Squares and Square Roots - Class 8 : Notes

Square number:
If any natural number m can be expressed as n^2, where n is also a natural number, then m is known as a square number.
The square numbers are also called as perfect squares.

***Example*:** Let m = 36.
Now, 36 can be expressed as 6^2, where 6 is a natural number. Therefore, 36 is a square number.

1. The unit's place of square numbers can be 0, 1, 4, 5, 6 or 9.

No square number can end with 2, 3, 7 or 8.

2. If a number have 1 or 9 in its unit's place, then square of that number will end with 1.

Example:

Number	Square
1	1
9	81
11	121
19	361
21	441

4.There will always be even number of zeros at end of any square number.

Example:

Number	Square
10	100
20	400
80	6400
700	490000
900	810000

Exercise 6.1

Question 1:

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

Answer 1:

(i) The number 81 contains its unit's place digit 1. So, square of 1 is 1. Hence, unit's digit of square of 81 is 1.

(ii) The number 272 contains its unit's place digit 2. So, square of 2 is 4. Hence, unit's digit of square of 272 is 4.

(iii) The number 799 contains its unit's place digit 9. So, square of 9 is 81. Hence, unit's digit of square of 799 is 1.

(iv) The number 3853 contains its unit's place digit 3. So, square of 3 is 9. Hence, unit's digit of square of 3853 is 9.

(v) The number 1234 contains its unit's place digit 4. So, square of 4 is 16. Hence, unit's digit of square of 1234 is 6.

(vi) The number 26387 contains its unit's place digit 7. So, square of 7 is 49. Hence, unit's digit of square of 26387 is 9.

(vii) The number 52698 contains its unit's place digit 8. So, square of 8 is 64. Hence, unit's digit of square of 52698 is 4.

(viii) The number 99880 contains its unit's place digit 0. So, square of 0 is 0. Hence, unit's digit of square of 99880 is 0.

(ix) The number 12796 contains its unit's place digit 6. So, square of 6 is 36. Hence, unit's digit of square of 12796 is 6.

(x) The number 55555 contains its unit's place digit 5. So, square of 5 is 25. Hence, unit's digit of square of 55555 is 5.

Question 2:

The following numbers are obviously not perfect squares. Give reasons.

(i)	1057	(ii)	23453
(iii)	7928	(iv)	222222
(v)	64000	(vi)	89722
(vii)	222000	(viii)	505050

Answer 2:

(i) Since, perfect square numbers contain their unit's place digit 1, 4, 5, 6, 9 and even numbers of 0.
Therefore 1057 is not a perfect square because its unit's place digit is 7.

(ii) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 23453 is not a perfect square because its unit's place digit is 3.

(iii) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 7928 is not a perfect square because its unit's place digit is 8.

(iv) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 222222 is not a perfect square because its unit's place digit is 2.

(v) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 64000 is not a perfect square because its unit's place digit is single 0.

(vi) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 89722 is not a perfect square because its unit's place digit is 2.

(vii) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 222000 is not a perfect square because its unit's place digit is triple 0.

(viii) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore 505050 is not a perfect square because its unit's place digit is 0.

Question 3:

The squares of which of the following would be odd number:

(i) 431
(ii) 2826
(iii) 7779
(iv) 82004

Answer 3:

(i) 431 – Unit's digit of given number is 1 and square of 1 is 1. Therefore, square of 431 would be an odd number.

(ii) 2826 – Unit's digit of given number is 6 and square of 6 is 36. Therefore, square of 2826 would not be an odd number.

(iii) 7779 – Unit's digit of given number is 9 and square of 9 is 81. Therefore, square of 7779 would be an odd number.

(iv) 82004 – Unit's digit of given number is 4 and square of 4 is 16. Therefore, square of 82004 would not be an odd number.

