EDUGROSS
WISDOMISING KNOWLEDGE

NCERT Solution For Class 8 Maths Chapter 6 - Squares and Square roots roots

Exercise 6.1 Page: 96

What will be the unit digit of the squares of the following numbers?

i. **81**
ii. **272**
iii. **799**
iv. **3853**
v. **1234**
vi. **26387**
vii. **52698**
viii. **99880**
ix. **12796**
x. **55555**

Solution:

The unit digit of square of a number having 'a' at its unit place ends with a×a.

i. The unit digit of the square of a number having digit 1 as unit's place is 1.
∴ Unit digit of the square of number 81 is equal to 1.

ii. The unit digit of the square of a number having digit 2 as unit's place is 4.
∴ Unit digit of the square of number 272 is equal to 4.

1.

iii. The unit digit of the square of a number having digit 9 as unit's place is 1.
∴ Unit digit of the square of number 799 is equal to 1.

iv. The unit digit of the square of a number having digit 3 as unit's place is 9.
∴ Unit digit of the square of number 3853 is equal to 9.

v. The unit digit of the square of a number having digit 4 as unit's place is 6.
∴ Unit digit of the square of number 1234 is equal to 6.

vi. The unit digit of the square of a number having digit 7 as unit's place is 9.
∴ Unit digit of the square of number 26387 is equal to 9.

vii. The unit digit of the square of a number having digit 8 as unit's place is 4.
∴ Unit digit of the square of number 52698 is equal to 4.

viii. The unit digit of the square of a number having digit 0 as unit's place is 01.
∴ Unit digit of the square of number 99880 is equal to 0.

ix. The unit digit of the square of a number having digit 6 as unit's place is 6.
∴ Unit digit of the square of number 12796 is equal to 6.

x. The unit digit of the square of a number having digit 5 as unit's place is 5. ∴ Unit digit of the square of number 55555 is equal to 5.

2. The following numbers are obviously not perfect squares. Give reason.
   i. 1057
   ii. 23453
   iii. 7928 iv. 222222
   v. 64000 vi. 89722
   vii. 222000
   viii. 505050

Solution:

We know that natural numbers ending in the digits 0, 2, 3, and 8 are not perfect squares.

i. 1057 ⟹ Ends with 7
ii. 23453 ⟹ Ends with 3
iii. 7928 ⟹ Ends with 8 iv. 222222 ⟹ Ends with 2
v. 64000 ⟹ Ends with 0 vi. 89722 ⟹ Ends with 2
vii. 222000 ⟹ Ends with 0
viii. 505050 ⟹ Ends with 0

3. The squares of which of the following would be odd numbers?
   i. 431
   ii. 2826 iii. 7779 iv. 82004

Solution:

We know that the square of an odd number is odd and the square of an even number is even.

i. The square of 431 is an odd number. ii. The square of 2826 is an even number. iii. The square of 7779 is an odd number.
iv. The square of 82004 is an even number.

4. Observe the following pattern and find the missing numbers.
   $11^2 = 121$
   $101^2 = 10201$

$1001^2 = 1002001$
$100001^2 = 1$ .....2.....1
$10000001^2 =$ .....

Solution:

We observe that the square on the number on R.H.S of the equality has an odd number of digits such that the first and last digits both are 1 and middle digit is 2. And the number of zeros between left most digits 1 and the middle digit 2 and right most digit 1 and the middle digit 2 is same as the number of zeros in the given number.
$\therefore 100001^2 = 10000200001$
$10000001^2 = 100000020000001$

Observe the following pattern and supply the missing numbers.
$11^2 = 121$
$101^2 = 10201$
$10101^2 = 102030201$
$1010101^2 =$ .....
.....^{2} $= 10203040504030201$

Solution:

We observe that the square on the number on R.H.S of the equality has an odd number of digits such that the first and last digits both are 1. And, the square is symmetric about the middle digit. If the middle digit is 4, then the number to be squared is 10101 and its square is 102030201.
So, $1010101^2 = 1020304030201$
$101010101^2 = 10203040505030201$

6. **Using the given pattern, find the missing numbers.**
$1^2 + 2^2 + 2^2 = 3^2$
$2^2 + 3^2 + 6^2 = 7^2$
$3^2 + 4^2 + 12^2 = 13^2$
$4^2 + 5^2 + \_^2 = 21^2$
$5 + \_^2 + 30^2 = 31^2$
$6 + 7 + \_^2 = \_^2$

Solution:

Given, $1^2 + 2^2 + 2^2 = 3^2$
i.e $1^2 + 2^2 + (1\times2)^2 = (1^2 + 2^2 - 1 \times 2)^2$

$2^2 + 3^2 + 6^2 = 7^2$
$\therefore 2^2 + 3^2 + (2\times3)^2 = (2^2 + 3^2 - 2 \times 3)^2$

$3^2 + 4^2 + 12^2 = 13^2$
$\therefore 3^2 + 4^2 + (3\times4)^2 = (3^2 + 4^2 - 3 \times 4)^2$

$4^2 + 5^2 + (4\times5)^2 = (4^2 + 5^2 - 4 \times 5)^2$
$\therefore 4^2 + 5^2 + 20^2 = 21^2$

$5^2 + 6^2 + (5\times6)^2 = (5^2 + 6^2 - 5 \times 6)^2$

5.

