

Unit 5

Ex: 5.1

Find the square of following numbers.

$$\begin{aligned} \text{Sol: } & \underline{6} \\ & = 6 \\ & = 6 \times 6 \\ & = 36 \end{aligned}$$

$$\begin{aligned} \text{Sol} & = \underline{5} \\ & = 5 \times 5 \\ & = 25 \end{aligned}$$

$$\begin{aligned} \text{Sol} & = \underline{10} \\ & = 10 \times 10 \\ & = 100 \end{aligned}$$

$$\begin{aligned} \text{Sol} & = \underline{7} \\ & = 7 \\ & = 7 \times 7 \\ & = 49 \end{aligned}$$

$$\begin{aligned} \text{Sol} & = \underline{13} \\ & = 13 \\ & = 13 \times 13 \\ & = 169 \end{aligned}$$

$$\begin{aligned} \text{Sol} & = \underline{8} \\ & = 8 \\ & = 8 \times 8 \\ & = 64 \end{aligned}$$

$$\begin{aligned} \text{Sol} &= \underline{41} \\ &= 41 \times 41 \\ &= 1681 \end{aligned}$$

$$\begin{aligned} \text{Sol} &= \underline{100} \\ &= 100 \times 100 \\ &= 10000 \end{aligned}$$

$$\begin{aligned} \text{Sol} &= \underline{11} \\ &= 11 \times 11 \\ &= 121 \end{aligned}$$

$$\begin{aligned} \text{Sol} &= \underline{19} \\ &= 19 \times 19 \\ &= 1061 \end{aligned}$$

$$\begin{aligned} \text{Sol} &= \underline{9} \\ &= 9 \times 9 \\ &= 81 \end{aligned}$$

$$\begin{aligned} \text{Sol} &= \underline{25} \\ &= 25 \times 25 \\ &= 625 \end{aligned}$$

2) Test whether the following numbers are perfect squares or not.

$$\begin{aligned} \text{Sol} &= 59 \\ &= 59 \times 1 \end{aligned}$$

We can see that each factor ~~factor~~ is not a perfect square

$$\begin{aligned} \text{Sol: } &= 625 \\ &= \underline{5 \times 5} \times \underline{5 \times 5} \end{aligned}$$

5	625
5	125
5	25
5	5

We can see that each factor can be paired. So it is a perfect square.

$$\begin{aligned} \text{Sol} &= 225 \\ &= \underline{5 \times 5} \times \underline{3 \times 3} \end{aligned}$$

5	225
5	45
3	9
3	3

We can see that each factor can be paired so it is a perfect square.

$$\begin{aligned} \text{Sol: } & 196 \\ & = 196 \\ & = \underline{2 \times 2} \times \underline{7 \times 7} \end{aligned}$$

2	196
2	98
7	49
7	7
	1

We can see that each factor can be paired. So it is a perfect square.

$$\begin{aligned} \text{Sol } & 425 \\ & = 425 \\ & = 5 \times 5 \times 17 \end{aligned}$$

5	425
5	85
17	17
	1

We can see that each factor can't be paired. So it is not a perfect square.

$$\begin{aligned} &81 \\ \text{Sol} &= 81 \\ &= \underline{3 \times 3} \times \underline{3 \times 3} \end{aligned}$$

$$\begin{array}{r|l} 3 & 81 \\ 3 & 27 \\ 3 & 9 \\ 3 & 3 \end{array}$$

We can see that each factors can be paired. so it is a perfect square.

$$\begin{aligned} &121 \\ \text{Sol} &= \sqrt{121} \\ &= 11 \times 11 \end{aligned}$$

$$\begin{array}{r|l} 11 & 121 \\ 11 & 11 \\ & 1 \end{array}$$

We can see that each factors can be paired so it is a perfect s.

$$5^2 = 5 \times 5 = 25$$

$$9^2 = 9 \times 9 = 81$$

$$7^2 = 7 \times 7 = 49$$

$$11^2 = 11 \times 11 = 121$$

hence, the squares of all odd numbers are also odd numbers.

example 2: Without solving, separate the perfect squares of even numbers of the square numbers.