Question 4:

Observe the following pattern and find the missing digits:

11^2 = 121
101^2 = 10201
1001^2 = 1002001
100001^2 = 1……..2……..1
10000002 = 1……………………

Answer 4:

11^2 = 121
101^2 = 10201
1001^2 = 1002001
100001^2 = 10000200001
1000000^2 = 1000000200000001

Question 5:

Observe the following pattern and supply the missing numbers:

$$11^2 = 121$$
$$101^2 = 10201$$
$$10101^2 = 102030201$$
$$1010101^2 = \ldots\ldots\ldots\ldots\ldots\ldots$$
$$\ldots\ldots\ldots\ldots^2 = 10203040504030201$$

Answer 5:

$$11^2 = 121$$
$$101^2 = 10201$$
$$10101^2 = 102030201$$
$$1010101^2 = 1020304030201$$
$$101010101^2 = 10203040504030201$$

Question 6:

Using the given pattern, find the missing numbers:

$$1^2 + 2^2 + 2^2 = 3^2$$
$$2^2 + 3^2 + 6^2 = 7^2$$
$$3^2 + 4^2 + 12^2 = 13^2$$
$$4^2 + 5^2 + \_^2 = 21^2$$
$$5^2 + \_^2 + 30^2 = 31^2$$
$$6^2 + 7^2 + \_^2 = \_^2$$

Answer 6:

$$1^2 + 2^2 + 2^2 = 3^2$$
$$2^2 + 3^2 + 6^2 = 7^2$$
$$3^2 + 4^2 + 12^2 = 13^2$$
$$4^2 + 5^2 + 20^2 = 21^2$$
$$5^2 + 6^2 + 30^2 = 31^2$$
$$6^2 + 7^2 + 42^2 = 43^2$$

Question 7:

Without adding, find the sum:

(i) $1 + 3 + 5 + 7 + 9$

(ii) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19$

(iii) $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23$

Answer 7:

(i) Here, there are five odd numbers. Therefore square of 5 is 25.

$\therefore \quad 1 + 3 + 5 + 7 + 9 = 5^2 = 25$

(ii) Here, there are ten odd numbers. Therefore square of 10 is 100.

$\therefore \quad 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = 10^2 = 100$

(iii) Here, there are twelve odd numbers. Therefore square of 12 is 144.

$\therefore \quad 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 = 12^2 = 144$

Question 8:

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

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

Answer 8:

(i) 49 is the square of 7. Therefore it is the sum of 7 odd numbers.

$49 = 1 + 3 + 5 + 7 + 9 + 11 + 13$

(ii) 121 is the square of 11. Therefore it is the sum of 11 odd numbers

$121 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21$

Question 9:

How many numbers lie between squares of the following numbers:

(i) 12 and 13

(ii) 25 and 26

(iii) 99 and 100

Answer 9:

(i) Since, non-perfect square numbers between n^2 and $(n+1)^2$ are $2n$.

Here, $n = 12$

Therefore, non-perfect square numbers between 12 and 13 = $2n = 2 \times 12$ $= 24$

(ii) Since, non-perfect square numbers between n^2 and $(n+1)^2$ are $2n$.

Here, $n = 25$

Therefore, non-perfect square numbers between 25 and 26 = $2n = 2 \times 25$ $= 50$

(iii) Since, non-perfect square numbers between n^2 and $(n+1)^2$ are $2n$.

Here, $n = 99$

Therefore, non-perfect square numbers between 99 and 100 = $2n = 2 \times 99$ $= 198$

Exercise 6.2

Question 1:

Find the squares of the following numbers:

(i) 32
(ii) 35
(iii) 86
(iv) 93
(v) 71
(vi) 46

Answer 1:

(i) $(32)^2 = (30+2)^2 = (30)^2 + 2\times30\times2 + (2)^2 \quad \left[\because (a+b)^2 = a^2 + 2ab + b^2\right]$

$= 900 + 120 + 4 = 1024$

(ii) $(35)^2 = (30+5)^2 = (30)^2 + 2\times30\times5 + (5)^2 \quad \left[\because (a+b)^2 = a^2 + 2ab + b^2\right]$

$= 900 + 300 + 25 = 1225$

(iii) $(86)^2 = (80+6)^2 = (80)^2 + 2\times80\times6 + (6)^2 \quad \left[\because (a+b)^2 = a^2 + 2ab + b^2\right]$

$= 1600 + 960 + 36 = 7386$

(iv) $(93)^2 = (90+3)^2 = (90)^2 + 2\times90\times3 + (3)^2 \quad \left[\because (a+b)^2 = a^2 + 2ab + b^2\right]$