$\therefore 5^2 + 6^2 + 30^2 = 31^2$

$6^2 + 7^2 + (6\times7)^2 = (6^2 + 7^2 - 6 \times 7)^2$
$\therefore 6^2 + 7^2 + 42^2 = 43^2$

7. Without adding, find the sum.
   i. $1 + 3 + 5 + 7 + 9$ Solution:

Sum of first five odd number $= (5)^2 = 25$

   ii. $1 + 3 + 5 + 7 + 9 + I1 + 13 + 15 + 17 + 19$ Solution:

Sum of first ten odd number $= (10)^2 = 100$

   iii. $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23$ Solution:

Sum of first thirteen odd number $= (12)^2 = 144$

8. (i) Express 49 as the sum of 7 odd numbers.

Solution:

We know, sum of first n odd natural numbers is n^2.
Since, $49 = 7^2$
$\therefore$ 49 = sum of first 7 odd natural numbers $= 1 + 3 + 5 + 7 + 9 + 11 + 13$

(ii) Express 121 as the sum of 11 odd numbers.

Solution:

Since, $121 = 11^2$
$\therefore$ 121 = sum of first 11 odd natural numbers $= 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21$

9. How many numbers lie between squares of the following numbers?
   i. 12 and 13
   ii. 25 and 26
   iii. 99 and 100 Solution:

Between n^2 and $(n+1)^2$, there are 2n non–perfect square numbers.
i. 122 and 132 there are $2\times12 = 24$ natural numbers. ii. 252 and 262 there are $2\times25 = 50$ natural numbers. iii. 992 and 1002 there are $2\times99 = 198$ natural numbers.

Page: 98

EDUGROSS
WISDOMISING KNOWLEDGE

NCERT Solution For Class 8 Maths Chapter 6 - Squares and Square roots roots

Exercise 6.2

1.

Find the square of the following numbers.

i. **32**
ii. **35**
iii. **86**
iv. **93**
v. **71**
vi. **46**

Solution:

i. $(32)^2$
$= (30+2)^2$
$= (30)^2 + (2)^2 + 2\times30\times2$ [Since, $(a+b)^2 = a^2+b^2+2ab$]
$= 900 + 4 + 120$
$= 1024$

ii. $(35)^2$
$= (30+5)^2$
$= (30)^2 + (5)^2 + 2\times30\times5$ [Since, $(a+b)^2 = a^2+b^2+2ab$]
$= 900 + 25 + 300$
$= 1225$

iii. $(86)^2$
$= (90 - 4)^2$
$= (90)^2 + (4)^2 - 2\times90\times4$ [Since, $(a-b)^2 = a^2 + b^2 - 2ab$]
$= 8100 + 16 - 720$
$= 8116 - 720$
$= 7396$

iv. $(93)^2$
$= (90+3)^2$
$= (90)^2 + (3)^2 + 2\times90\times3$ [Since, $(a+b)^2 = a^2+b^2+2ab$]
$= 8100 + 9 + 540$
$= 8649$

v. $(71)^2$
$= (70+1)^2$
$= (70)^2 + (1)^2 + 2\times70\times1$ [Since, $(a+b)^2 = a^2+b^2+2ab$]
$= 4900 + 1 + 140$
$= 5041$

vi. $(46)^2$
$= (50 -4)^2$
$= (50)^2 + (4)^2 - 2\times50\times4$ [Since, $(a-b)^2 = a^2 + b^2 - 2ab$]
$= 2500 + 16 - 400$
$= 2116$

Solution:

1, m^2+1 is a Pythagorean triplet.

i. $2m = 6$

$\Rightarrow m = \frac{6}{2} = 3$

$m^2-1 = 3^2 - 1 = 9-1 = 8$

$m^2+1 = 3^2+1 = 9+1 = 10$

$\therefore$ (6, 8, 10) is a Pythagorean triplet.

ii. $2m = 14$

$\Rightarrow m = \frac{14}{2} = 7$

$m^2-1 = 7^2-1 = 49-1 = 48$

$m^2+1 = 7^2+1 = 49+1 = 50$

$\therefore$ (14, 48, 50) is not a Pythagorean triplet.

iii. $2m = 16$

$\Rightarrow m = \frac{16}{2} = 8$

$m^2-1 = 8^2-1 = 64-1 = 63$

$m^2+ 1 = 8^2+1 = 64+1 = 65$

$\therefore$ (16, 63, 65) is a Pythagorean triplet.

iv. $2m = 18$

$\Rightarrow m = \frac{18}{2} = 9$

$m^2-1 = 9^2-1 = 81-1 = 80$

$m^2+1 = 9^2+1 = 81+1 = 82$

$\therefore$ (18, 80, 82) is a Pythagorean triplet.

2.