Sol

$$2500$$
$$= 2500$$
$$= 5 \times 5 \times 5 \times 5 \times 2 \times 2$$

5	2500
5	500
5	100
5	20
2	4
2	2

We can see that each factor can be paired. so it is a perfect square.

Sol:

Unit 5: Math Ex: 5-1

3) Find the square of proper fraction. Also compare them with itself.

$$\begin{aligned} & \frac{3}{4} \\ \text{Sol} &= \frac{3}{4} \\ &= \frac{3 \times 3}{4 \times 4} \\ &= \frac{9}{16} \\ &= \frac{9}{16} < \frac{3}{4} \end{aligned}$$

$$\begin{aligned} & \frac{5}{6} \\ \text{Sol} &= \frac{5}{6} \\ &= \frac{5 \times 5}{6 \times 6} \\ &= \frac{25}{36} \\ &= \frac{25}{36} < \frac{5}{6} \end{aligned}$$



$$\frac{4}{11}$$

Sol = $\frac{4}{11}$

$$= \frac{4 \times 4}{11 \times 11}$$

$$= \frac{16}{121}$$

$$= \frac{16}{121} < \frac{4}{11}$$

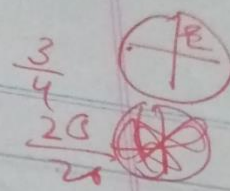
$$\frac{1}{7}$$

Sol = $\frac{1}{7}$

$$= \frac{1 \times 1}{7 \times 7}$$

$$= \frac{1}{49}$$

$$= \frac{1}{49} < \frac{1}{7}$$



Find the square of decimals and compare them with it self.

0.4

Sol = 0.4

$$= 0.4 \times 0.4$$

$$= 0.16$$

$$= 0.16 < 0.4$$

$$\begin{aligned} & 0.6 \\ \text{Sol} & = 0.6 \\ & = \frac{6}{10} \end{aligned}$$

$$\begin{aligned} \text{Square} & = \frac{6 \times 6}{10 \times 10} = \frac{36}{100} \\ & = \frac{36}{100} = 0.36 \end{aligned}$$

$$\text{Compare} = 0.36 < 0.6$$

$$\begin{aligned} & 0.12 \\ \text{Sol:} & = 0.12 \\ & = \frac{0.12}{100} \\ & = \frac{12}{100} \end{aligned}$$

$$\begin{aligned} \text{Square} & = \frac{12 \times 12}{100 \times 100} = \frac{144}{10000} \end{aligned}$$

$$= 0.0144$$

$$= 0.0144 < 0.12$$

$$0.05$$

$$|S| = 0.05$$

$$= \frac{0.05}{100}$$

$$= \frac{5 \times 5}{100 \times 100}$$

$$= \frac{25}{10000}$$

$$= \frac{0.0025}{10000}$$

$$= 0.0025$$

$$= 0.0025 < 0.05$$

Ex: 5.2:

Find the square roots of
following numbers

4

$$= 2 \times 2$$

$$\begin{aligned}\text{Square root} &= \sqrt{2 \times 2} \\ &= \sqrt{2^2} \\ &= 2\end{aligned}$$

$$c^2$$

$$c^2$$

$$\begin{aligned}\text{Square roots} &= \sqrt{c^2} \\ &= c\end{aligned}$$

$$36$$

$$\text{Sol} = 36$$

$$= 6 \times 6$$

$$\begin{aligned}\text{Square root} &= \sqrt{6^2} \\ &= 6\end{aligned}$$

$$(25)^2$$

$$\text{Sol} = (25)^2$$

$$\begin{aligned}\text{Square root} &= \sqrt{(25)^2} \\ &= 25\end{aligned}$$

Simplification

$$\begin{aligned} & 25 \\ \text{Sol} & = 25 \\ & = 5 \times 5 \end{aligned}$$

$$\begin{aligned} \text{Square root} & = \sqrt{5' \times 5'} \\ & = \sqrt{5^2} \\ & = 5 \end{aligned}$$

81

$$\text{Sol} = 81 = 9 \times 9$$

$$\begin{aligned} \text{Square root} & = \sqrt{9' \times 9'} \\ & = \sqrt{9^2} \\ & = 9 \end{aligned}$$

$$\begin{aligned} & y^2 \\ \text{Sol} & y^2 \\ \text{Square root} & = \sqrt{y^2} \\ & = y \end{aligned}$$

100

$$\text{Sol} = 100 = 10 \times 10$$

$$\begin{aligned} \text{Square root} & = \sqrt{10' \times 10'} \\ & = \sqrt{10^2} \\ & = 10 \end{aligned}$$

Find the square roots of the following numbers by prime factorization.

