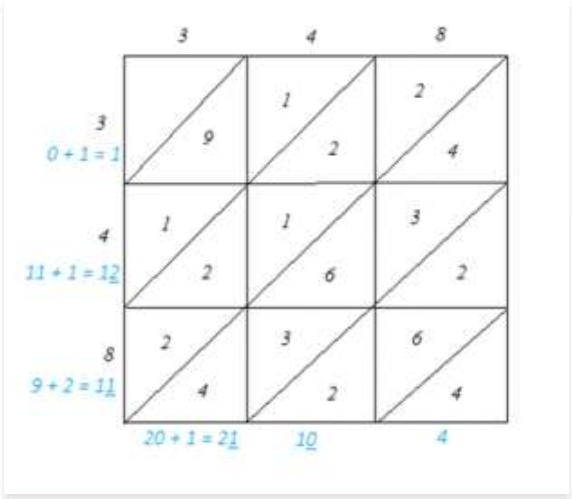
(ii) 273

$\therefore 273^2 = 74529$



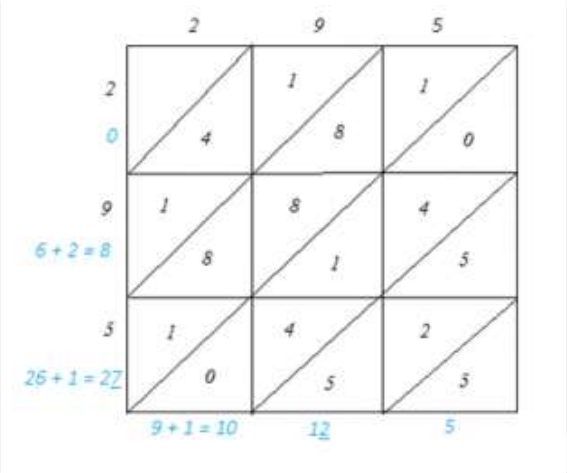
(iii) 348

$\therefore 348^2 = 121104$



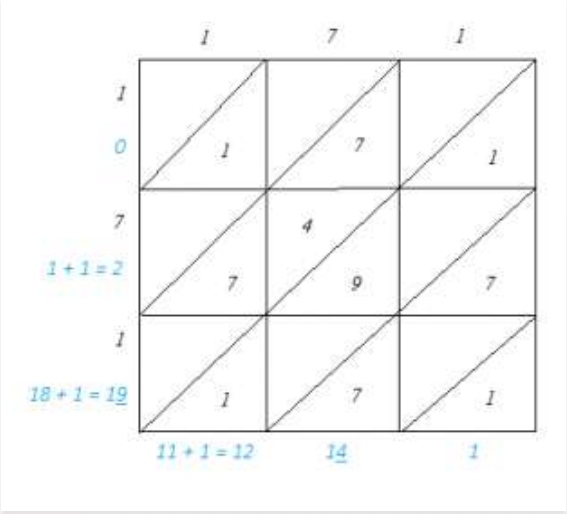
(iv) 295

$\therefore 295^2 = 87025$



(v) 171

$\therefore 171^2 = 29241$



3.) Find the squares of the following numbers:

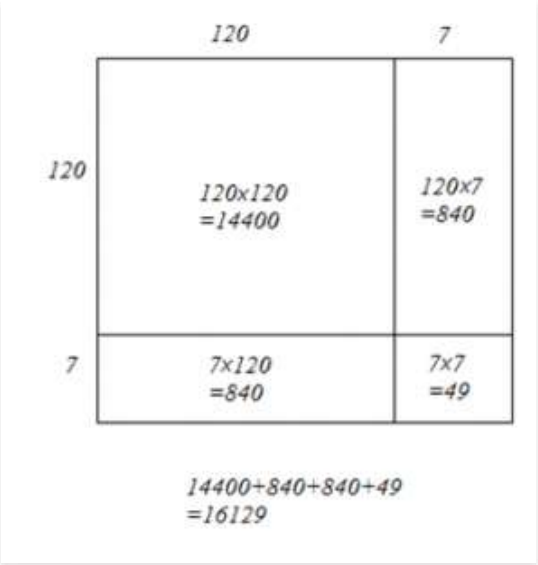
Answer:

We will use visual method as it is the efficient method to solve this problem.