$= 8100 + 540 + 9 = 8649$

(v) $(71)^2 = (70+1)^2 = (70)^2 + 2\times70\times1 + (1)^2 \quad \left[\because (a+b)^2 = a^2 + 2ab + b^2\right]$

$= 4900 + 140 + 1 = 5041$

(vi) $(46)^2 = (40+6)^2 = (40)^2 + 2\times40\times6 + (6)^2 \quad \left[\because (a+b)^2 = a^2 + 2ab + b^2\right]$

$= 1600 + 480 + 36 = 2116$

Question 2:

Write a Pythagoras triplet whose one member is:

(i) 6
(ii) 14
(iii) 16
(iv) 18

Answer 2:

(i) There are three numbers $2m, m^2-1$ and m^2+1 in a Pythagorean Triplet.

Here, $2m=6 \quad \Rightarrow \quad m=\frac{6}{2}=3$

Therefore,

Second number $(m^2-1)=(3)^2-1=9-1=8$

Third number $m^2+1=(3)^2+1=9+1=10$

Hence, Pythagorean triplet is (6, 8, 10).

(ii) There are three numbers $2m, m^2-1$ and m^2+1 in a Pythagorean Triplet.

Here, $2m=14 \quad \Rightarrow \quad m=\frac{14}{2}=7$

Therefore,

Second number $(m^2-1)=(7)^2-1=49-1=48$

Third number $m^2+1=(7)^2+1=49+1=50$

Hence, Pythagorean triplet is (14, 48, 50).

(iii) There are three numbers $2m, m^2-1$ and m^2+1 in a Pythagorean Triplet.

Here, $2m=16 \quad \Rightarrow \quad m=\frac{16}{2}=8$

Therefore,

Second number $(m^2-1)=(8)^2-1=64-1=63$

Third number $m^2+1=(8)^2+1=64+1=65$

Hence, Pythagorean triplet is (16, 63, 65).

(iv) There are three numbers $2m, m^2-1$ and m^2+1 in a Pythagorean Triplet.

Here, $2m=18 \quad \Rightarrow \quad m=\frac{18}{2}=9$

Therefore,

Second number $(m^2-1)=(9)^2-1=81-1=80$

Third number $m^2+1=(9)^2+1=81+1=82$

Hence, Pythagorean triplet is (18, 80, 82).

Chapter 6 - Squares And Square Roots

Exercise 6.3

Question 1:

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

Answer 1:

Since, Unit's digits of square of numbers are 0, 1, 4, 5, 6 and 9. Therefore, the possible unit's digits of the given numbers are:

(i) 1 (ii) 6 (iii) 1 (iv) 5

Question 2:

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

(i) 153
(ii) 257
(iii) 408
(iv) 441

Answer 2:

Since, all perfect square numbers contain their unit's place digits 0, 1, 4, 5, 6 and 9.

(i) But given number 153 has its unit digit 3. So it is not a perfect square number.
(ii) Given number 257 has its unit digit 7. So it is not a perfect square number.
(iii) Given number 408 has its unit digit 8. So it is not a perfect square number.
(iv) Given number 441 has its unit digit 1. So it would be a perfect square number

Question 3:

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

Answer 3:

By successive subtracting odd natural numbers from 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		

This successive subtraction is completed in 10 steps.

Therefore $\sqrt{100} = 10$

By successive subtracting odd natural numbers from 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			

This successive subtraction is completed in 13 steps.