144

Sol = 144

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

= Square root =

$\sqrt{2^4} \sqrt{2^2} \sqrt{3^2}$

= $2 \times 2 \times 3$

= 12

2	144
2	72
2	36
2	18
3	9
3	3
	1

4356

Sol = 4356

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

= Square root

$\sqrt{2^2} \sqrt{3^2} \sqrt{11^2}$

= $2 \times 3 \times 11$

= 66

2	4356
2	2178
3	1089
3	363
11	121
11	11
	1

$$\begin{aligned}
 \text{Sol } &= 256 \\
 &= \underline{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2} \\
 &= \text{Square root} \\
 &= \sqrt{2^8} \sqrt{2^8} \sqrt{2^8} \sqrt{2^8} \\
 &= 2 \times 2 \times 2 \times 2 \\
 &= 16
 \end{aligned}$$

$$\begin{array}{r|l}
 2 & 256 \\
 \hline
 2 & 128 \\
 \hline
 2 & 64 \\
 \hline
 2 & 32 \\
 \hline
 2 & 16 \\
 \hline
 2 & 8 \\
 \hline
 2 & 4 \\
 \hline
 2 & 2 \\
 \hline
 & 1
 \end{array}$$

$$\begin{aligned}
 \text{Sol } &= 576 \\
 &= \underline{2 \times 2 \times 2 \times 2 \times 2 \times 2} \times \underline{3 \times 3} \\
 &= \text{Square root} \\
 &= \sqrt{2^8} \sqrt{2^8} \sqrt{2^8} \sqrt{3^2} \\
 &= 2 \times 2 \times 2 \times 3 \\
 &= 24
 \end{aligned}$$

$$\begin{array}{r|l}
 2 & 576 \\
 \hline
 2 & 288 \\
 \hline
 2 & 144 \\
 \hline
 2 & 72 \\
 \hline
 2 & 36 \\
 \hline
 2 & 18 \\
 \hline
 3 & 9 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

$$324$$

$$\text{Sol} = 324$$

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

Square root

$$\sqrt{2^2} \sqrt{3^4} \sqrt{3^2}$$

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

$$= 18$$

2	324
2	162
3	81
3	27
3	9
3	3
	1

$$441$$

$$= 441$$

$$= 3 \times 3 \times 7 \times 7$$

Square root

$$\sqrt{3^2} \sqrt{7^2}$$

$$= 3 \times 7$$

$$= 21$$

3	441
3	147
7	49
7	7
	1

$$\begin{aligned}
 \text{Sol } &= 729 \\
 &= \underline{3 \times 3 \times 3 \times 3 \times 3 \times 3} \\
 &\text{Square root} \\
 &\sqrt{3^6} \quad \sqrt{3^4} \quad \sqrt{3^2} \\
 &= 3 \times 3 \times 3 \\
 &= 27
 \end{aligned}$$

3	729
3	243
3	81
3	27
3	9
3	3
	1

$$\begin{aligned}
 \text{Sol } &= 1764 \\
 &= \underline{2 \times 2 \times 3 \times 3 \times 7 \times 7} \\
 &\text{Square root} \\
 &\sqrt{2^2} \quad \sqrt{3^2} \quad \sqrt{7^2} \\
 &= 2 \times 3 \times 7 \\
 &= 42
 \end{aligned}$$

2	1764
2	882
3	441
3	147
7	49
7	7
	1

196

Sol: 196

$$= 2 \times 2 \times 7 \times 7$$

= Square root

$$\sqrt{2^2} \quad \sqrt{7^2}$$

$$= 2 \times 7$$

$$= 14$$

2	196
2	98
7	49
7	7
	1

1225

Sol = 1225

$$= 5 \times 5 \times 7 \times 7$$

Square root

$$\sqrt{5^2} \quad \sqrt{7^2}$$

$$= 5 \times 7$$

$$= 35$$

5	1225
5	245
7	49
7	7
	1

square of an odd number is odd

$$\begin{aligned} \text{Sol} &= 10000 \\ &= \underline{5 \times 5 \times 5 \times 5 \times 2 \times 2} \times \\ &\quad \underline{2 \times 2} \end{aligned}$$

