CBSE NCERT Solutions for Class 8 Mathematics Chapter 6

Back of Chapter Questions

Exercise 6.1:

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

Solution:

We know that if a number has its unit's place digit as m, then its square will end with the unit digit of the multiplication m × m.

(i) 81

As the given number has its unit's place digit as 1, its square will end with the unit digit of the multiplication $(1 \times 1 = 1)$ i.e., 1.

(ii) 272

As the given number has its unit's place digit as 2, its square will end with the unit digit of the multiplication $(2 \times 2 = 4)$ i.e., 4.

(iii) 799

As the given number has its unit's place digit as 9, its square will end with the unit digit of the multiplication $(9 \times 9 = 81)$ i.e., 1.

(iv) 3853

As the given number has its unit's place digit as 3, its square will end with the unit digit of the multiplication $(3 \times 3 = 9)$ i.e., 9.

(v) 1234

As the given number has its unit's place digit as 4, its square will end with the unit digit of the multiplication $(4 \times 4 = 16)$ i.e., 6.

(vi) 26387

As the given number has its unit's place digit as 7, its square will end with the unit digit of the multiplication $(7 \times 7 = 49)$ i.e., 9.

(vii) 52698

As the given number has its unit's place digit as 8, its square will end with the unit digit of the multiplication $(8 \times 8 = 64)$ i.e., 4.

(viii) 99880

As the given number has its unit's place digit as 0, its square will have two zeroes at the end. Therefore, the unit digit of the square of the given number is 0.

(xi) 12796

As the given number has its unit's place digit as 6, its square will end with the unit digit of the multiplication $(6 \times 6 = 36)$ i.e., 6.

(x) 55555

As the given number has its unit's place digit as 5, its square will end with the unit digit of the multiplication $(5 \times 5 = 25)$ i.e., 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 the square of numbers may end with any one of the digits: 0, 1, 5, 6, or 9. Also, a perfect square has only even number of zeroes at the end of it.

(i) 1057

Has its unit place digit as 7. Hence, it cannot be a perfect square.

(ii) 23453

Has its unit place digit as 3. Hence, it cannot be a perfect square.

(iii) 7928

Has its unit place digit as 8. Hence, it cannot be a perfect square.

(iv) 222222

Has its unit place digit as 2. Hence, it cannot be a perfect square.

(v) 64000

Has three zeros at the end of it. However, since a perfect square cannot end with odd number of zeroes, it is not a perfect square.

(vi) 89722

Has its unit place digit as 2. Hence, it cannot be a perfect square.

(vii) 222000

Has three zeroes at the end of it. Therefore, since a perfect square cannot end with odd number of zeroes, it is not a perfect square.

(viii) 505050

Has one zero at the end of it. Therefore, since a perfect square cannot end with odd number of zeroes, it is not a perfect square.

3. The squares of which of the following would be odd numbers?

(i) 431

(ii) 2826

(iii) 7779

(iv) 82004

Solution:

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

(i) 431^2 is an odd number

(ii) 2826^2 is an even number

(iii) 7779^2 is an odd number

(iv) 82004^2 is an even number

4. Observe the following pattern and find the missing digits.

$11^2 = 121$

$101^2 = 10201$

$1001^2 = 1002001$

$100001^2 = 1\_2\_1$

$10000001^2 = \cdots$

Solution:

From the given pattern, it can be observed that the squares of the given numbers have the same number of zeroes before and after the digit 2 as it was in the original number. Therefore,

$100001^2 = 10000200001$

$10000001^2 = 100000020000001$

5. Observe the following pattern and supply the missing number.

$11^2 = 121$

$101^2 = 10201$

$10101^2 = 102030201$

$1010101^2 = .\ldots\ldots$

$\ldots^2 = 10203040504030201$

Solution:

From the above pattern, we obtain

$1010101^2 = 1020304030201$

$101010101^2 = 10203040504030201$

6. Using the given pattern, find the missing numbers.

$1^2 + 2^2 + 2^2 = 3^2$

$2^2 + 3^2 + 6^2 = 7^2$

$3^2 + 4^2 + 12^2 = 13^2$

$4^2 + 5^2 + \_^2 = 21^2$

$5^2 + \_^2 + 30^2 = 31^2$

$6^2 + 7^2 + \_^2 = \_^2$

Solution:

From the given pattern, it can be observed that,

(i) The third number is the product of the first two numbers.

