

NCERT SOLUTIONS Of square and square roots Exercise 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

i) 1 and 9.

Explanation: Since 1^2 and 9^2 give 1 at unit's place, so these are the possible values of unit digit of the square root.

ii) 4 and 6

Explanation: Since, $4^2 = 16$ and $6^2 = 36$, hence, 4 and 6 are possible digits

iii) 1 and 9

iv) 5

Explanation: Since, $5^2 = 25$, hence 5 is possible.

Question 2

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

(i) 153

(ii) 257

(iii) 408

(iv) 441

Answer:

The square of any numbers end in with following digits at its unit place

0,1,4,5,6 or 9

Since i),ii),iii) does not these at its unit place, it can be perfect square of any number, iv) has 1 at its unit place, so it can be square and it is the perfect square of 21



Question 3

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

Answer:

i) Square root of 100 by Repeated subtraction:

1. $100 - 1 = 99$

2. $99 - 3 = 96$

3. $96 - 5 = 91$

4. $91 - 7 = 84$

5. $84 - 9 = 75$

6. $75 - 11 = 64$

7. $64 - 13 = 51$

8. $51 - 15 = 36$

9. $36 - 17 = 19$

10. $19 - 19 = 0$

We get 0 at 10th step. Thus, 10 is the square root of 100.

ii) Square root of 169 by Repeated subtraction:

1. $169 - 1 = 168$

2. $168 - 3 = 165$

3. $165 - 5 = 160$

4. $160 - 7 = 153$

5. $153 - 9 = 144$

6. $144 - 11 = 133$

7. $133 - 13 = 120$

8. $120 - 15 = 105$

9. $105 - 17 = 88$

10. $88 - 19 = 69$

11. $69 - 21 = 48$

12. $48 - 23 = 25$

13. $25 - 25 = 0$

We get 0 at 13th step. Thus 13 is the square root of 169

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

i) Let find the factor by division of number

3	729
3	243
3	81
3	27
3	9
	3

So $729 = 3^2 \times 3^2 \times 3^2$

$\sqrt{729} = 27$

ii) Let find the factor by division of number

2	400
2	200
2	100
2	50
5	25
	5

So $400 = 2^2 \times 2^2 \times 5^2$

$\sqrt{400} = 20$

iii) Let find the factor by division of number

2	1764
2	882
3	441
3	147
7	49
	7

So $1764 = 2^2 \times 3^2 \times 7^2$

$\sqrt{1764} = 42$

iv) Let find the factor by division of number

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

So $4096 = 2^2 \times 2^2 \times 2^2 \times 2^2 \times 2^2 \times 2^2$
 $\sqrt{4096} = 64$

v) Let find the factor by division of number

2	7764
2	3872
2	1936
2	968
2	484
2	242
11	121
	11

So $7744 = 2^2 \times 2^2 \times 2^2 \times 11^2$
 $\sqrt{7744} = 88$

vi) Let find the factor by division of number

2	9604
2	4802
7	2401
7	343
7	49
	7

So $9604 = 2^2 \times 7^2 \times 7^2$

$$\sqrt{9604} = 98$$

vii) Let find the factor by division of number

11	5929
11	539
7	49
	7

$$\text{So } 5929 = 11^2 \times 7^2$$

$$\sqrt{5929} = 77$$

viii) So $9216 = 2^2 \times 2^2 \times 2^2 \times 2^2 \times 2^2 \times 3^2$

$$\sqrt{9216} = 96$$

ix) So $529 = 23^2$

$$\sqrt{529} = 23$$

x) $8100 = 2^2 \times 5^2 \times 3^2 \times 3^2$

$$\sqrt{8100} = 90$$

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:

i) By prime factorization we get,

$$252 = 2 \times 2 \times 3 \times 3 \times 7$$

Here, 2 and 3 are in pairs but 7 needs a pair. Thus, 7 can become pair after multiplying 252 with 7.

So, 252 will become a perfect square when multiplied by 7.

ii)

By prime factorization, we get, $180 = 3 \times 3 \times 2 \times 2 \times 5$

Here, 3 and 2 are in pair but 5 needs a pair to make 180 a perfect square.