Exercise 6.3 Page: 102

What could be the possible 'one's' digits of the square root of each of the following numbers?

i. **9801**
ii. **99856**
iii. **998001**
iv. **657666025**

Solution:

i. We know that the unit's digit of the square of a number having digit as unit's place 1 is 1 and also 9 is 1[9^2=81 whose unit place is 1].
∴ Unit's digit of the square root of number 9801 is equal to 1 or 9.

ii. We know that the unit's digit of the square of a number having digit as unit's place 6 is 6 and also 4 is 6 [6^2=36 and 4^2=16, both the squares have unit digit 6].
∴ Unit's digit of the square root of number 99856 is equal to 6.

iii. We know that the unit's digit of the square of a number having digit as unit's place 1 is 1 and also 9 is 1[9^2=81 whose unit place is 1].
∴ Unit's digit of the square root of number 998001 is equal to 1 or 9.

iv. We know that the unit's digit of the square of a number having digit as unit's place 5 is 5.
∴ Unit's digit of the square root of number 657666025 is equal to 5.

2. Without doing any calculation, find the numbers which are surely not perfect squares.

i. **153**
ii. **257**
iii. **408**
iv. **441**

Solution:

We know that natural numbers ending with the digits 0, 2, 3, 7 and 8 are not perfect square.

i. 153⟹ Ends with 3.
∴, 153 is not a perfect square

ii. 257⟹ Ends with 7
∴, 257 is not a perfect square

iii. 408⟹ Ends with 8
∴, 408 is not a perfect square

1.

iv. 441⟹ Ends with 1
∴, 441 is a perfect square.

Find the square roots of 100 and 169 by the method of repeated subtraction.

Solution:

100

- 100 – 1 = 99

99 – 3 = 96
96 – 5 = 91
91 – 7 = 84
84 – 9 = 75
75 – 11 = 64
64 – 13 = 51
51 – 15 = 36
36 – 17 = 19
19 – 19 = 0
Here, we have performed subtraction ten times.
∴$\sqrt{100} = 10$

169

- 169 – 1 = 168

168 – 3 = 165
165 – 5 = 160
160 – 7 = 153
153 – 9 = 144
144 – 11 = 133
133 – 13 = 120
120 – 15 = 105
105 – 17 = 88
88 – 19 = 69
69 – 21 = 48
48 – 23 = 25
25 – 25 = 0
Here, we have performed subtraction thirteen times.
∴ $\sqrt{169} = 13$

Find the square roots of the following numbers by the Prime Factorisation Method.

i. 729
ii. 400
iii. 1764
iv. 4096
v. 7744
vi. 9604
vii. 5929
viii. 9216

4.

ix. 529

x. 8100

Solution:

i.

3	729
3	243
3	81
3	27
3	9
3	3
	1

$729 = 3\times3\times3\times3\times3\times3\times1$

$\Rightarrow 729 = (3\times3)\times(3\times3)\times(3\times3)$

$\Rightarrow 729 = (3\times3\times3)\times(3\times3\times3)$

$\Rightarrow 729 = (3\times3\times3)^2$

$\Rightarrow \sqrt{729} = 3\times3\times3 = 27$

ii.

2	400
2	200
2	100
2	50
5	25
5	5
	1

$400 = 2\times2\times2\times2\times5\times5\times1$
$\Rightarrow 400 = (2\times2)\times(2\times2)\times(5\times5)$
$\Rightarrow 400 = (2\times2\times5)\times(2\times2\times5)$
$\Rightarrow 400 = (2\times2\times5)^2$
$\Rightarrow \sqrt{400} = 2\times2\times5 = 20$

iii.

2	1764
2	882
3	441
3	147
7	49
7	7
	1

$1764 = 2\times2\times3\times3\times7\times7$
$\Rightarrow 1764 = (2\times2)\times(3\times3)\times(7\times7)$
$\Rightarrow 1764 = (2\times3\times7)\times(2\times3\times7)$
$\Rightarrow 1764 = (2\times3\times7)^2$
$\Rightarrow \sqrt{1764} = 2\times3\times7 = 42$

iv.

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$4096 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2$

$\Rightarrow 4096 = (2\times2)\times(2\times2)\times(2\times2)\times(2\times2)\times(2\times2)\times(2\times2)$

$\Rightarrow 4096 = (2\times2\times2\times2\times2\times2)\times(2\times2\times2\times2\times2\times2)$

$\Rightarrow 4096 = (2\times2\times2\times2\times2\times2)^2$

$\Rightarrow \sqrt{4096} = 2\times2\times2\times2\times2\times2 = 64$

v.

2	7744
2	3872
2	1936
2	968
2	484
2	242
11	121
11	11
	1

$7744 = 2\times2\times2\times2\times2\times2\times11\times11\times1$
$\Rightarrow 7744 = (2\times2)\times(2\times2)\times(2\times2)\times(11\times11)$
$\Rightarrow 7744 = (2\times2\times2\times11)\times(2\times2\times2\times11)$
$\Rightarrow 7744 = (2\times2\times2\times11)^2$
$\Rightarrow \sqrt{7744} = 2\times2\times2\times11 = 88$

vi.