(ii) The fourth number can be obtained by adding 1 to the third number.

Thus, the missing numbers in the pattern will be:

$4^2 + 5^2 + \underline{20^2} = 21^2$

$5^2 + \underline{6^2} + 30^2 = 31^2$

$6^2 + 7^2 + \underline{42^2} = \underline{43^2}$

7. Without adding find the sum

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

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

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

Solution:

We know that the sum of first n odd natural numbers is n^2.

(i) Now, we have to find the sum of first five odd natural numbers.

Hence, $1 + 3 + 5 + 7 + 9 = (5)^2 = 25$

(ii) Now, we have to find the sum of first ten odd natural numbers.

Hence, $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 = (10)^2 = 100$

(iii) Now, we have to find the sum of first twelve odd natural numbers.

Hence, $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 = (12)^2 = 144$

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

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

Solution:

We know that the sum of first n odd natural numbers is n^2.

(i) $49 = (7)^2$

Therefore, 49 is the sum of first 7 odd natural numbers.

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

(ii) $121 = (11)^2$

Therefore, 121 is the sum of first 11 odd natural numbers.

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

9. How many numbers lie between squares of the following numbers?

(i) 12 and 13

(ii) 25 and 26

(iii) 99 and 100

Solution:

We know that there will be $2n$ numbers in between the squares of the numbers n and $(n+1)$.

(i) Between 12^2 and 13^2, there will be $2 \times 12 = 24$ numbers

(ii) Between 25^2 and 26^2, there will be $2 \times 25 = 50$ numbers

(iii) Between 99^2 and 100^2, there will be $2 \times 99 = 198$ numbers

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) $32^2 = (30+2)^2$

$= 30\ (30+2) + 2\ (30+2)$

$= 30^2 + 30 \times 2 + 2 \times 30 + 2^2$

$= 900 + 60 + 60 + 4$

$= 1024$

(ii) $35^2 = (30+5)^2$

$= 30(30+5) + 5(30+5)$

$= 30^2 + 30 \times 5 + 5 \times 30 + 5^2$

$= 900 + 150 + 150 + 25$

$= 1225$

(iii) $86^2 = (80+6)^2$

$= 80(80+6) + 6(80+6)$

$= 80^2 + 80 \times 6 + 6 \times 80 + 6^2$

$= 6400 + 480 + 480 + 36$

$= 7396$

(iv) $93^2 = (90 + 3)^2$

$= 90(90 + 3) + 3(90 + 3)$

$= 90^2 + 90 \times 3 + 3 \times 90 + 3^2$

$= 8100 + 270 + 270 + 9$

$= 8649$

(v) $71^2 = (70 + 1)^2$

$= 70(70 + 1) + 1(70 + 1)$

$= 70^2 + 70 \times 1 + 1 \times 70 + 1^2$

$= 4900 + 70 + 70 + 1$

$= 5041$

(vi) $46^2 = (40 + 6)^2$

$= 40(40 + 6) + 6(40 + 6)$

$= 40^2 + 40 \times 6 + 6 \times 40 + 6^2$

$= 1600 + 240 + 240 + 36$

$= 2116$

2. Write a Pythagorean triplet whose one member is

(i) 6

(ii) 14

(iii) 16

(iv) 18

Solution:

For any natural number $m > 1; 2m, m^2 - 1, m^2 + 1$ forms a Pythagorean triplet.

