



Class – 7

Chapter – 1

Rational and Irrational Number

Lecture sheet – 3

Finding Square root by division method

Example-1: Find the square root of 2304 by division method.

Solution:

1. Write down the number **2304**.
2. Group the digits in pairs, starting with the digit in the unit's place. Each pair and the remaining digit (if any) are called a period.

$\overline{23} \overline{04}$

3. Think of the largest number whose square is equal to or just less than the first period. Take this number as the divisor and also as the quotient.

$4 \left| \overline{23} \overline{04} \right. (4$
 16

4. Subtract the product of the divisor and the quotient from the first period and bring down the next period to the right of the remainder. This becomes the new dividend.

$4 \left| \overline{23} \overline{04} \right. (4$
 16

 $7 \ 04$

5. Now, the new divisor is obtained by taking two times the quotient and annexing with it a suitable digit which is also taken as the next digit of the quotient, chosen in such a way that the product of the new divisor and this digit is equal to or just less than the new dividend.

$$\begin{array}{r}
 4 \quad | \quad \overline{23 \ 04} \ (48) \\
 \quad \quad | \quad \underline{16} \\
 88 \quad | \quad \underline{7 \ 04} \\
 \quad \quad | \quad \underline{7 \ 04} \\
 \quad \quad | \quad \underline{0}
 \end{array}$$

6. Repeat steps (3), (4) and (5) till all the periods have been taken up. Now, the quotient so obtained is the required square root of the given number
7. 48 is obtained in the quotient. This is the required square root.

$$\therefore \sqrt{2304} = 48$$

Example-2: Find the square root of 31684 by division method.

Solution:

$$\begin{array}{r}
 1 \quad | \quad \overline{3 \ 16 \ 84} \ (178) \\
 \quad \quad | \quad \underline{1} \\
 27 \quad | \quad \underline{2 \ 16} \\
 \quad \quad | \quad \underline{1 \ 89} \\
 348 \quad | \quad \underline{2784} \\
 \quad \quad | \quad \underline{2784} \\
 \quad \quad | \quad \underline{0}
 \end{array}$$

\therefore The square root of 31684 = $\sqrt{31684} = 178$

Ans: 178.

Example-3: Find the square root of 10404 by division method.

Solution:

$$\begin{array}{r} 1 \quad | \quad \overline{10404} \quad (102 \\ \quad \quad | \quad \underline{1} \\ 202 \quad | \quad \quad \underline{0404} \\ \quad \quad | \quad \quad \underline{0404} \\ \quad \quad | \quad \quad \quad \underline{0} \end{array}$$

∴ The square root of 10404 = $\sqrt{10404} = 102$

Ans: 102.

1. Exercise (Do yourself)

Find the square root of each by division method:

a) 225, b) 961, c) 3969

Example-4: What is the least number which is to be subtracted from 8655 to get a perfect square number?

Solution:

$$\begin{array}{r} 9 \quad | \quad \overline{8655} \quad (93 \\ \quad \quad | \quad \underline{81} \\ 183 \quad | \quad \quad \underline{555} \\ \quad \quad | \quad \quad \underline{549} \\ \quad \quad | \quad \quad \quad \underline{6} \end{array}$$

Here, 6 is the remainder in finding the square root of 8655 by division method.

Therefore, if 6 is subtracted from the given number, then the number will be a perfect square.

∴ The required least number is 6.

Ans: 6.

2. Exercise (Do yourself)

- What is the least number which is to be subtracted from 4639 so that the difference is a perfect square number?
- What least number must be subtracted from 7250 to get a perfect square? Also, find the square root of this perfect square.

Example-5: What is the least number which is to be added to 651201 to get a perfect square number?

Solution:

$$\begin{array}{r}
 8 \quad | \quad \overline{65 \ 12 \ 01} \quad (\ 806 \\
 \quad \quad | \quad \underline{64} \\
 1606 \quad | \quad 11201 \\
 \quad \quad | \quad \underline{9636} \\
 \quad \quad | \quad 1565
 \end{array}$$

We observe here that, $(806)^2 < 651201 < (807)^2$

The required number to be added = $(807)^2 - 651201$

$$= (807 \times 807) - 651201$$

$$= 651249 - 651201$$

$$= 48$$

Ans: 48.

3. Exercise (Do yourself)

- a) What is the least number to be added to 5605 so the total sum is a perfect square number?
- b) Find the least number that must be added to 6412 to make it a perfect square.

Example-6: Find the greatest number of four digits which is a perfect square.

Solution:

Greatest number of four digits = 9999.

Let us try to find the square root of 9999.

$$\begin{array}{r} 9 \overline{) 99\ 99} \quad (99 \\ \underline{81} \\ 1899 \\ \underline{1701} \\ 198 \end{array}$$

This shows that $(99)^2$ is less than 9999 by 198.
So, the least number to be subtracted is 198.
Hence, the required number is $(9999 - 198) = 9801$.

Ans: 9801.

4. Exercise (Do yourself)

Find the greatest number of five digits which is a perfect square.

Example-7: Find the least number of six digits which is a perfect square. Find the square root of this number.

Solution: The least number of six digits = 100000, which is not a perfect square because here we have odd number of zeroes.

Now, we must find the least number which when added to 100000 gives a perfect square. This perfect square is the required number.

Now, we find out the square root of 100000.

$$\begin{array}{r|l} 3 & \overline{10\ 00\ 00} \text{ (} 316 \\ & \underline{9} \\ 61 & \underline{1\ 00} \\ & \underline{61} \\ 626 & \underline{39\ 00} \\ & \underline{37\ 56} \\ & 144 \end{array}$$

Clearly, $(316)^2 < 100000 < (317)^2$

Therefore, the least number to be added = $(317)^2 - 100000$

$$= (317 \times 317) - 100000$$

$$= 100489 - 100000$$

$$= 489$$

Hence, the required number = $(100000 + 489)$

$$= 100489.$$

Also, $\sqrt{100489} = 317$.

Ans: 100489 and 317.

5. Exercise (Do yourself)

Find the least number of four digits which is a perfect square.

Sadia Khanam (Main Campus) : sadiakhan5532@gmail.com