(i) We have:

127 = 120 + 7

Hence, let us draw a square having side 127 units. Let us split it into 120 units and 7 units.

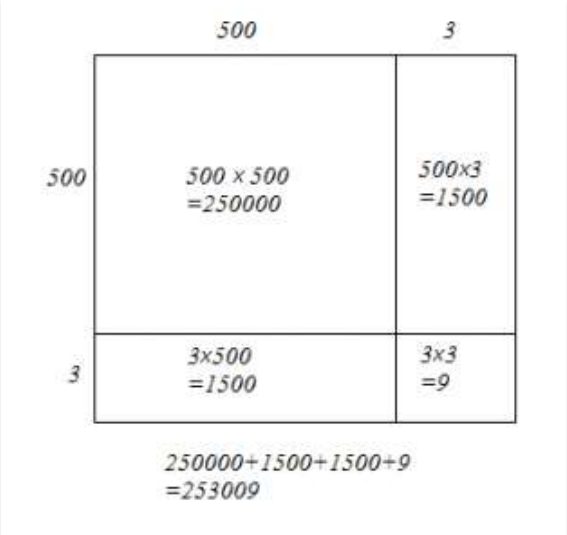


Hence, the square of 127 is 16129.

(ii) We have:

503 = 500 + 3

Hence, let us draw a square having side 503 units. Let us split it into 500 units and 3 units.

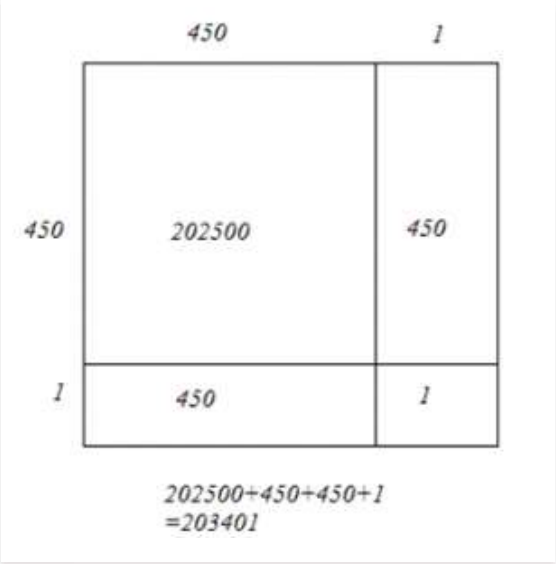


Hence, the square of 503 is 253009.

(iii) We have:

451 = 450 + 1

Hence, let us draw a square of having side 451 units. Let us split it into 450 units and 1 units.

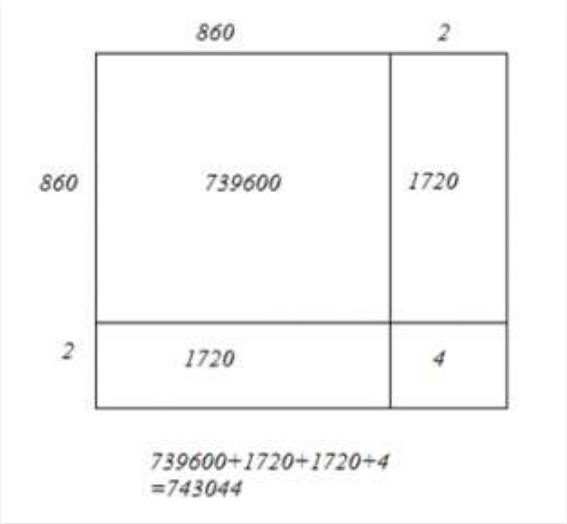


Hence, the square of 451 is 203401.

(iv) We have:

862 = 860 + 2

Hence, let us draw a square having side 862 units. Let us split it into 860 units and 2 units.