(i) If we take $m^2 + 1 = 6$, then $m^2 = 5$

The value of m will not be an integer.

If we take $m^2 - 1 = 6$, then $m^2 = 7$

Again the value of m is not an integer.

Let $2m = 6$,

$m = 3$

$2 \times \mathrm{m} = 2 \times 3 = 6$

$\mathrm{m}^2 - 1 = 3^2 - 1 = 8$

$\mathrm{m}^2 + 1 = 3^2 + 1 = 10$.

Therefore, the Pythagorean triplets are: $6, 8$, and 10.

(ii) If we take $\mathrm{m}^2 + 1 = 14$, then $\mathrm{m}^2 = 13$

The value of m will not be an integer.

If we take $\mathrm{m}^2 - 1 = 14$, then $\mathrm{m}^2 = 15$

Again the value of m is not an integer.

Let $2\mathrm{m} = 14$

$\mathrm{m} = 7$

Thus, $\mathrm{m}^2 - 1 = 49 - 1 = 48$ and $\mathrm{m}^2 + 1 = 49 + 1 = 50$

Therefore, the required triplet is $14, 48$, and 50.

(iii) If we take $\mathrm{m}^2 + 1 = 16$, then $\mathrm{m}^2 = 15$

The value of m will not be an integer.

If we take $\mathrm{m}^2 - 1 = 16$, then $\mathrm{m}^2 = 17$

Again the value of m is not an integer.

Let $2\mathrm{m} = 16$

$\mathrm{m} = 8$

Thus, $\mathrm{m}^2 - 1 = 64 - 1 = 63$ and $\mathrm{m}^2 + 1 = 64 + 1 = 65$

Therefore, the Pythagorean triplet is $16, 63$, and 65.

(iv) If we take $\mathrm{m}^2 + 1 = 18$,

$\mathrm{m}^2 = 17$

The value of m will not be an integer.

If we take $\mathrm{m}^2 - 1 = 18$, then $\mathrm{m}^2 = 19$

Again the value of m is not an integer.

Let $2\mathrm{m} = 18$

$\mathrm{m} = 9$

Thus, $m^2 - 1 = 81 - 1 = 80$ and $m^2 + 1 = 81 + 1 = 82$

Therefore, the Pythagorean triplet is $18, 80$, and 82.

Exercise 6.3:

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

Solution:

(i) If the number ends with 1, then the one's digit of the square root of that number may be 1 or 9. Hence, one's digit of the square root of 9801 is either 1 or 9.

(ii) If the number ends with 6, then the one's digit of the square root of that number may be 4 or 6. Hence, one's digit of the square root of 99856 is either 4 or 6.

(iii) If the number ends with 1, then the one's digit of the square root of that number may be 1 or 9. Hence, one's digit of the square root of 998001 is either 1 or 9.

(iv) If the number ends with 5, then the one's digit of the square root of that number will be 5. Hence, the one's digit of the square root of 657666025 is 5.

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

(i) 153

(ii) 257

(iii) 408

(iv) 441

Solution:

The perfect squares of a number can end with any of the digits $0, 1, 4, 5, 6$, or 9 at unit's place. Also, a perfect square will end with even number of zeroes.

(i) Since the number 153 has its unit's place digit as 3, it is not a perfect square.

(ii) Since the number 257 has its unit's place digit as 7, it is not a perfect square.

(iii) Since the number 408 has its unit's place digit as 8, it is not a perfect square.

(iv) Since the number 441 has its unit's place digit as 1, it is a perfect square.

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

Solution:

We know that the sum of the first n odd natural numbers is n^2.

Consider $\sqrt{100}$.

(i) $100 - 1 = 99$

(ii) $99 - 3 = 96$

(iii) $96 - 5 = 91$

(iv) $91 - 7 = 84$

(v) $84 - 9 = 75$

(vi) $75 - 11 = 64$

(vii) $64 - 13 = 51$

(viii) $51 - 15 = 36$

(ix) $36 - 17 = 19$

(x) $19 - 19 = 0$

We see that we have subtracted successive odd numbers starting from 1 to 100, and obtained 0 at 10^{th} step.