Therefore $\sqrt{169} = 13$

Question 4:

Find the square roots of the following numbers by the Prime Factorization method:

(i)	729	(ii)	400
(iii)	1764	(iv)	4096
(v)	7744	(vi)	9604
(vii)	5929	(viii)	9216
(ix)	529	(x)	8100

Answer 4:

(i) 729

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

= 3 x 3 x 3

= 27

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

(ii) 400

$$\sqrt{400} = \sqrt{2\times2\times2\times2\times5\times5}$$

= 2 x 2 x 5

= 20

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

(iii) 1764

$$\sqrt{1764} = \sqrt{2\times2\times3\times3\times7\times7}$$

= 2 x 3 x 7

= 42

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

(iv) 4096

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

= 2 x 2 x 2 x 2 x 2 x 2

= 64

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

(v) 7744

$\sqrt{7744} = \sqrt{2\times2\times2\times2\times2\times2\times11\times11}$

= 2 x 2 x 2 x 11

= 88

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

(vi) 9604

$\sqrt{9604} = \sqrt{2\times2\times7\times7\times7\times7}$

= 2 x 7 x 7

= 98

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

(vii) 5929

$\sqrt{5929} = \sqrt{7\times7\times11\times11}$

= 7 x 11

= 77

7	**5929**
7	847
11	121
11	11
	1

(viii) 9216

$\sqrt{9216} = \sqrt{2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times3\times3}$

= 2 x 2 x 2 x 2 x 2 x 3

= 96

2	**9216**
2	4608
2	2304
2	1152
2	576
2	288
2	144
2	72
2	36
2	18
3	9
3	3
	1

(ix) 529

$\sqrt{529} = \sqrt{23 \times 23}$

= 23

23	529
23	23
	1

(x) 8100

$\sqrt{8100} = \sqrt{2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5}$

= 2 x 3 x 3 x 5

= 90

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

Question 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

Answer 5:

(i) 252 = 2 x 2 x 3 x 3 x 7

Here, prime factor 7 has no pair. Therefore 252 must be multiplied by 7 to make it a perfect square.

∴ 252 x 7 = 1764

And $\sqrt{1764}$ = 2 x 3 x 7 = 42

2	252
2	126
3	63
3	21
7	7
	1

(ii) 180 = 2 x 2 x 3 x 3 x 5

Here, prime factor 5 has no pair. Therefore 180 must be multiplied by 5 to make it a perfect square.

∴ 180 x 5 = 900

And $\sqrt{900}$ = 2 x 3 x 5 = 30

2	180
2	90
3	45
3	15
5	5
	1

(iii) 1008 = 2 x 2 x 2 x 2 x 3 x 3 x 7

Here, prime factor 7 has no pair. Therefore 1008 must be multiplied by 7 to make it a perfect square.

∴ 1008 x 7 = 7056

And $\sqrt{7056}$ = 2 x 2 x 3 x 7 = 84

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

(iv) 2028 = 2 x 2 x 3 x 13 x 13

Here, prime factor 3 has no pair. Therefore 2028 must be multiplied by 3 to make it a perfect square.

∴ 2028 x 3 = 6084

And $\sqrt{6084}$ = 2 x 2 x 3 x 3 x 13 x 13 = 78

2	**2028**
2	1014
3	507
13	169
13	13
	1

(v) 1458 = 2 x 3 x 3 x 3 x 3 x 3 x 3

Here, prime factor 2 has no pair. Therefore 1458 must be multiplied by 2 to make it a perfect square.

∴ 1458 x 2 = 2916

And $\sqrt{2916}$ = 2 x 3 x 3 x 3 = 54

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

(vi) 768 = 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 3

Here, prime factor 3 has no pair. Therefore 768 must be multiplied by 3 to make it a perfect square.

∴ 768 x 3 = 2304

And $\sqrt{2304}$ = 2 x 2 x 2 x 2 x 3 = 48

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

Question 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

Answer 6:

(i) $252 = 2 \times 2 \times 3 \times 3 \times 7$

Here, prime factor 7 has no pair. Therefore 252 must be divided by 7 to make it a perfect square.

$\therefore$ $252 \div 7 = 36$

And $\sqrt{36} = 2 \times 3 = 6$

2	252
2	126
3	63
3	21
7	7
	1

(ii) $2925 = 3 \times 3 \times 5 \times 5 \times 13$

Here, prime factor 13 has no pair. Therefore 2925 must be divided by 13 to make it a perfect square.

$\therefore$ $2925 \div 13 = 225$

And $\sqrt{225} = 3 \times 5 = 15$

3	2925
3	975
5	325
5	65
13	13
	1

(iii) $396 = 2 \times 2 \times 3 \times 3 \times 11$

Here, prime factor 11 has no pair. Therefore 396 must be divided by 11 to make it a perfect square.