2	9604
2	4802
7	2401
7	343
7	49
7	7
	1

$9604 = 62 \times 2 \times 7 \times 7 \times 7 \times 7$
$\Rightarrow 9604 = (2 \times 2) \times (7 \times 7) \times (7 \times 7)$
$\Rightarrow 9604 = (2 \times 7 \times 7) \times (2 \times 7 \times 7)$
$\Rightarrow 9604 = (2\times7\times7)^2$
$\Rightarrow \sqrt{9604} = 2\times7\times7 = 98$

vii.

2	7744
2	3872
2	1936
2	968
2	484
2	242
11	121
11	11
	1

$7744 = 2\times2\times2\times2\times2\times2\times11\times11\times1$
$\Rightarrow 7744 = (2\times2)\times(2\times2)\times(2\times2)\times(11\times11)$
$\Rightarrow 7744 = (2\times2\times2\times11)\times(2\times2\times2\times11)$
$\Rightarrow 7744 = (2\times2\times2\times11)^2$
$\Rightarrow \sqrt{7744} = 2\times2\times2\times11 = 88$

vi.

2	9604
2	4802
7	2401
7	343
7	49
7	7
	1

$9604 = 62 \times 2 \times 7 \times 7 \times 7 \times 7$
$\Rightarrow 9604 = (2 \times 2) \times (7 \times 7) \times (7 \times 7)$
$\Rightarrow 9604 = (2 \times 7 \times 7) \times (2 \times 7 \times 7)$
$\Rightarrow 9604 = (2\times7\times7)^2$
$\Rightarrow \sqrt{9604} = 2\times7\times7 = 98$

vii.

$\Rightarrow 9216 = (96)^2 \Rightarrow$
$\sqrt{9216} = 96$

ix.

23	529
23	23
	1

$529 = 23 \times 23$
$\Rightarrow 529 = (23)^2 \Rightarrow$
$\sqrt{529} = 23$

x.

2	8100
2	4050
3	2025
3	675
3	225
3	75
5	25
5	5
	1

$8100 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 1$
$\Rightarrow 8100 = (2 \times 2) \times (3 \times 3) \times (3 \times 3) \times (5 \times 5)$
$\Rightarrow 8100 = (2 \times 3 \times 3 \times 5) \times (2 \times 3 \times 3 \times 5)$
$\Rightarrow 8100 = 90 \times 90$
$\Rightarrow 8100 = (90)^2$
$\Rightarrow \sqrt{8100} = 90$

5. For each of the following numbers, find the smallest whole number by which it should be multiplied so as to get a perfect square number. Also find the square root of the square number so obtained.
   i. 252
   ii. 180
   iii. 1008 iv. 2028

v. 1458

vi. 768

Solution:

i.

2	252
2	126
3	63
3	21
7	7
	1

$252 = 2\times2\times3\times3\times7 =$
$(2\times2)\times(3\times3)\times7$

Here, 7 cannot be paired.

∴ We will multiply 252 by 7 to get perfect square.

New number $= 252 \times 7 = 1764$

2	1764
2	882
3	441
3	147
7	49
7	7
	1

$1764 = 2\times2\times3\times3\times7\times7$

$\Rightarrow 1764 = (2\times2)\times(3\times3)\times(7\times7)$

$\Rightarrow 1764 = 2^2\times3^2\times7^2$

$\Rightarrow 1764 = (2\times3\times7)^2$

$\Rightarrow \sqrt{1764} = 2\times3\times7 = 42$

ii.

NCERT Solution For Class 8 Maths Chapter 6 - Squares and Square roots roots

2	180
2	90
3	45
3	15
5	5
	1

$180 = 2\times2\times3\times3\times5 =$
$(2\times2)\times(3\times3)\times5$
Here, 5 cannot be paired.
$\therefore$ We will multiply 180 by 5 to get perfect square.
New number $= 180 \times 5 = 900$

2	900
2	450
3	225
3	75
5	25
5	5
	1

$900 = 2\times2\times3\times3\times5\times5\times1$
$\Rightarrow 900 = (2\times2)\times(3\times3)\times(5\times5)$
$\Rightarrow 900 = 2^2\times3^2\times5^2$
$\Rightarrow 900 = (2\times3\times5)^2$
$\Rightarrow \sqrt{900} = 2\times3\times5 = 30$

iii.

2	1008
2	504
2	252
2	126
3	63
3	21
7	7
	1

$1008 = 2\times2\times2\times2\times3\times3\times7$
$= (2\times2)\times(2\times2)\times(3\times3)\times7$
Here, 7 cannot be paired.
∴ We will multiply 1008 by 7 to get perfect square.
New number $= 1008\times7 = 7056$

2	7056
2	3528
2	1764
2	882
3	441
3	147
7	49
7	7
	1

$7056 = 2\times2\times2\times2\times3\times3\times7\times7$
$\Rightarrow 7056 = (2\times2)\times(2\times2)\times(3\times3)\times(7\times7)$
$\Rightarrow 7056 = 2^2\times2^2\times3^2\times7^2$
$\Rightarrow 7056 = (2\times2\times3\times7)^2$
$\Rightarrow \sqrt{7056} = 2\times2\times3\times7 = 84$

iv.