Therefore, $\sqrt{100} = 10$

The square root of 169 can be obtained by the method of repeated subtraction as follows.

(i) $169 - 1 = 168$

(ii) $168 - 3 = 165$

(iii) $165 - 5 = 160$

(iv) $160 - 7 = 153$

(v) $153 - 9 = 144$

(vi) $144 - 11 = 133$

(vii) $133 - 13 = 120$

(viii) $120 - 15 = 105$

(ix) $105 - 17 = 88$

(x) $88 - 19 = 69$

(xi) $69 - 21 = 48$

(xii) $48 - 23 = 25$

(xiii) $25 - 25 = 0$

We have subtracted successive odd numbers starting from 1 to 169, and obtained 0 at 13^{th} step.

Therefore, $\sqrt{169} = 13$

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

Solution:

(i) After performing the prime factorization, we obtain the factors as,

$729 = \underline{3 \times 3} \times \underline{3 \times 3} \times \underline{3 \times 3}$

$\sqrt{729} = 3 \times 3 \times 3 = 27$

(ii) After performing the prime factorization, we obtain the factors as,

$400 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{5 \times 5}$

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

(iii) After performing the prime factorization, we obtain the factors as,

$1764 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{7 \times 7}$

$\sqrt{1764} = 2 \times 3 \times 7 = 42$

(iv) After performing the prime factorization, we obtain the factors as

$4096 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2}$

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

(v) After performing the prime factorization, we obtain the factors as,

$7744 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{11 \times 11}$

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

(vi) After performing the prime factorization, we obtain the factors as,

$9604 = \underline{2 \times 2} \times \underline{7 \times 7} \times \underline{7 \times 7}$

$\sqrt{9604} = 2 \times 7 \times 7 = 98$

(vii) After performing the prime factorization, we obtain the factors as,

$5929 = \underline{7 \times 7} \times \underline{11 \times 11}$

$\sqrt{5929} = 7 \times 11 = 77$

(viii) After performing the prime factorization, we obtain the factors as,

$9216 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{3 \times 3}$

$\sqrt{5929} = 2 \times 2 \times 2 \times 2 \times 2 \times 3 = 96$

(ix) After performing the prime factorization, we obtain the factors as,

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

$\sqrt{529} = 23$

(x) After performing the division, we obtain the factors as,

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

$\sqrt{8100} = 2 \times 3 \times 3 \times 5 = 90$

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) $252 = \underline{2 \times 2} \times \underline{3 \times 3} \times 7$

Here, prime factor 7 does not have its pair.

If 7 gets a pair, then the number will become a perfect square.

Therefore, 252 must be multiplied with 7 to obtain a perfect square.

$252 \times 7 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{7 \times 7}$

Therefore, $252 \times 7 = 1764$ is a perfect square

$\therefore \sqrt{1764} = 2 \times 3 \times 7 = 42$

(ii) $180 = \underline{2 \times 2} \times \underline{3 \times 3} \times 5$

Here, prime factor 5 does not have its pair. If 5 gets a pair, then the number will become a perfect square.

Therefore, 180 must be multiplied with 5 to obtain a perfect square.

$180 \times 5 = 900 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{5 \times 5}$

Therefore, $180 \times 5 = 900$ is a perfect square.

$\therefore \sqrt{900} = 2 \times 3 \times 5 = 30$

(iii) $1008 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7$

Here, prime factor 7 does not have its pair. If 7 gets a pair, then the number will become a perfect square.

Therefore, 1008 can be multiplied with 7 to obtain a perfect square.

$1008 \times 7 = 7056 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{7 \times 7}$

Therefore, $1008 \times 7 = 7056$ is a perfect square.