$\therefore$ $396 \div 11 = 36$

And $\sqrt{36} = 2 \times 3 = 6$

2	396
2	198
3	99
3	33
11	11
	1

(iv) $2645 = 5 \times 23 \times 23$

Here, prime factor 5 has no pair. Therefore 2645 must be divided by 5 to make it a perfect square.

$\therefore$ $2645 \div 5 = 529$

And $\sqrt{529} = 23 \times 23 = 23$

5	2645
23	529
23	23
	1

(v) $2800 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 7$

Here, prime factor 7 has no pair. Therefore 2800 must be divided by 7 to make it a perfect square.

∴ $2800 \div 7 = 400$

And $\sqrt{400} = 2 \times 2 \times 5 = 20$

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

(vi) $1620 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5$

Here, prime factor 5 has no pair. Therefore 1620 must be divided by 5 to make it a perfect square.

∴ $1620 \div 5 = 324$

And $\sqrt{324} = 2 \times 3 \times 3 = 18$

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

Question 7:

The students of Class VIII of a school donated ` 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.

Answer 7:

Here, Donated money = ` 2401

Let the number of students be x.

Therefore donated money = $x \times x$

According to question,

$x^2 = 2401$

$\Rightarrow \quad x = \sqrt{2401} = \sqrt{7 \times 7 \times 7 \times 7}$

$\Rightarrow \quad x = 7 \times 7 = 49$

7	2401
7	343
7	49
7	7
	1

Hence, the number of students is 49.

Question 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.

Answer 8:

Here, Number of plants = 2025

Let the number of rows of planted plants be x.

And each row contains number of plants = x

According to question,

$x^2 = 2025$

$\Rightarrow \quad x = \sqrt{2025} = \sqrt{3 \times 3 \times 3 \times 3 \times 5 \times 5}$

$\Rightarrow \quad x = 3 \times 3 \times 5 = 45$

Hence, each row contains 45 plants.

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

Question 9:

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

Answer 9:

L.C.M. of 4, 9 and 10 is 180.

Prime factors of 180 = 2 x 2 x 3 x 3 x 5

Here, prime factor 5 has no pair. Therefore 180 must be multiplied by 5 to make it a perfect square.

$\therefore \quad 180 \times 5 = 900$

Hence, the smallest square number which is divisible by 4, 9 and 10 is 900.

2	180
2	90
3	45
3	15
5	5
	1

Question 10:

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

Answer 10:

L.C.M. of 8, 15 and 20 is 120.

Prime factors of 120 = 2 x 2 x 2 x 3 x 5

Here, prime factor 2, 3 and 5 has no pair. Therefore 120 must be multiplied by

2 x 3 x 5 to make it a perfect square.

$\therefore \quad 120 \times 2 \times 3 \times 5 = 3600$

Hence, the smallest square number which is divisible by 8, 15 and 20 is 3600.

2	120
2	60
3	30
3	15
5	5
	1

Chapter 6 - Squares And Square Roots

Exercise 6.4

Question 1:

Find the square roots 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

Answer 1:

(i) 2304

	48
4	$\overline{23}\ \overline{04}$ -16
88	704 -704
	0

Hence, the square root of 2304 is 48.

(ii) 4489

	67
6	$\overline{44}\ \overline{89}$ -36
127	889 -889
	0

Hence, the square root of 4489 is 67.

(iii) 3481

	59
5	$\overline{34}\ \overline{81}$ -25
109	981 -981
	0

Hence, the square root of 3481 is 59.

(iv) 529

	23
2	$\overline{5}\ \overline{29}$ -4
43	129 -129
	0

Hence, the square root of 529 is 23.

(v) 3249

	57
5	$\overline{32}\ \overline{49}$ -25
107	749 -749

Hence, the square root of 3249 is 57.

(vi) 1369

Hence, the square root of 1369 is 37.

	37
3	$\overline{13}\ \overline{69}$ − 9
67	469 − 469
	0

(vii) 5776

Hence, the square root of 5776 is 76.