2	2028
2	1014
3	507
13	169
13	13
	1

$2028 = 2\times2\times3\times13\times13 =$
$(2\times2)\times(13\times13)\times3$
Here, 3 cannot be paired.
$\therefore$ We will multiply 2028 by 3 to get perfect square.
New number $= 2028\times3 = 6084$

2	6084
2	3042
3	1521
3	507
13	169
13	13
	1

$6084 = 2\times2\times3\times3\times13\times13$
$\Rightarrow 6084 = (2\times2)\times(3\times3)\times(13\times13)$
$\Rightarrow 6084 = 2^2\times3^2\times13^2$
$\Rightarrow 6084 = (2\times3\times13)^2$
$\Rightarrow \sqrt{6084} = 2\times3\times13 = 78$

v.

2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

$1458 = 2\times3\times3\times3\times3\times3\times3$
$= (3\times3)\times(3\times3)\times(3\times3)\times2$
Here, 2 cannot be paired.
$\therefore$ We will multiply 1458 by 2 to get perfect square.
New number $= 1458 \times 2 = 2916$

2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

$2916 = 2\times2\times3\times3\times3\times3\times3\times3$
$\Rightarrow 2916 = (3\times3)\times(3\times3)\times(3\times3)\times(2\times2)$
$\Rightarrow 2916 = 3^2\times3^2\times3^2\times2^2$
$\Rightarrow 2916 = (3\times3\times3\times2)^2$
$\Rightarrow \sqrt{2916} = 3\times3\times3\times2 = 54$

vi.

NCERT Solution For Class 8 Maths Chapter 6 - Squares and Square roots roots

2	768
2	384
2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

$768 = 2\times2\times2\times2\times2\times2\times2\times2\times3 =$
$(2\times2)\times(2\times2)\times(2\times2)\times(2\times2)\times3$
Here, 3 cannot be paired.
∴ We will multiply 768 by 3 to get perfect square.
New number $= 768\times3 = 2304$

2	2304
2	1152
2	576
2	288
2	144
2	72
2	36
2	18
3	9
3	3
	1

$2304 = 2\times2\times2\times2\times2\times2\times2\times2\times3\times3$
$\Rightarrow 2304 = (2\times2)\times(2\times2)\times(2\times2)\times(2\times2)\times(3\times3) \Rightarrow 2304 = 2^2\times2^2\times2^2\times2^2\times3^2$

$\Rightarrow 2304 = (2\times2\times2\times2\times3)^2$
$\Rightarrow \sqrt{2304} = 2\times2\times2\times2\times3 = 48$

6. For each of the following numbers, find the smallest whole number by which it should be divided so as to get a perfect square. Also find the square root of the square number so obtained.
   i. 252
   ii. 2925
   iii. 396
   iv. 2645
   v. 2800
   vi. 1620

Solution:

i.

2	252
2	126
3	63
3	21
7	7
	1

$252 = 2\times2\times3\times3\times7 =$
$(2\times2)\times(3\times3)\times7$
Here, 7 cannot be paired.
∴ We will divide 252 by 7 to get perfect square.
New number $= 252 \div 7 = 36$

2	36
2	18
3	9
3	3
	1

$36 = 2\times2\times3\times3$

$\Rightarrow 36 = (2\times2)\times(3\times3)$
$\Rightarrow 36 = 2^2\times3^2$
$\Rightarrow 36 = (2\times3)^2$
$\Rightarrow \sqrt{36} = 2\times3 = 6$

ii.

3	2925
3	975
5	325
5	65
13	13
	1

$2925 = 3\times3\times5\times5\times13 = (3\times3)\times(5\times5)\times13$
Here, 13 cannot be paired.
∴ We will divide 2925 by 13 to get perfect square.
New number $= 2925 \div 13 = 225$

3	225
3	75
5	25
5	5
	1

$225 = 3\times3\times5\times5$
$\Rightarrow 225 = (3\times3)\times(5\times5)$
$\Rightarrow 225 = 3^2\times5^2$
$\Rightarrow 225 = (3\times5)^2$
$\Rightarrow \sqrt{36} = 3\times5 = 15$

iii.

2	396
2	198
3	99
3	33
11	11
	1

$396 = 2\times2\times3\times3\times11 =$
$(2\times2)\times(3\times3)\times11$
Here, 11 cannot be paired.
∴ We will divide 396 by 11 to get perfect square.
New number $= 396 \div 11 = 36$

2	36
2	18
3	9
3	3
	1

$36 = 2\times2\times3\times3$
$\Rightarrow 36 = (2\times2)\times(3\times3)$
$\Rightarrow 36 = 2^2\times3^2$
$\Rightarrow 36 = (2\times3)^2$
$\Rightarrow \sqrt{36} = 2\times3 = 6$

iv.

5	2645
23	529
23	23
	1

$2645 = 5\times23\times23$
$\Rightarrow 2645 = (23\times23)\times5$
Here, 5 cannot be paired.

∴ We will divide 2645 by 5 to get perfect square. New number = 2645 ÷ 5 = 529

23	529
23	23
	1

529 = 23×23
⇒ 529 = $(23)^2$ ⇒
√529 = 23

v.