Square root

$$\begin{aligned} &\sqrt{5^4} \quad \sqrt{5^4} \\ &\sqrt{2^4} \quad \sqrt{2^4} \\ &= 5 \times 5 \times 2 \times 2 \\ &= 100 \end{aligned}$$

5	10000
5	2000
5	400
5	80
2	16
2	8
2	4
2	2
	1

Find the square roots of the following numbers by prime factorization.

$$196$$

$$= 2 \times 2 \times 7 \times 7$$

$$= \text{Square root}$$

$$\sqrt{2^2} \quad \sqrt{7^2}$$

$$= 2 \times 7$$

$$= 14$$

2	196
2	98
7	14
7	2
	1

$$1225$$

$$\text{Sol: } = 1225$$

$$= 5 \times 5 \times 7 \times 7$$

$$= \text{Square root}$$

$$\sqrt{5^2} \quad \sqrt{7^2}$$

$$= 5 \times 7$$

$$= 35$$

5	1225
5	245
7	35
7	5
	1

Unit 5

Exercises

Ex: 5.2

Find the square roots of following fractions.

$$\frac{49}{81}$$

$$\begin{array}{r|l} 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

Sol:- $= \frac{49}{81}$

$$\begin{array}{r|l} 9 & 81 \\ \hline 9 & 9 \\ \hline & 1 \end{array}$$

$$= \frac{7 \times 7}{9 \times 9}$$

Square root $\sqrt{\frac{7 \times 7}{9 \times 9}}$

$$= \sqrt{\frac{7^2}{9^2}}$$

$$= \sqrt{\left(\frac{7}{9}\right)^2}$$

$$= \frac{7}{9}$$

$$\begin{aligned} \text{Sol} &= \frac{2.25}{100} \\ &= \frac{225}{100} \\ &= \frac{5 \times 5 \times 3 \times 3}{100} \end{aligned}$$

$$\begin{aligned} &= \frac{10 \times 10}{100} \\ &= \frac{5^2 \times 3^2}{10^2} \end{aligned}$$

$$\text{Square root} = \sqrt{\frac{5^2 \times 3^2}{100^2}}$$

$$= \sqrt{\frac{(5 \times 3)^2}{100}}$$

$$= \frac{5 \times 3}{100}$$

$$= \frac{15}{100} = 0.15$$

$$\begin{array}{r|l} 5 & 225 \\ \hline 5 & 45 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

144

196

Sol: 144

196

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

$$2 \times 2 \times 7 \times 7$$

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

$$2^2 \times 7^2$$

$$\text{Square root} = \sqrt{2^2 \times 2^2 \times 3^2}$$

$$\sqrt{2^2 \times 7^2}$$

$$= \sqrt{(2 \times 2 \times 3)^2}$$

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

$$2 \times 7$$

$$= \underline{12}$$

$$\underline{14}$$

$$= \underline{6}$$

$$7$$

$$\begin{array}{r|l} 2 & 144 \\ \hline & 72 \\ 2 & 36 \\ 2 & 18 \\ 3 & 9 \\ 3 & 3 \\ & 1 \end{array}$$

$$0.0196$$

$$\text{Sol.} = \frac{0.0196}{10000}$$

$$= \frac{196}{10000}$$

$$= \frac{2 \times 2 \times 7 \times 7}{100 \times 100}$$

$$= \frac{2^2 \times 7^2}{(100)^2}$$

$$\text{Square root} = \sqrt{\frac{2^2 \times 7^2}{100^2}}$$

$$= \sqrt{\left(\frac{2 \times 7}{100}\right)^2}$$

$$= \frac{2 \times 7}{100}$$

$$= \frac{14}{100} = 0.14$$

2	196
2	98
7	49
7	7

WOW!!!