	76
7	$\overline{57}\ \overline{76}$ − 49
146	876 − 876
	0

(viii) 7921

Hence, the square root of 7921 is 89.

	89
8	$\overline{79}\ \overline{21}$ − 64
169	1521 − 1521
	0

(ix) 576

Hence, the square root of 576 is 24.

	24
2	$\overline{5}\ \overline{76}$ − 4
44	176 − 176
	0

(x) 1024

Hence, the square root of 1024 is 32.

	32
3	$\overline{10}\ \overline{24}$ − 9
62	124 − 124
	0

(xi) 3136

Hence, the square root of 3136 is 56.

	56
5	$\overline{31}\ \overline{36}$ − 25
106	636 − 636
	0

(xii) 900

Hence, the square root of 900 is 30.

	30
3	$\overline{9}\ \overline{00}$ – 9
00	000 – 000
	0

Question 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

Answer 2:

(i) Here, 64 contains two digits which is even.

Therefore, number of digits in square root = $\frac{n}{2}=\frac{2}{2}=1$

(ii) Here, 144 contains three digits which is odd.

Therefore, number of digits in square root = $\frac{n+1}{2}=\frac{3+1}{2}=\frac{4}{2}=2$

(iv) Here, 4489 contains four digits which is even.

Therefore, number of digits in square root = $\frac{n}{2}=\frac{4}{2}=2$

(v) Here, 390625 contains six digits which is even.

Therefore, number of digits in square root = $\frac{n}{2}=\frac{6}{2}=3$

Question 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

Answer 3:

(i) 2.56

Hence, the square root of 2.56 is 1.6.

	1.6
1	$\overline{2}\ .\ \overline{56}$ – 1
26	156 – 156
	0

(ii) 7.29

Hence, the square root of 7.29 is 2.7.

	2.7
2	$\overline{7}\,.\,\overline{29}$ – 4
47	329 – 329
	0

(iii) 51.84

Hence, the square root of 51.84 is 7.2.

	7.2
7	$\overline{51}\,.\,\overline{84}$ – 49
142	284 – 284
	0

(iv) 42.25

Hence, the square root of 42.25 is 6.5.

	6.5
6	$\overline{42}\,.\,\overline{25}$ – 36
125	625 – 625
	0

(v) 31.36

Hence, the square root of 31.36 is 5.6.

	5.6
5	$\overline{31}\,.\,\overline{36}$ – 25
106	636 – 636
	0

Question 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

Answer 4:

(i) 402

We know that, if we subtract the remainder from the number, we get a perfect square.

Here, we get remainder 2. Therefore 2 must be subtracted from 402 to get a perfect square.

∴ 402 – 2 = 400

	20
2	$\overline{4}\ \overline{02}$ – 4
40	02 – 00
	2

Hence, the square root of 400 is 20.

	20
2	$\overline{4}\ \overline{00}$ − 4
00	00 − 00
	0

(ii) 1989

We know that, if we subtract the remainder from the number, we get a perfect square.

Here, we get remainder 53. Therefore 53 must be subtracted from 1989 to get a perfect square.

∴ 1989 – 53 = 1936

	44
4	$\overline{19}\ \overline{89}$ − 16
84	389 − 336
	53

Hence, the square root of 1936 is 44.

	44
4	$\overline{19}\ \overline{36}$ − 16
84	336 − 336
	0

(iii) 3250

We know that, if we subtract the remainder from the number, we get a perfect square.

Here, we get remainder 1. Therefore 1 must be subtracted from 3250 to get a perfect square.

∴ 3250 – 1 = 3249

	57
5	$\overline{32}\ \overline{50}$ − 25
107	750 − 749
	1

Hence, the square root of 3249 is 57.

	57
5	$\overline{32}\ \overline{49}$ − 25
107	749 − 749
	0

(iv) 825

We know that, if we subtract the remainder from the number, we get a perfect square.

Here, we get remainder 41. Therefore 41 must be subtracted from 825 to get a perfect square.

∴ 825 – 41 = 784

	28
2	$\overline{8}\ \overline{25}$ – 4
48	425 – 384
	41

Hence, the square root of 784 is 28.