$\therefore \sqrt{7056} = 2 \times 2 \times 3 \times 7 = 84$

(iv) $2028 = \underline{2 \times 2} \times 3 \times \underline{13 \times 13}$

Here, prime factor 3 does not have its pair. If 3 gets a pair, then the number will become a perfect square.

Therefore, 2028 has to be multiplied with 3 to obtain a perfect square.

Therefore, $2028 \times 3 = 6084$ is a perfect square.

$2028 \times 3 = 6084 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{13 \times 13}$

$\therefore \sqrt{6084} = 2 \times 3 \times 13 = 78$

(v) $1458 = 2 \times \underline{3 \times 3} \times \underline{3 \times 3} \times \underline{3 \times 3}$

Here, prime factor 2 does not have its pair. If 2 gets a pair, then the number will become a perfect square.

Therefore, 1458 has to be multiplied with 2 to obtain a perfect square.

Therefore, $1458 \times 2 = 2916$ is a perfect square.

$1458 \times 2 = 2916 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{3 \times 3} \times \underline{3 \times 3}$

$\therefore \sqrt{2916} = 2 \times 3 \times 3 \times 3 = 54$

(vi) $768 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times 3$

Here, prime factor 3 does not have its pair. If 3 gets a pair, then the number will become a perfect square.

Therefore, 768 must be multiplied with 3 to obtain a perfect square.

Therefore, $768 \times 3 = 2304$ is a perfect square.

$768 \times 3 = 2304 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{3 \times 3}$

$\therefore \sqrt{2304} = 2 \times 2 \times 2 \times 2 \times 3 = 48$

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 number. 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) 252 can be factorized as follows.

$252 = \underline{2 \times 2} \times \underline{3 \times 3} \times 7$

Here, prime factor 7 does not have its pair.

If we divide this number by 7, then the number will become a perfect square. Therefore, 252 must be divided by 7 to obtain a perfect square.

$252 \div 7 = 36$ is a perfect square.

$36 = \underline{2 \times 2} \times \underline{3 \times 3}$

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

(ii) 2925 can be factorized as follows.

$2925 = \underline{3 \times 3} \times \underline{5 \times 5} \times 13$

Here, prime factor 13 does not have its pair.

If we divide this number by 13, then the number will become a perfect square.

Therefore, 2925 has to be divided by 13 to obtain a perfect square.

$2925 \div 13 = 225$ is a perfect square.

$225 = \underline{3 \times 3} \times \underline{5 \times 5}$

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

(iii) 396 can be factorized as follows.

$396 = \underline{2 \times 2} \times \underline{3 \times 3} \times 11$

Here, prime factor 11 does not have its pair.

If we divide this number by 11, then the number will become a perfect square.

Therefore, 396 must be divided by 11 to obtain a perfect square.

$396 \div 11 = 36$ is a perfect square.

$36 = \underline{2 \times 2} \times \underline{3 \times 3}$

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

(iv) 2645 can be factorized as follows.

$2645 = 5 \times \underline{23 \times 23}$

Here, prime factor 5 does not have its pair.

If we divide this number by 5, then the number will become a perfect square.

Therefore, 2645 has to be divided by 5 to obtain a perfect square.

$2645 \div 5 = 529$ is a perfect square.

$529 = 23 \times 23$

$\therefore \sqrt{529} = 23$

(v) 2800 can be factorized as follows.

$2800 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{5 \times 5} \times 7$

Here, prime factor 7 does not have its pair.

If we divide this number by 7, then the number will become a perfect square.

Therefore, 2800 has to be divided by 7 to obtain a perfect square.

$2800 \div 7 = 400$ is a perfect square.

$400 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{5 \times 5}$

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

(vi) 1620 can be factorized as follows.

$1620 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{3 \times 3} \times 5$

Here, prime factor 5 does not have its pair.

If we divide this number by 5, then the number will become a perfect square.

Therefore, 1620 has to be divided by 5 to obtain a perfect square.