2	2800
2	1400
2	700
2	350
5	175
5	35
7	7
	1

2800 = 2×2×2×2×5×5×7
= (2×2)×(2×2)×(5×5)×7
Here, 7 cannot be paired.
∴ We will divide 2800 by 7 to get perfect square.
New number = 2800 ÷ 7 = 400

2	400
2	200
2	100
2	50
5	25
5	5
	1

$400 = 2\times2\times2\times2\times5\times5$
$\Rightarrow 400 = (2\times2)\times(2\times2)\times(5\times5)$
$\Rightarrow 400 = (2\times2\times5)^2 \Rightarrow$
$\sqrt{400} = 20$

vi.

2	1620
2	810
3	405
3	135
3	45
3	15
5	5
	1

$1620 = 2\times2\times3\times3\times3\times3\times5$
$= (2\times2)\times(3\times3)\times(3\times3)\times5$
Here, 5 cannot be paired.
∴ We will divide 1620 by 5 to get perfect square. New number $= 1620 \div 5 = 324$

2	324
2	162
3	81
3	27
3	9
3	3
	1

$324 = 2\times2\times3\times3\times3\times3$
$\Rightarrow 324 = (2\times2)\times(3\times3)\times(3\times3)$
$\Rightarrow 324 = (2\times3\times3)^2$
$\Rightarrow \sqrt{324} = 18$

7. The students of Class VIII of a school donated Rs 2401 in all, for Prime Minister's National Relief Fund. Each student donated as many rupees as the number of students in the class. Find the number of students in the class.

Solution:

Let the number of students in the school be, x.
∴ Each student donate Rs.x .
Total many contributed by all the students $= x\times x = x^2$ Given,
x^2 = Rs.2401

7	2401
7	343
7	49
7	7
	1

$x^2 = 7\times7\times7\times7 \Rightarrow x^2 =$
$(7\times7)\times(7\times7) \Rightarrow x^2 = 49\times49$
$\Rightarrow x = \sqrt{49\times49}$
$\Rightarrow x = 49$
∴ The number of students = 49

NCERT Solution For Class 8 Maths Chapter 6 - Squares and Square roots roots

8. 2025 plants are to be planted in a garden in such a way that each row contains as many plants as the number of rows. Find the number of rows and the number of plants in each row. Solution:

Let the number of rows be, x.
∴ the number of plants in each rows = x.
Total many contributed by all the students = x×x = x^2
Given, x^2 =
Rs.2025

3	2025
3	675
3	225
3	75
5	25
5	5
	1

$x^2 = 3\times3\times3\times3\times5\times5 \Rightarrow x^2 =$
$(3\times3)\times(3\times3)\times(5\times5) \Rightarrow x^2$
$= (3\times3\times5)\times(3\times3\times5) \Rightarrow x^2$
$= 45\times45$
$\Rightarrow x = \sqrt{45\times45}$
$\Rightarrow x = 45$
∴ The number of rows = 45 and the number of plants in each rows = 45.

9. Find the smallest square number that is divisible by each of the numbers 4, 9 and 10.
Solution:

2	4, 9, 10
	2, 9, 5

L.C.M of 4, 9 and 10 is (2×2×9×5) 180.

180 = 2×2×9×5
= (2×2)×3×3×5
= (2×2)×(3×3)×5
Here, 5 cannot be paired.

∴ we will multiply 180 by 5 to get perfect square.
Hence, the smallest square number divisible by 4, 9 and 10 = 180×5 = 900

10. Find the smallest square number that is divisible by each of the numbers 8, 15 and 20.
Solution:

2	8, 15, 20
2	4, 15, 10
5	2, 15, 5
	2, 3, 1

L.C.M of 8, 15 and 20 is (2×2×5×2×3) 120.
120 = 2×2×3×5×2
= (2×2)×3×5×2
Here, 3, 5 and 2 cannot be paired.
∴ We will multiply 120 by (3×5×2) 30 to get perfect square.
Hence, the smallest square number divisible by 8, 15 and 20 =120×30 = 3600

Exercise 6.4 Page: 107

Find the square root of each of the following numbers by Division method.

i. 2304
ii. 4489
iii. 3481
iv. 529
v. 3249
vi. 1369
vii. 5776
viii. 7921
ix. 576
x. 1024
xi. 3136
xii. 900

Solution:

1.

i.

	48
4	2304
+ 4	16
88	704
+8	704
96	0

$\therefore \sqrt{2304} = 48$

ii.

$\therefore \sqrt{}$

	67
6	$\overline{44}\,\overline{89}$
+ 6	36
127	889
+7	889
134	0

$4489 = 67$

iii.

	59
5	$\overline{34}\,\overline{81}$
+5	25
109	981
+9	981
118	0

$\therefore \sqrt{3481} = 59$

iv.

	23
2	$5\overline{29}$
+2	4
43	129
+3	129
46	0

$\therefore \sqrt{}$

$\therefore \sqrt{529} = 23$

v.

	57
5	3249
+5	25
107	749
+7	749
114	0

vi. $3249 = 57$

	37
3	1369
+3	9
67	469
+7	469
74	0

$\therefore \sqrt{1369} = 37$

vii.