$$\begin{aligned}
 & \begin{array}{r} 784 \\ 441 \\ \hline \end{array} \\
 \text{So } & = \frac{784}{441} \\
 & = \frac{2 \times 2 \times 2 \times 2 \times 7 \times 7}{3 \times 3 \times 7 \times 7} \\
 & = \frac{2^2 \times 2^2 \times 7^2}{3^2 \times 7^2}
 \end{aligned}$$

$$\begin{aligned}
 \text{Square root} &= \sqrt{\frac{2^2 \times 2^2 \times 7^2}{3^2 \times 7^2}} \\
 &= \sqrt{\left(\frac{2 \times 2 \times 7}{3 \times 7}\right)^2} \\
 &= \frac{2 \times 2 \times 7}{3 \times 7}
 \end{aligned}$$

$$= \frac{28}{21} = \frac{4}{3} = 1\frac{1}{3}$$

$$\begin{array}{r} 21 \overline{) 28} \\ \underline{21} \\ 7 \\ \underline{7} \\ 0 \end{array}$$

$$\begin{array}{r} 2 \overline{) 784} \\ \underline{2} \\ 2 \\ \underline{2} \\ 0 \\ 2 \\ \underline{2} \\ 0 \\ 2 \\ \underline{2} \\ 0 \\ 7 \\ \underline{7} \\ 0 \\ 7 \\ \underline{7} \\ 0 \\ 1 \end{array}$$

$$\begin{array}{r} 3 \overline{) 441} \\ \underline{3} \\ 1 \\ \underline{3} \\ 1 \\ \underline{3} \\ 0 \\ 7 \\ \underline{7} \\ 0 \\ 7 \\ \underline{7} \\ 0 \\ 1 \end{array}$$

$$1 \frac{13}{36}$$

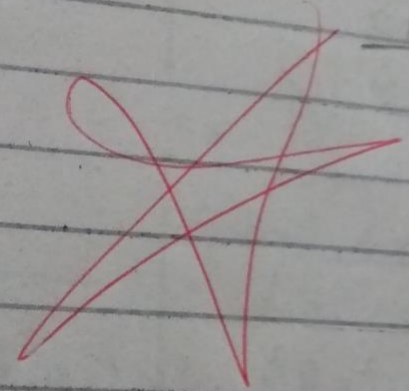
$$\text{Sol: } = 1 \frac{13}{36}$$

$$= \frac{49}{36}$$

$$= \frac{7 \times 7}{6 \times 6}$$

$$= \frac{7^2}{6^2}$$

$$6 \overline{) 7} \begin{array}{r} 1 \\ 6 \\ \hline 1 \end{array} \quad \begin{array}{r} 36 \\ 13 \\ \hline 49 \end{array}$$



$$\text{Square root} = \sqrt{\frac{7^2}{6}}$$

$$= \sqrt{\left(\frac{7}{6}\right)^2}$$

$$= \frac{7}{6}$$

$$= 1 \frac{1}{6}$$

$$\begin{aligned}
 \text{Sol} &= 3 \cdot 24 \\
 &= \frac{3 \cdot 24}{100} \\
 &= \frac{324}{100}
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{2 \times 2 \times 9 \times 9}{10 \times 10} \\
 &= \frac{2^2 \times 9^2}{10^2}
 \end{aligned}$$

$$\text{Square root} = \sqrt{\frac{2^2 \times 9^2}{10^2}}$$

$$= \sqrt{\left(\frac{2 \times 9}{10}\right)^2}$$

$$= \frac{2 \times 9}{10}$$

$$= \frac{18}{10}$$

$$\begin{array}{r|l}
 2 & 324 \\
 \hline
 2 & 162 \\
 \hline
 9 & 81 \\
 \hline
 9 & 9 \\
 \hline
 & 1
 \end{array}$$

$$\begin{array}{r|l}
 & 1 \\
 \hline
 5 & 9 \\
 & 5 \\
 \hline
 & 4
 \end{array}$$

Unit 5:-

Ex:5.2

Find the square root of the following fraction.