$1620 \div 5 = 324$ is a perfect square

$324 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{3 \times 3}$

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

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:

It is given that each student donated as many rupees as the number of students of the class.

Number of students in the class will be the square root of the amount donated by the students of the class.

The total amount of donation is Rs 2401.

Number of students in the class $= \sqrt{2401}$

$2401 = \underline{7 \times 7} \times \underline{7 \times 7}$

$\therefore \sqrt{2401} = 7 \times 7 = 49$

Hence, the number of students in the class is 49.

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:

It is given that in the garden, each row contains as many plants as the number of rows.

Hence,

Number of rows = Number of plants in each row

Total number of plants = Number of rows × Number of plants in each row

Number of rows × Number of plants in each row = 2025

$(\text{Number of rows})^2 = 2025$

2	4, 9, 10
2	2, 9, 5
3	1, 9, 5
3	1, 3, 5
5	1, 1, 5
	1, 1, 1

Number of rows = $\sqrt{2025}$

$2025 = \underline{5 \times 5} \times \underline{3 \times 3} \times \underline{3 \times 3}$

$\therefore \sqrt{2025} = 5 \times 3 \times 3 = 45$

Thus, the number of rows and the number of plants in each row is 45.

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

Solution:

The number that will be perfectly divisible by each one of 4, 9, and 10 is the LCM of these numbers. The LCM of these numbers is as follows.

LCM of 4, 9, 10 = $\underline{2 \times 2} \times \underline{3 \times 3} \times 5 = 180$

Here, prime factor 5 does not have its pair. Therefore, 180 is not a perfect square. If we multiply 180 with 5, then the number will become a perfect square.

Therefore, 180 should be multiplied with 5 to obtain a perfect square.

Hence, the required square number is $180 \times 5 = 900$.

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

Solution:

The number that is perfectly divisible by each of the numbers 8, 15, and 20 is their LCM.

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

LCM of 8, 15, and 20 $= \underline{2 \times 2} \times 2 \times 3 \times 5 = 120$

Here, prime factors 2, 3, and 5 do not have their respective pairs. Therefore, 120 is not a perfect square.

Therefore, 120 should be multiplied by $2 \times 3 \times 5$, i.e. 30, to obtain a perfect square. Hence, the required square number is $120 \times 2 \times 3 \times 5 = 3600$.

Exercise 6.2:

1. 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:

(i) The square root of 2304 can be calculated as follows.

	48

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

$\therefore \sqrt{2304} = 48$

(ii) The square root of 4489 can be calculated as follows.

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

$\therefore \sqrt{4489} = 67$

(iii) The square root of 3481 can be calculated as follows.

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

Therefore, $\sqrt{3481} = 59$

(iv) The square root of 529 can be calculated as follows.

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

	0

$\therefore \sqrt{529} = 23$

(v) The square root of 3249 can be calculated as follows.

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

$\therefore \sqrt{3249} = 57$

(vi) The square root of 1369 can be calculated as follows.

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

$\therefore \sqrt{1369} = 37$

(vii) The square root of 5776 can be calculated as follows.

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

$\therefore \sqrt{5776} = 76$

(viii) The square root of 7921 can be calculated as follows.

	89

8	$\overline{79}\,\overline{21}$ -64
169	1521 1521
	0

$\therefore \sqrt{7921} = 89$

(ix) The square root of 576 can be calculated as follows.

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

$\therefore \sqrt{576} = 24$

(x) The square root of 1024 can be calculated as follows.

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

$\therefore \sqrt{1024} = 32$

(xi) The square root of 3136 can be calculated as follows.

	56
5	$\overline{31}\,\overline{36}$ -25
106	636 636

	0

$\therefore \sqrt{3136} = 56$

(xii) The square root of 900 can be calculated as follows.

	30
3	$\overline{9}\,\overline{00}$ −9
60	00 00
	0

$\therefore \sqrt{900} = 30$

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) By placing bars, we obtain

$64 = \overline{64}$

Since there is only one bar, the square root of 64 will have only one digit in it.