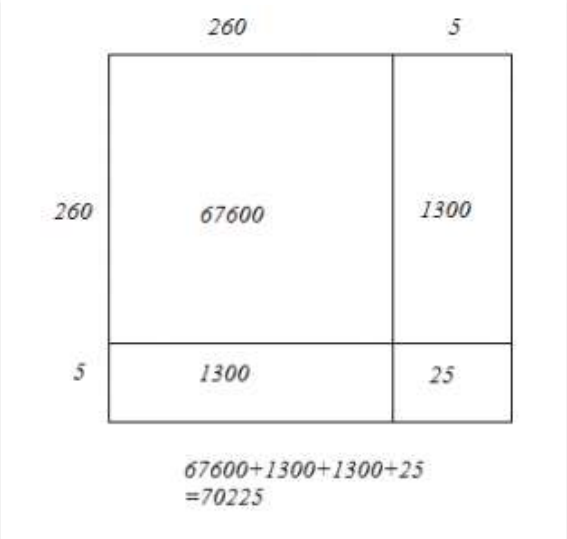


Hence, the square of 862 is 743044.

(v) We have:

265= 260 +5

Hence, let us draw a square having 265 units. Let us split it into 260 units and 5 units.



Hence, the square of 265 units is 70225.

4.) Find the squares of the following numbers:

Notice that all numbers except the one in question (vii) has 5 as their respective unit digits. We know that the square of a number with the form n5 is a number ending with 25 and has the number n(n + 1) before 25.

(i) 425

Here, n = 42

∴ n(n + 1) = (42)(43) = 1806

∴ 4252 = 180625

(ii) 575

Here, n = 57

∴n(n + 1) = (57)(58) = 3306

∴ 5752 = 330625

(iii) 405

Here n = 40

∴n(n + 1) = (40)(41) = 1640

∴ 4052 = 164025

(iv) 205

Here n = 20

∴n(n + 1) = (20)(21) = 420

∴ 2052 = 42025

(v) 95

Here n = 9

∴n(n + 1) = (9)(10) = 90

∴ 952 = 9025

(vi) 745

Here n = 74

∴ n(n + 1) = (74)(75) = 5550

∴ 7452 = 555025

(vii) 512

We know: The square of a three-digit number of the form 5ab = (250 + ab) 1000 + $(ab)^2$

∴ 512^2 = (250+12)1000 + (12)2 = 262000 + 144 = 262144

(viii) 995

Here, n = 99

∴ n(n + 1) = (99)(100) = 9900

∴ 995^2 = 990025

5.) Find the squares of the following numbers using the identity $(a+b)^2 = a^2 + 2ab + b^2$:

(i) 405

On decomposing:

405 = 400 + 5

Here, a = 400x and b = 5

Using the identity (a + b)2 = a2 + 2ab + b2:

$405^2 = (400 + 5)^2 = 400^2 + 2(400)(5) + 5^2 = 160000 + 4000 + 25 = 164025$

(ii) 510

On decomposing:

510 = 500 + 10 Here, a = 500 and b = 10

Using the identity (a + b)2 = a2 + 2ab + b2:

$510^2 = (500 + 10)^2 = 500^2 + 2(500)(10) + 10^2 = 250000 + 10000 + 100 = 260100$

(iii) 1001

On decomposing:

1001 = 1000 + 1

Here, a = 1000 and b = 1

Using the identity (a + b)2 = a2 + 2ab + b2:

$1001^2 = (1000 + 1)^2 = 1000^2 + 2(1000)(1) + 12 = 1000000 + 2000 + 1 = 1002001$

(iv) 209

On decomposing:

209 = 200 + 9

Here, a = 200 and b = 9

Using the identity $(a + b)^2 = a^2 + 2ab + b^2$:

$209^2 = (200 + 9)^2 = 200^2 + 2(200)(9) + 9^2 = 40000 + 3600 + 81 = 43681$

(v) 605

On decomposing:

605 = 600 + 5

Here, a = 600 and b = 5

Using the identity $(a + b)^2 = a2 + 2ab + b2$:

$605^2 = (600 + 5)^2 = 6002 + 2(600)(5) + 5^2 = 360000 + 6000 + 25 = 366025$

6.)Find the squares of the following numbers using the identity $(a - b)^2 = a^2 - 2ab + b^2$:

(i) 395

Decomposing: 395 = 400 — 5

Here, a= 400 and b = 5

Using the identity $(a — b)^2 = a^2 — 2ab + b^2$:

$395^2 = (400 — 5)^2 = 400^2 — 2(400)(5) + 5^2 = 160000 — 4000 + 25 = 156025$

(ii) 995

Decomposing:

995 = 1000 — 5

Here, a =1000 and b = 5

Using the identity $(a — b)^2 = a^2 — 2ab + b^2$:

$995^2 = (1000 — 5)^2 = 1000^2 — 2(1000)(5) + 5^2 = 1000000 —10000 + 25 = 990025$

(iii) 495

Decomposing: 495 = 500 — 5 Here, a = 500 and b = 5 Using the identity $(a — b)^2 = a^2 — 2ab + b^2$:

$495^2 = (500 — 5)^2 = 500^2 — 2(500)(5) + 5^2 = 250000 — 5000 + 25 = 245025$

(iv) 498

Decomposing: 498 = 500 — 2 250000 — 5000 + 25 = 245025

Here, a = 500 and b = 2

Using the identity $(a — b)^2 = a^2 — 2ab + b^2$:

$4982 = (500 — 2)2 = 5002 — 2(500)(2) + 22 = 250000 — 2000 + 4 = 248004$

(v) 99

Decomposing: 99 = 100 — 1 Here, a = 100 and b = 1 Using the identity (a — b)2 = a2 — 2ab + b2: 992 = (100 — 1)2 = 1002 — 2(100)(1) + 12 = 10000 — 200 + 1 = 9801

(vi) 999

Decomposing: 999 = 1000 – 1

Here, a = 1000 and b = 1

Using the identity $(a — b)^2 = a^2 — 2ab + b^2$:

$999^2 = (1000 – 1)^2 – 1000^2 – 2(1000)(1)+1^2 = 1000000 – 2000 +1 = 998001$

(vii) 599

Decomposing: 599 = 600 — 1

Here, a = 600 and b = 1

Using the identity $(a — b)^2 = a^2 — 2ab + b^2$:

$5992 = (600 —1)^2 = 600^2— 2(600)(1) + 12 = 360000 —1200 + 1 = 358801$

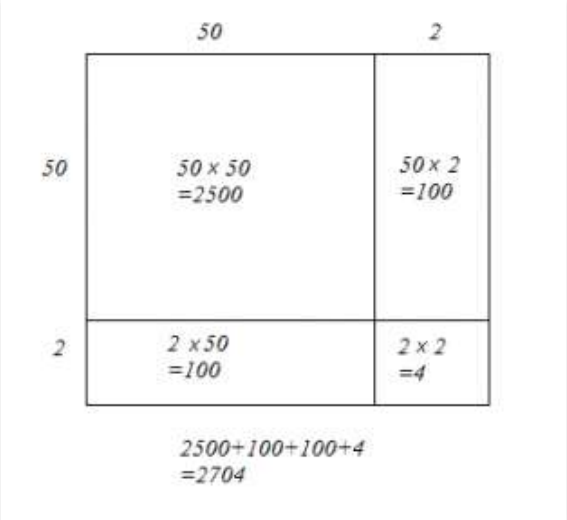
7.) Find the squares of the following numbers by visual method:

(i) 52

We have:

52 = 50 +2

Let us draw a square having side 52 units. Let us split it into 50 units and 2 units.



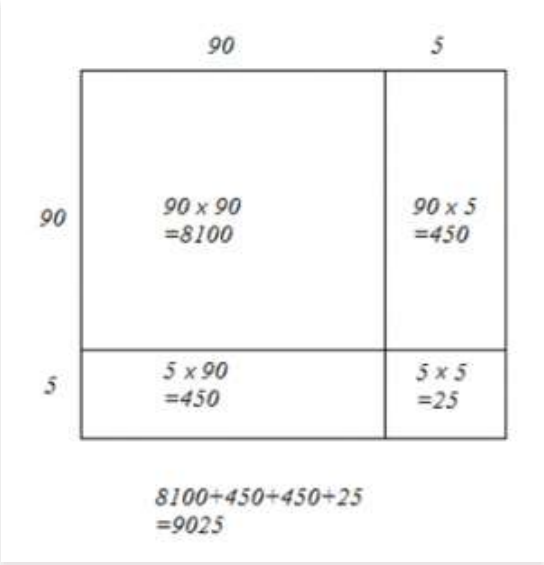
The sum of the areas of these four parts is the square of 52. Thus, the square of 52 is 2704.