180 needs to be multiplied by 5 to become a perfect square.

iii) By prime factorization of 1008, we get

$$1008 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7$$

Here, 2 and 3 are in pair, but 7 needs a pair to make 1008 a perfect square.

Thus, 1008 needs to be multiplied by 7 to become a perfect square

iv) By prime factorization of 2028, we get

$$2028 = 2 \times 2 \times 3 \times 13 \times 13$$

Here, 2 and 13 are in pair, but 3 needs a pair to make 2028 a perfect square.

Thus, 2028 needs to be multiplied by 3 to become a perfect square.

v) By prime factorization of 1458, we get

$$1458 = 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$$

Here, 3 are in pair, but 2 needs a pair to make 1458 a perfect square.

So, 1458 needs to be multiplied by 2 to become a perfect square.

vi) By prime factorization of 768, we get

$$768 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$$

Here, 2 are in pair, but 3 needs a pair to make 768 a perfect square.

So, 768 needs to be multiplied by 3 to become a perfect square.

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

i) By prime factorization of 252, we get

$$252 = 2 \times 2 \times 3 \times 3 \times 7$$

Here, 2 and 3 are in pair, but 7 has no pair, which can be eliminated after dividing 252 by 7.

Hence, 252 needs to be divided by 7 to become a perfect square

ii) By prime factorization of 2925, we get

$$2925 = 5 \times 5 \times 3 \times 3 \times 13$$

Here, 5 and 3 are in pair, but 13 has no pair, which can be eliminated after dividing 2925 by 13.

Thus, 2925 needs to be divided by 13 to become a perfect square

iii) By prime factorization of 396, we get

$$396 = 2 \times 2 \times 3 \times 3 \times 11$$

Here, 2 and 3 are in pair, but 11 needs another 11 to make a pair. Thus, 11 can be eliminated after dividing 396 by 11.

Thus, 396 needs to be divided by 11 to become a perfect square

iv) By prime factorization of 2645, we get

$$2645 = 5 \times 23 \times 23$$

Here, 23 is in pair, but 5 needs a pair. Thus, 5 can be eliminated after dividing 2645 by 5

Hence, 2645 needs to be divided by 5 to become a perfect square.

v) By prime factorization of 2800, we get

$$2800 = 2 \times 2 \times 7 \times 10 \times 10$$

Since, only 7 is not in pair, thus, by eliminating 7, from 2800, it can be a perfect square.

Hence, 2800 needs to be divided by 7 to become a perfect square.

vi) By prime factorization of 1620, we get

$$1620 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5$$

Here, 2 and 3 are in pair, but 5 is not in pair. Thus, by eliminating 5 from 1620, obtained number will be a perfect square.

Hence, 1620 needs to be divided by 5 to become a perfect square

Question 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.

Answer

We need to calculate the square root of 2401 to get the solution.

By prime factorization of 2401, we get

$$2401 = 7 \times 7 \times 7 \times 7$$

$$\sqrt{2401} = 49$$

There are 49 students, each contributing 49 rupees

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

To calculate the number of rows and number of plants, we need to find the square root of 2025.

By prime factorisation of 2025, we get

$$2025 = 5 \times 5 \times 3 \times 3 \times 3 \times 3$$

$$\sqrt{2025} = 45$$

There are 45 rows with 45 plants in each of them.

Question 9

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

Answer

In these type of question , we need to find LCM of 4, 9 and 10

$$4 = 2 \times 2$$

$$9 = 3 \times 3$$

$$10 = 5 \times 2$$

$$\text{So, LCM} = 2^2 \times 3^2 \times 5 = 180$$

So 180 is smallest number which is divisible by 4,9,10

But as you see it is not a perfect square

Now the LCM gives us a clue that if 180 is multiplied by 5 then it will become a perfect square.

$$\text{The Required number} = 180 \times 5 = 900$$

Question 10

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

Answer

$$8 = 2 \times 2 \times 2$$

$$15 = 3 \times 5$$

$$20 = 2 \times 2 \times 5$$

$$\text{So, LCM} = 2 \times 2 \times 2 \times 3 \times 5 = 120$$

As 3 and 5 are not in pair in LCM's factor so we need to multiply 120 by 5 and three to make it a perfect square.

$$\text{Required Number} = 120 \times 3 \times 5 = 1800$$