(ii) By placing bars, we obtain

$144 = \overline{1}\,\overline{44}$

Since there are two bars, the square root of 144 will have 2 digits in it.

(iii) By placing bars, we obtain

$4489 = \overline{44}\,\overline{89}$

Since there are two bars, the square root of 4489 will have 2 digits in it.

(iv) By placing bars, we obtain

$27225 = \overline{2}\,\overline{72}\,\overline{25}$

Since there are three bars, the square root of 27225 will have three digits in it.

(v) By placing the bars, we obtain

$390625 = \overline{39}\,\overline{06}\,\overline{25}$

Since there are three bars, the square root of 390625 will have 3 digits in it.

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) The square root of 2.56 can be calculated as follows.

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

$\therefore \sqrt{2.56} = 1.6$

(ii) The square root of 7.29 can be calculated as follows.

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

$\therefore \sqrt{7.29} = 2.7$

(iii) The square root of 51.84 can be calculated as follows.

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

$\therefore \sqrt{51.84} = 7.2$

(iv) The square root of 42.25 can be calculated as follows.

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

$\therefore \sqrt{42.25} = 6.5$

(v) The square root of 31.36 can be calculated as follows.

	5.6
5	$\overline{31}.\overline{36}$ -25
106	636 636
	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) The square root of 402 can be calculated by long division method as follows.

	20
2	$\overline{4}\,\overline{02}$ -4
40	02 00
	2

The remainder is 2. It represents that the square of 20 is less than 402 by 2. Therefore, a perfect square will be obtained by subtracting 2 from the given number 402.

Therefore, required perfect square $= 402 - 2 = 400$

And, $\sqrt{400} = 20$

(ii) The square root of 1989 can be calculated by long division method as follows.

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

The remainder is 53. It represents that the square of 44 is less than 1989 by 53. Therefore, a perfect square will be obtained by subtracting 53 from the given number 1989.

Therefore, required perfect square $= 1989 - 53 = 1936$

And, $\sqrt{1936} = 44$

(iii) The square root of 3250 can be calculated by long division method as follows.

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

The remainder is 1. It represents that the square of 57 is less than 3250 by 1. Therefore, a perfect square can be obtained by subtracting 1 from the given number 3250.

Therefore, required perfect square $= 3250 - 1 = 3249$

And, $\sqrt{3249} = 57$

(iv) The square root of 825 can be calculated by long division method as follows.

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

The remainder is 41. It represents that the square of 28 is less than 825 by 41. Therefore, a perfect square can be calculated by subtracting 41 from the given number 825.

Therefore, required perfect square $= 825 - 41 = 784$

And, $\sqrt{784} = 28$

(v) The square root of 4000 can be calculated by long division method as follows.

	63
6	$\overline{40}\,\overline{00}$ -36

123	400 369
	31

The remainder is 31. It represents that the square of 63 is less than 4000 by 31. Therefore, a perfect square can be obtained by subtracting 31 from the given number 4000.

Therefore, required perfect square $= 4000 - 31 = 3969$

And, $\sqrt{3969} = 63$

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) The square root of 525 can be calculated by long division method as follows.

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

The remainder is 41. It represents that the square of 22 is less than 525. Next number is 23 and $23^2 = 529$

Hence, number to be added to $525 = 232 - 525 = 529 - 525 = 4$

The required perfect square is 529 and $\sqrt{529} = 23$

(ii) The square root of 1750 can be calculated by long division method as follows.

	41

4	$\overline{17}\,\overline{50}$ -16
81	150 81
	69

The remainder is 69.

It represents that the square of 41 is less than 1750.

The next number is 42 and $42^2 = 1764$

Hence, number to be added to $1750 = 42^2 - 1750 = 1764 - 1750 = 14$

The required perfect square is 1764 and $\sqrt{1764} = 42$

(iii) The square root of 252 can be calculated by long division method as follows.