(ii) 95

We have:

95 = 90 +5

Let us draw a square having side 95 units. Let us split it into 90 units and 5 units.



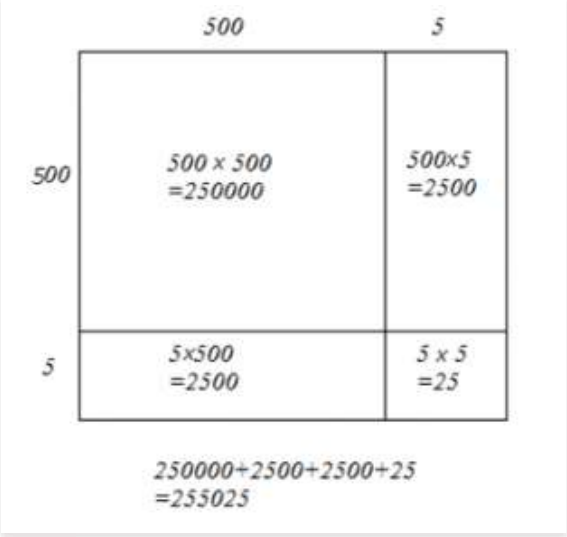
The sum of the areas of these four parts is the square of 95. Thus, the square of 95 is 9025.

(iii) 505

We have:

505 = 500 +5

Let us draw a square having side 505 units. Let us split it into 500 units and 5 units.



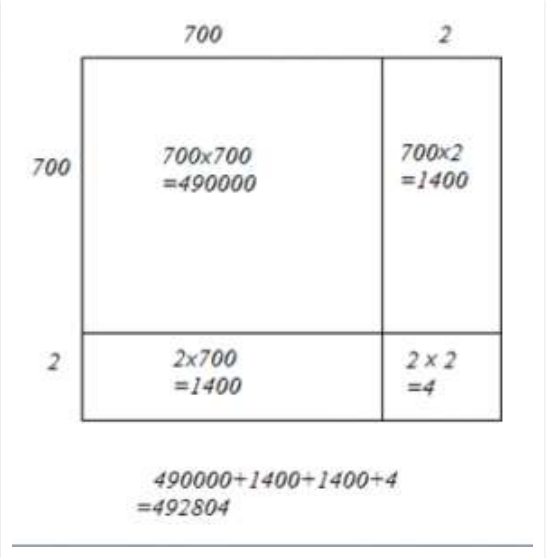
The sum of the areas of these four parts is the square of 505. Thus, the square of 505 is 255025.

(iv) 702

We have:

702 = 700 + 2

Let us draw a square of having side 702 units. Let us split it into 700 units and 2 units.

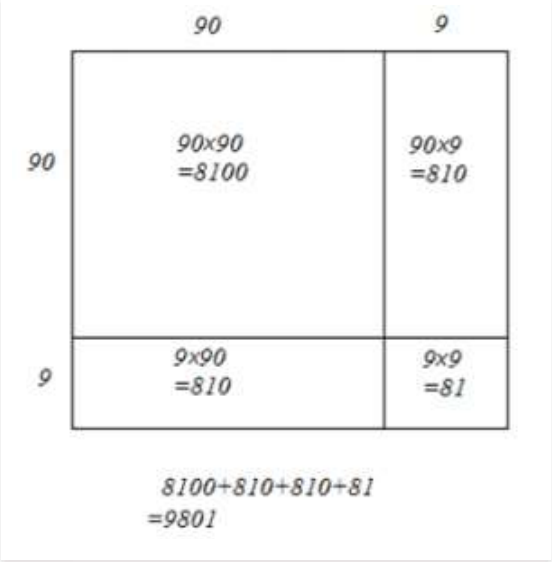


The sum of the areas of these four parts is the square of 702. Thus, the square of 702 is 492804.

(v) 99

We have:
99 = 90 +9

Let us draw a square of having side 99 units. Let us split it into 90 units and 9 units.



The sum of the areas of these four parts is the square of 99. Thus, the square of 99 is 9801.