$$12.25$$
$$= \frac{12.25}{100}$$

$$= \frac{1225}{100}$$

Square root $\sqrt{\frac{5 \times 5 \times 7 \times 7}{10 \times 10}}$

$$= \sqrt{\frac{5^2 \times 7^2}{10^2}}$$

$$= \sqrt{\frac{35^2}{10}}$$

$$= \frac{5 \times 7}{10}$$

$$= \frac{35}{10}$$

$$= 3.5$$

5	1225
5	245
7	49
7	7
	1

$$3 \overline{) 325}$$

$$900$$

$$S_a = \frac{3025}{900}$$

$$= 5 \times 5 \times 11 \times 11$$

$$\text{Square root} = \sqrt{5^2 \times 11^2}$$

$$= \sqrt{27 \times 5^2 \times 3^2}$$

$$= \sqrt{(5 \times 11)^2}$$

$$= \sqrt{(2 \times 5 \times 3)^2}$$

$$30 \overline{) 55}$$

$$30$$

$$25$$

$$6 \overline{) 11}$$

$$6$$

$$5$$

$$59.29$$

$$S_d = 59.29$$

$$= 59.29$$

$$100$$

$$= 5929$$

$$100$$

$$\text{Square root} =$$

$$\sqrt{7 \times 7 \times 11 \times 11}$$

$$10 \times 10$$

$$31 \overline{) 900}$$

$$2700$$

$$325$$

$$3025$$

$$5 \overline{) 3025}$$

$$5 \overline{) 605}$$

$$11 \overline{) 121}$$

$$7 \overline{) 5929}$$

$$7 \overline{) 847}$$

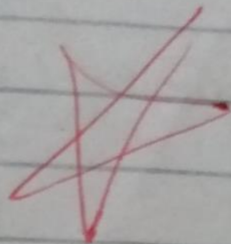
$$11 \overline{) 121}$$

$$11 \overline{) 11}$$

$$= \sqrt{\frac{7^2 \times 11^2}{10^2}}$$

$$= \sqrt{\left(\frac{7 \times 11}{10}\right)^2}$$

$$= \frac{77}{10} = 7.7$$



$$\begin{array}{r} 324 \\ 252 \\ \hline 576 \end{array}$$

$$\begin{array}{r} 1 \ 252 \\ \hline 324 \end{array}$$

$$\text{ol: } \begin{array}{r} = 576 \\ \hline 324 \end{array}$$

$$= \frac{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3}{2 \times 2 \times 9 \times 9}$$

$$\text{Square root} = \sqrt{\frac{2^2 \times 2^2 \times 2^2 \times 3^2}{2^2 \times 9^2}}$$

$$= \sqrt{\frac{(2 \times 2 \times 2 \times 3)^2}{2 \times 9}}$$

$$= \frac{2 \times 2 \times 2 \times 3}{18}$$

$$\begin{array}{l} \sqrt{576} \\ \sqrt{288} \\ \sqrt{144} \\ \sqrt{72} \\ \sqrt{36} \\ \sqrt{18} \\ \sqrt{9} \\ \sqrt{3} \end{array}$$

$$\begin{array}{r} 2 \ 324 \\ \hline 2 \ 162 \\ \hline 9 \ 81 \\ \hline 9 \ 9 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 3 \overline{) 11} \\ \underline{9} \\ 2 \\ \underline{3} \\ 11 \\ \underline{9} \\ 2 \end{array}$$

$$= \frac{24 + 4}{18 + 3}$$

$$= \frac{1}{3} \text{ Ans.}$$

$$1.5625$$

$$\text{Sol} = 1.5625$$

$$= \frac{1.5625}{10000}$$

$$= \frac{15625}{10000}$$

$$= \frac{5 \times 5 \times 5 \times 5 \times 5 \times 5}{100 \times 100}$$

$$\begin{aligned} \text{Square root} &= \sqrt{\frac{5^2 \times 5^2 \times 5^2}{100^2}} \\ &= \sqrt{\frac{(5 \times 5 \times 5)^2}{100^2}} \\ &= \frac{5 \times 5 \times 5}{100} \end{aligned}$$

5	15625
5	3125
5	625
5	125
5	25
5	5
	1

$$= \frac{125}{100} = 1.25$$

$$\begin{array}{r} 25 \\ \times 5 \\ \hline 125 \end{array}$$

Prove each of the following.