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

The remainder is 27. It represents that the square of 15 is less than 252.

The next number is 16 and $16^2 = 256$

Hence, number to be added to $252 = 16^2 - 252 = 256 - 252 = 4$

The required perfect square is 256 and $\sqrt{256} = 16$

(iv) The square root of 1825 can be calculated by long division method as follows.

	42
4	$\overline{18}\,\overline{25}$ -16
82	225

	164
	61

The remainder is 61. It represents that the square of 42 is less than 1825.

The next number is 43 and $43^2 = 1849$

Hence, number to be added to $1825 = 43^2 - 1825 = 1849 - 1825 = 24$

The required perfect square is 1849 and $\sqrt{1849} = 43$

(v) The square root of 6412 can be calculated by long division method as follows.

	80
8	$\overline{64}\,\overline{12}$ -64
160	012 0
	12

The remainder is 12. It represents that the square of 80 is less than 6412.

The next number is 81 and $81^2 = 6561$

Hence, number to be added to $6412 = 81^2 - 6412 = 6561 - 6412 = 149$

The required perfect square is 6561 and $\sqrt{6561} = 81$

6. Find the length of the side of a square whose area is $441\ \text{m}^2$.

Solution:

Let the length of the side of the square be x m.

Area of square $= (x)^2 = 441\ \text{m}^2$

$x = \sqrt{441}$

The square root of 441 can be calculated as follows.

	21
2	$\overline{4}\,\overline{41}$ -4

41	041 41
	0

$\therefore x = 21$ m

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

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

(A) If AB = 6 cm, BC = 8 cm, find AC

(B) If AC = 13 cm, BC = 5 cm, find AB

Solution:

(A) ΔABC is right-angled at B.

Therefore, by applying Pythagoras theorem, we obtain

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

$AC^2 = (6\text{ cm})^2 + (8\text{ cm})^2$

$AC^2 = (36 + 64)\text{ cm}^2 = 100\text{ cm}^2$

$AC = (\sqrt{100})\text{cm} = (\sqrt{10 \times 10})\text{ cm}$

$AC = 10$ cm

(B) ΔABC is right-angled at B.

Therefore, by applying Pythagoras theorem, we obtain

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

$(13\text{ cm})^2 = (AB)^2 + (5\text{ cm})^2$

$AB^2 = (13\text{ cm})^2 - (5\text{ cm})^2 = (169 - 25)\text{cm}^2 = 144\text{ cm}^2$

$AB = (\sqrt{144})\text{cm} = (\sqrt{12 \times 12})\text{cm}$

$AB = 12$ cm

8. 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:

It is given that the gardener has 1000 plants. The number of rows and the number of columns is the same.

We have to find the number of more plants that should be there, so that when the gardener plants them, the number of rows and columns are same.

That is, the number which should be added to 1000 to make it a perfect square has to be calculated.

The square root of 1000 can be calculated by long division method as follows.

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

The remainder is 39. It represents that the square of 31 is less than 1000.

The next number is 32 and $32^2 = 1024$

Hence, number to be added to 1000 to make it a perfect square

$= 32^2 - 1000 = 1024 - 1000 = 24$

Thus, the required number of plants is 24.

9. These 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:

It is given that there are 500 children in the school. They have to stand for a P.T. drill such that the number of rows is equal to the number of columns.

The number of children who will be left out in this arrangement has to be calculated. That is, the number which should be subtracted from 500 to make it a perfect square has to be calculated.

The square root of 500 can be calculated by long division method as follows.

	22
2	$\overline{5}\,\overline{00}$ -4
42	100 84

	16

The remainder is 16.

It shows that the square of 22 is less than 500 by 16. Therefore, if we subtract 16 from 500, we will obtain a perfect square.

Required perfect square $= 500 - 16 = 484$

Thus, the number of children who will be left out is 16.