SQUARES AND SQUARE ROOTS

SQUARE ROOTS OF DECIMALS

Square Root of Rational Numbers whose Numerators and Denominators are

Perfect Squares.

We will use the following rules to calculate square root.

(i)
$$\sqrt{\frac{p}{q}} = \sqrt{\frac{p}{q}}$$
 Where $q \neq 0$

(ii) If p and q are positive numbers, then $\sqrt{pq} = \sqrt{p} \times \sqrt{q}$

Ex.1 Find square root of .

Sol.
$$\sqrt{\frac{144}{625}} = \frac{\sqrt{144}}{\sqrt{625}}$$

 $\sqrt{144} = \sqrt{2 \times 2 \times 2 \times 2 \times 3 \times 3} = \sqrt{2^2 \times 2^2 \times 3^2} = 2 \times 2 \times 3 = 12$
 $\sqrt{625} = \sqrt{5 \times 5 \times 5 \times 5} = 5 \times 5 = 25$
 $\sqrt{\frac{144}{625}} = \frac{12}{25}$

Square Root of Perfect Square Decimal Number by Division Method :

As we have seen that the square root of these kinds of numbers can be found by first converting them into rational number. However by using division method we can find the square root directly. Follow the steps explained below:

- Place the bar on integral part (from left side of decimal) of the number in usual manner.
- (2) Place bar on decimal part (from right side of decimal) on every pair of digits.
- (3) Apply division method and find square root.
- (4) Place the decimal point ill the quotient as soon as the integral part is exhausted.
- **Ex.2** Find square root of 52.8529

Sol.



 $\sqrt{52.8539} = 7.27$

Ex.3 Find square root of 0.000169

Sol.



 $\sqrt{0.000169} = 0.013$

Square Root of Numbers which are not Perfect Squares.

Division method can also be applied for finding square root of numbers which are not perfect square numbers. Method is explained with the following illustrative examples.

Ex.4 Find square root of 3 upto 3 decimal places.

Sol



Here we have added 3 pairs of zero after decimal. One pair each for 1 digit after decimal point.

 $\sqrt{3} = 1.732$ upto three decimal places.

- **Ex.5** Find square root of $5\frac{2}{15}$ upto 3 decimal places.
- **Sol** $5\frac{2}{15} = 5.133333$ (approx.)



$$\therefore \quad \sqrt{5\frac{2}{15}} = \sqrt{5.133333} = 2.265 \text{ (approx.) up to three decimal places.}$$

Relation between the digits of a perfect square and its square root

In order to find the number of digits in the square root of a natural number, we follow the following steps:

Step I Obtain the number.

Step II Place a bar over every pair of digits starting with the units digit.

Each pair and remaining one digit (it any) on the extreme left is called a period. For example

- (i) 2809 will be written as $\overline{2809}$. In this 28 is called the first period and 09 is called the second period.
- (ii) 39204 will be written as 39202. Here, 3 is the first period, 92 is the second period and 04 is the third period.
- **Step III** Count the number of bars. The number of bars is the number of digits in the square root of the given number.

For example, the square root of 2809 has two digits and the square root of 39204 has three digits.