$\therefore \sqrt{}$

	76
7	5776
+7	49
146	876
+6	876
152	0

$\therefore \sqrt{5776} = 76$

viii.

	89
8	7921
+8	64
169	1521
+9	1521
178	0

$7921 = 89$

$\therefore \sqrt{}$

ix.

	24
2	576
+2	4
44	176
+4	176
48	0

x. $\therefore \sqrt{576} = 24$

	32
3	1024
+3	9
62	124
+2	124
64	0

xi. $\therefore \sqrt{1024} = 32$

	56
5	3136
+5	25
106	636
+6	636
112	0

$\therefore \sqrt{3136} = 56$

xii.

	30
3	900
+3	9
60	00

$\therefore \sqrt{900} = 30$

2. Find the number of digits in the square root of each of the following numbers (without any calculation).

i. 64 ii. 144 iii. 4489 iv. 27225 v. 390625

Solution:

i.

	8
8	64
+8	64
16	0

$\therefore \sqrt{64} = 8$

Hence, the square root of the number 64 has 1 digit.

ii.

	12
1	144
+1	1
22	44
+2	44
24	0

$\therefore \sqrt{144} = 12$

Hence, the square root of the number 144 has 2 digits.

iii.

	67
6	4489
+6	36
127	889
+7	889
134	0

$\therefore \sqrt{4489} = 67$

Hence, the square root of the number 4489 has 2 digits.

iv.

	165
1	$\overline{27}\,\overline{25}$
+1	1
26	172
+6	156
325	1625
+5	1625
350	0

$\therefore \sqrt{27225} = 165$

Hence, the square root of the number 27225 has 3 digits.

v.

	625
6	$\overline{39}\,\overline{06}\,\overline{25}$
+6	36
122	306
+2	244
1245	6225
+5	6225
1250	0

$\therefore \sqrt{390625} = 625$

Hence, the square root of the number 390625 has 3 digits.

3. Find the square root of the following decimal numbers.

i. 2.56 ii. 7.29

iii. 51.84 iv.

42.25 v.
31.36
Solution:

i.

	1.6
1	2.56
+1	1
26	156
+6	156
32	0

$\therefore \sqrt{2.56} = 1.6$

ii.

	2.7
2	7.29
+2	4
47	329
+7	329
54	0

$\therefore \sqrt{7.29} = 2.7$

iii.

	7.2
7	$\overline{51}.\overline{84}$
+7	49
142	284
+2	284
144	0

$\therefore \sqrt{51.84} = 7.2$

iv.

	6.5
6	$\overline{42}.\overline{25}$
+6	36
125	625
+5	625
130	0

$\therefore \sqrt{42.25} = 6.5$

v.

	5.6
5	$\overline{31}.\overline{36}$
+5	25
106	636
+6	636
112	0

$\therefore \sqrt{31.36} = 5.6$

4. Find the least number which must be subtracted from each of the following numbers so as to get a perfect square. Also find the square root of the perfect square so obtained.

i. 402
ii. 1989 iii. 3250
iv. 825
v. 4000

Solution:

i.

	2
2	$\overline{4}\overline{02}$
+2	4
4	02

∴ We must subtracted 2 from 402 to get a perfect square.

New number = 402 – 2 = 400

	20
2	400
+2	4
40	00

∴ $\sqrt{400} = 20$

ii.

	44
4	1989
+4	16
84	389
+4	336
88	53

∴ We must subtracted 53 from 1989 to get a perfect square. New number = 1989 – 53 = 1936

∴ We must subtracted 1 from 3250 to get a perfect square. New number = 3250 – 1 = 3249

	44
4	1936
+4	16
84	336
+4	336
88	0

∴ $\sqrt{1936} = 44$

iii.

	57
5	3250
+5	25
107	750
+7	749
114	1

	57
5	32 49
+5	25
107	749
+7	749
114	0

$\therefore \sqrt{3249} = 57$

iv.

	28
2	8 25
+2	4
48	425
+8	384
56	41

$\therefore$ We must subtracted 41 from 825 to get a perfect square.
New number $= 825 - 41 = 784$

	28
2	784
+2	4
48	384
+8	384
56	0

$\therefore \sqrt{784} = 28$

v.

	63
6	4000
+6	36
123	400
+3	369
126	31

$\therefore$ We must subtracted 31 from 4000 to get a perfect square.
New number = 4000 – 31 = 3969

$\therefore \sqrt{3969} = 63$

5. Find the least number which must be added to each of the following numbers so as to get a perfect square. Also find the square root of the perfect square so obtained.