	28
2	$\overline{7}\ \overline{84}$ – 4
48	384 – 384
	0

(v) 4000

We know that, if we subtract the remainder from the number, we get a perfect square.

Here, we get remainder 31. Therefore 31 must be subtracted from 4000 to get a perfect square.

∴ 4000 – 31 = 3969

	63
6	$\overline{40}\ \overline{00}$ – 36
123	400 – 369
	31

Hence, the square root of 3969 is 63.

	63
6	$\overline{39}\ \overline{69}$ – 36
123	369 – 369
	0

Question 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

Answer 5:

(i) 525

Since remainder is 41. Therefore $22^2 < 525$

Next perfect square number $23^2 = 529$

Hence, number to be added = 529 – 525 = 4

∴ 525 + 4 = 529

Hence, the square root of 529 is 23.

	22
2	$\overline{5}\ \overline{25}$ – 4
42	125 – 84
	41

(ii) 1750

Since remainder is 69. Therefore $41^2 < 1750$

Next perfect square number $42^2 = 1764$

Hence, number to be added = 1764 – 1750 = 14

∴ 1750 + 14 = 1764

Hence, the square root of 1764 is 42.

	41
4	$\overline{17}\ \overline{50}$ – 16
81	150 – 81
	69

(iii) 252

Since remainder is 27. Therefore $15^2 < 252$

Next perfect square number $16^2 = 256$

Hence, number to be added = 256 – 252 = 4

∴ 252 + 4 = 256

Hence, the square root of 256 is 16.

	15
1	$\overline{2}\ \overline{52}$ – 1
25	152 – 125
	27

(iv) 1825

Since remainder is 61. Therefore $42^2 < 1825$

Next perfect square number $43^2 = 1849$

Hence, number to be added = 1849 – 1825 = 24

∴ 1825 + 24 = 1849

Hence, the square root of 1849 is 43.

	42
4	$\overline{18}\ \overline{25}$ – 16
82	225 – 164
	61

(v) 6412

Since remainder is 12. Therefore $80^2 < 6412$

Next perfect square number $81^2 = 6561$

Hence, number to be added = 6561 – 6412 = 149

∴ 6412 + 149 = 6561

Hence, the square root of 6561 is 81.

	80
8	$\overline{64}\ \overline{12}$ – 64
160	0012 – 0000
	12

Question 6:

Find the length of the side of a square whose area is 441 m^2?

Answer 6:

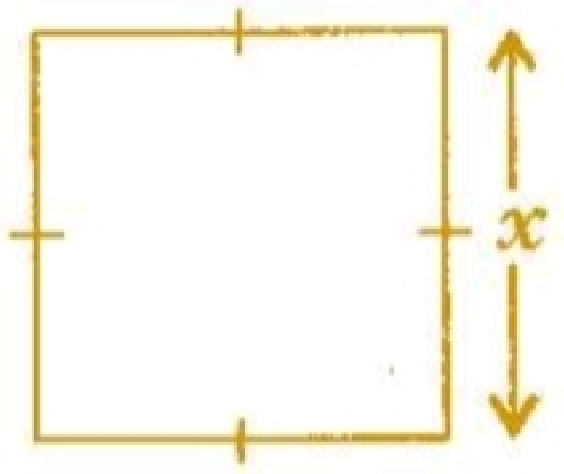
Let the length of side of a square be x meter.

Area of square = $(\text{side})^2 = x^2$

According to question, $x^2 = 441$

⇒ $x = \sqrt{441} = \sqrt{3\times3\times7\times7} = 3 \times 7$

⇒ $x = 21$ m



Hence, the length of side of a square is 21 m.

Question 7:

In a right triangle ABC, $\angle B = 90^\circ$.

(i) If AB = 6 cm, BC = 8 cm, find AC.
(ii) If AC = 13 cm, BC = 5 cm, find AB.

