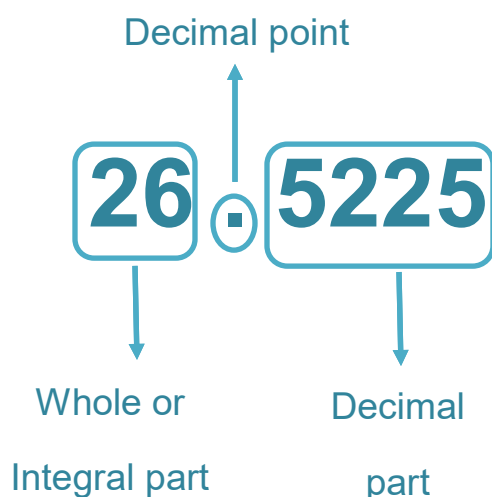


Rational and Irrational Number

Lecture sheet – 4

Finding square root of decimal fraction



[There are two parts of a decimal fraction. The part on the left side of decimal point is the whole or integral part and the part on the right side of decimal point is called decimal part.]

Rules for finding a square root

- In the whole part, horizontal bar is to be drawn on two digits each from the unit place gradually to the left.
- In the decimal part, horizontal line is to be drawn over the digits in pairs from the right side of decimal point. If a digit is left alone in this way, then a zero is put beside the digit and the bar is put on two digits.

- In the usual way of determining square root, the activity over the integer part is carried out and a decimal point should be put in the square root before considering the first two digits after decimal point.
- For each pair of zeros in the decimal of number, one zero is to be put after decimal point in the square root.

Example 1: Find the square root of 26.5225.

Solution:

$$\begin{array}{r}
 5 \overline{) 26.52 \overline{) 25}} \quad (5.15 \\
 \underline{25} \\
 101 \quad 1 \ 52 \\
 \underline{1 \ 01} \\
 1025 \quad 51 \ 25 \\
 \underline{51 \ 25} \\
 0
 \end{array}$$

\therefore The required square root = $\sqrt{26.5225} = 5.15$

Ans: 5.15.

Example 2: Find the square root of 0.002916.

Solution:

$$\begin{array}{r} 5 \quad | \quad \overline{0.00} \overline{29} \overline{16} \quad (0.054 \\ \quad \quad \quad 25 \\ \hline 104 \quad | \quad \quad 4 \ 16 \\ \quad \quad \quad 4 \ 16 \\ \hline \quad \quad \quad \quad 0 \end{array}$$

\therefore The required square root = $\sqrt{0.002916} = 0.054$

Ans: 0.054.

Example 3: Find the square root of 50.6944.

Solution:

$$\begin{array}{r} 7 \quad | \quad \overline{50.} \overline{69} \overline{44} \quad (7.12 \\ \quad \quad \quad 49 \\ \hline 141 \quad | \quad \quad 1 \ 69 \\ \quad \quad \quad 1 \ 41 \\ \hline 1421 \quad | \quad \quad 28 \ 44 \\ \quad \quad \quad 28 \ 44 \\ \hline \quad \quad \quad \quad 0 \end{array}$$

\therefore The required square root = $\sqrt{50.6944} = 7.12$

Ans: 7.12.

1. Exercise (Do yourself)

Determine the square root:

a) 0.36 b) 2.25 c) 0.0049 d) 641.1024 e) 0.000576 f) 144..841225

Determination of square root in approximate value:

- To find the square root correct upto three decimal places, at least 6 digits after the decimal are to be taken.
- If needed, after the last digit, zero is to be added to the right as required. It does not change the value of the number.

Rules for finding approximate value of square root:

- To find the square root upto two decimal places, the square root upto three decimal point is to be determined.
- If the next digit after decimal place upto which square root is to be determined is 0, 1, 2, 3 or 4, 1 should not be added with the previous digit.
- If the next digit after decimal place upto which square root is to be determined is 5, 6, 7, 8 or 9, 1 is to be added to the previous digit.

Example 4: Find the square root of 9.253 upto three decimal places. (approximate)

Solution:

$$\begin{array}{r}
 3 \overline{) 9.253000} \quad (3.0418 \\
 \underline{9} \\
 60 \quad 25 \\
 \underline{\quad 0} \\
 604 \quad 2530 \\
 \underline{\quad 2416} \\
 6081 \quad 11400 \\
 \underline{\quad 6081} \\
 60828 \quad 531900 \\
 \underline{\quad 486624} \\
 \quad \quad 45276
 \end{array}$$

∴ The required square root = 3.042 (approx)

Ans: 3.042 (approx).

N.B. : In this square root, the fourth digit after decimal is being 8, 1 is to be added with third digit and the required value of square root (upto 3 decimal places) becomes 3.042.

Example 5: Find the square root of 123 upto three decimal places. (approximate)

Solution:

$$\begin{array}{r}
 1 \quad | \quad 1 \overline{23.00\ 00\ 00} \quad (\ 11.090 \\
 \quad \quad 1 \\
 \hline
 21 \quad \quad 23 \\
 \quad \quad 21 \\
 \hline
 220 \quad \quad 2\ 00 \\
 \quad \quad \quad 0 \\
 \hline
 2209 \quad \quad 2\ 00\ 00 \\
 \quad \quad \quad 1\ 98\ 81 \\
 \hline
 22180 \quad \quad 1\ 19\ 00 \\
 \quad \quad \quad \quad 0 \\
 \hline
 \quad \quad \quad \quad 1\ 19\ 00
 \end{array}$$

\therefore The required square root = 11.090 (approx)

Ans: 11.090 (approx).

Example 6: Find the square root of 7.12 upto two decimal places. (approximate)

Solution:

$$\begin{array}{r} 2 \overline{) 7.12 \overline{00} \overline{00}} \quad (2.668 \\ \underline{4} \\ 46 \quad 3 \quad 12 \\ \underline{2 \quad 76} \\ 526 \quad 36 \quad 00 \\ \underline{31 \quad 56} \\ 5328 \quad 4 \quad 44 \quad 00 \\ \underline{4 \quad 26 \quad 24} \\ 1776 \end{array}$$

\therefore The required square root = 2.67 (approx)

Ans: 2.67 (approx).

2. Exercise (Do yourself)

Determine the square root upto two decimal places:

a) 7 b) 23.24 c) 0.036