(i) 525
(ii) 1750
(iii) 252
(iv) 1825
(v) 6412

Solution:

(i)

	22
2	525
+2	4
42	125
+2	84
44	41

	23
2	525
+2	4
43	125
+3	129

Here, $(22)^2 < 525 > (23)^2$
We can say 525 is (129 – 125) 4
.
∴ If we add 4 to 525, it will be perfect square. New numbr = 525 + 4 = 529

	23
2	529
+2	4
43	129
+3	129
46	0

∴ $\sqrt{529} = 23$

(ii)

	41
4	$\overline{17}\overline{50}$
+4	16
81	150
+1	81
82	69

	42
4	$\overline{17}\overline{50}$
4	16
82	150
+2	164

Here, $(41)^2 < 1750 > (42)^2$
We can say 1750 is (164 – 150) 14 less than $(42)^2$.
∴ If we add 14 to 1750, it will be perfect square.
New number = 1750 + 14 = 1764

	42
4	$\overline{17}\overline{64}$
4	16
82	164
+2	164

$\therefore \sqrt{1764} = 42$

(iii)

	15
1	$\overline{252}$
+1	1
25	152
+5	125
30	27

	16
1	$\overline{252}$
+1	1
26	152
+6	156

Here, $(15)^2 < 252 > (16)^2$
We can say 252 is (156 – 152) 4 less than $(16)^2$.
∴ If we add 4 to 252, it will be perfect square. New number = 252 + 4 = 256

	16
1	256
+1	1
26	156
+6	156
32	0

$\therefore \sqrt{256} = 16$

	42
4	1825
+4	16
82	225
+2	162
84	63

	43
4	1825
+4	16
83	225
+3	249

(iv)

Here, $(42)^2 < 1825 > (43)^2$

We can say 1825 is (249 – 225) 24 less than $(43)^2$.

$\therefore$ If we add 24 to 1825, it will be perfect square. New number = 1825 + 24 = 1849

	43
4	1849
+4	16
83	249
+3	249
86	0

$\therefore \sqrt{1849} = 43$

(v)

	80
8	6412
+8	64
160	120
0	0

	81
8	6412
+8	64
161	12
+1	161

Here, $(80)^2 < 6412 > (81)^2$
We can say 6412 is (161 – 12) 149 less than $(81)^2$.
$\therefore$ If we add 149 to 6412, it will be perfect square. New number = 6412 + 149 = 6561

	81
8	6561
+8	64
161	161
+1	161
162	0

$\therefore \sqrt{6561} = 81$

6. Find the length of the side of a square whose area is 441 m^2. Solution:

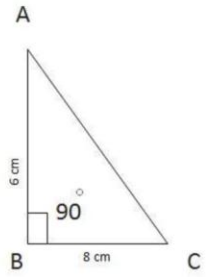
Let the length of each side of the field = a
Then, area of the field = 441 m^2
$\Rightarrow a^2 = 441\ m^2$
$\Rightarrow a = \sqrt{441}$ m

	21
2	441
+ 2	4
41	41
+1	41
42	0

$\therefore$ The length of each side of the field = a m = 21 m.

7. In a right triangle ABC, $\angle B = 90°$.
   a. If AB = 6 cm, BC = 8 cm, find AC
   b. If AC = 13 cm, BC = 5 cm, find AB Solution:

a.



Given, AB = 6 cm, BC = 8 cm
Let AC be x cm.
∴ $AC^2 = AB^2 + BC^2$

$AC = \sqrt{AB^2 + BC^2}$

$= \sqrt{6^2 + 8^2}$

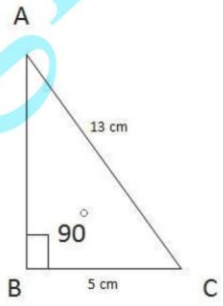
$= \sqrt{36 + 64}$

$= \sqrt{100} = 10$

Given, AC = 13 cm, BC = 5 cm Let AB be x cm.

Hence, AC = 10 cm.

b.



$\therefore AC^2 = AB^2 + BC^2$

$\Rightarrow AC^2 - BC^2 = AB^2$

$$AB = \sqrt{AC^2 - BC^2}$$

$$= \sqrt{13^2 - 5^2}$$

$$= \sqrt{169 - 25}$$

$$= \sqrt{144} = 12$$

Hence, AB = 12 cm

A gardener has 1000 plants. He wants to plant these in such a way that the number of rows and the number of columns remain same. Find the minimum number of plants he needs more for this.

Solution:

8.

Let the number of rows and column be, x.

$\therefore$ Total number of row and column= $x \times x = x^2$

As per question, $x^2 = 1000$

$\Rightarrow x = \sqrt{1000}$

	31
3	$\overline{10}\,\overline{00}$
+3	9
61	100
+1	61

	32
3	$\overline{10}\,\overline{00}$
+3	9
62	100
+2	124

Here, $(31)^2 < 1000 > (32)^2$
We can say 1000 is (124 – 100) 24 less than $(32)^2$.
∴ 24 more plants are needed.

9.

There are 500 children in a school. For a P.T. drill they have to stand in such a manner that the number of rows is equal to number of columns. How many children would be left out in this arrangement.

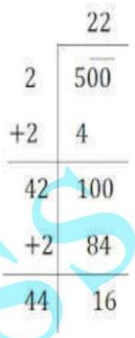
Solution:

Let the number of rows and column be, x.

∴ Total number of row and column= $x \times x = x^2$

As per question, $x^2 = 500$

$x = \sqrt{500}$



Hence, 16 children would be left out in the arrangement.