Answer 7:

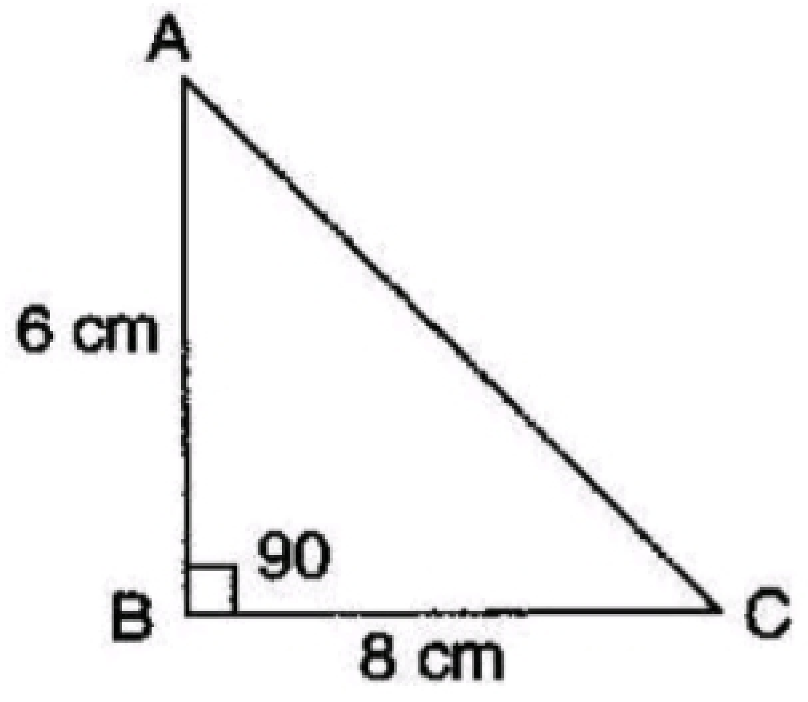
(i) Using Pythagoras theorem,

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

$\Rightarrow AC^2 = (6)^2 + (8)^2$

$\Rightarrow AC^2 = 36 + 84 = 100$

$\Rightarrow AC = 10$ cm



(ii) Using Pythagoras theorem,

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

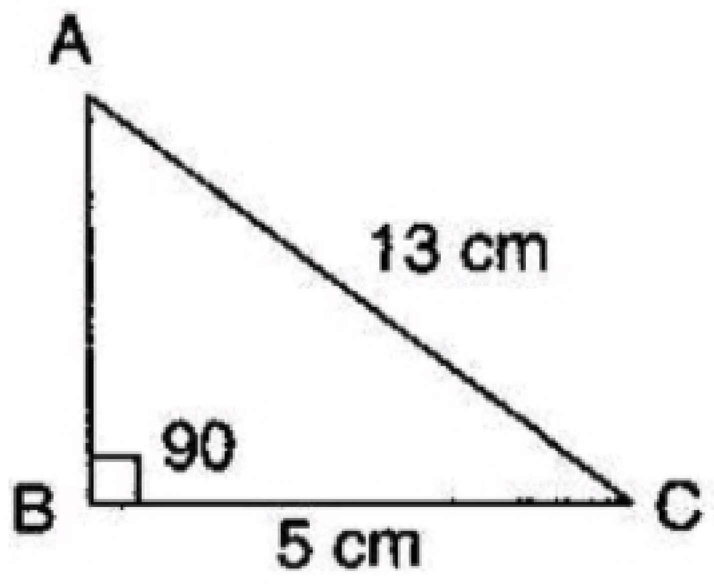
$\Rightarrow (13)^2 = AB^2 + (5)^2$

$\Rightarrow 169 = AB^2 + 25$

$\Rightarrow AB^2 = 169 - 25$

$\Rightarrow AB^2 = 144$

$\Rightarrow AB = 12$ cm



Question 8:

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

Answer 8:

Here, plants = 1000

Since remainder is 39. Therefore $31^2 < 1000$

Next perfect square number $32^2 = 1024$

Hence, number to be added = 1024 – 1000 = 24

$\therefore$ 1000 + 24 = 1024

Hence, the gardener required 24 more plants.

	31
3	$\overline{10}\ \overline{00}$ – 9
61	100 – 61
	39

Question 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?

Answer 9:

Here, Number of children = 500

By getting the square root of this number, we get,

In each row, the number of children is 22.

And left out children are 16.

	22
2	$\overline{5}\ \overline{00}$ – 4
42	100 – 84
	16