$$\sqrt{\frac{144}{9}} = \frac{\sqrt{144}}{\sqrt{9}}$$

Sol L.H.S

$$= \sqrt{\frac{144}{9}}$$

$$= \sqrt{\frac{2 \times 2 \times 2 \times 2 \times 3 \times 3}{3 \times 3}}$$

$$\text{Square root} = \sqrt{\frac{2^2 \times 2^2 \times 3^2}{3^2}}$$

$$= \sqrt{\frac{2 \times 2 \times 3}{3}}$$

$$= \frac{2 \times 2 \times 3}{3}$$

R.H.S

$$= \frac{\sqrt{144}}{\sqrt{9}}$$

$$= \frac{\sqrt{2 \times 2 \times 2 \times 2 \times 3 \times 3}}{\sqrt{3 \times 3}}$$

$$= \frac{\sqrt{2^2 \times 2^2 \times 3^2}}{\sqrt{3^2}}$$

$$= \frac{\sqrt{(2 \times 2 \times 3)^2}}{\sqrt{(3)^2}}$$

$$= \frac{2 \times 2 \times 3}{3}$$

$$= \frac{18}{3}$$

$$\begin{array}{r} 2 \overline{)144} \\ \underline{2 \ 72} \\ 2 \ 36 \\ \underline{2 \ 18} \\ 3 \ 9 \\ \underline{3 \ 3} \end{array}$$

Prove each of the following by prime factorization.

$$\sqrt{9 \times 36} = \sqrt{9} \times \sqrt{36}$$

Sol:-

$$\text{L.H.S} \rightarrow$$

$$= \sqrt{9 \times 36}$$

$$= \sqrt{324}$$

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

$$= \sqrt{2^2 \times 3^2 \times 3^2}$$

$$= \sqrt{(2 \times 3 \times 3)^2}$$

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

$$= 18$$

$$\text{R.H.S}$$

$$= \sqrt{9} \times \sqrt{36}$$

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

$$= \sqrt{3^2} \times \sqrt{3^2 \times 2^2}$$

$$= (3) \times \sqrt{(3 \times 2)^2}$$

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

$$= 18$$

$$\begin{array}{r} 536 \\ \times 9 \\ \hline 324 \end{array}$$

$$\begin{array}{r} 3 \overline{) 9} \\ 3 \overline{) 3} \\ \hline 1 \end{array}$$

$$\begin{array}{r} 3 \overline{) 36} \\ 3 \overline{) 12} \\ \hline 2 \overline{) 4} \\ 2 \overline{) 2} \\ \hline 1 \end{array}$$

It is proved that
L.H.S = R.H.S

$$\sqrt{144 \times 4} = \sqrt{144} \times \sqrt{4}$$

Sol:

L.H.S

R.H.S

$$= \sqrt{144 \times 4}$$

$$= \sqrt{144} \times \sqrt{4}$$

$$144$$

$$= \sqrt{576}$$

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

$$\times 4$$

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

$$\sqrt{2 \times 2}$$

$$576$$

$$3 \times 3$$

$$= \sqrt{2^2 \times 2^2 \times 2^2 \times 3^2}$$

$$= \sqrt{2^2 \times 2^2 \times 3^2} \times \sqrt{2^2}$$

$$= \sqrt{(2 \times 2 \times 2 \times 3)^2}$$

$$= \sqrt{(2 \times 2 \times 3)^2} \times 2$$

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

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

$$24$$

$$= 24$$

$$2 \overline{) 144}$$

$$2 \overline{) 72}$$

$$2 \overline{) 36}$$

$$2 \overline{) 18}$$

$$3 \overline{) 9}$$

$$3 \overline{) 3}$$

$$1$$

$$2 \overline{) 576}$$

$$2 \overline{) 288}$$

$$144$$

It is proved that
L.H.S = R.H.S

$$\sqrt{64 \times 25} = \sqrt{64} \times \sqrt{25}$$

L.H.S

$$= \sqrt{64 \times 25}$$

$$= \sqrt{1600}$$

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

$$= \sqrt{5^2 \times 2^2 \times 2^2 \times 2^2}$$

$$= \sqrt{(5 \times 2 \times 2 \times 2)^2}$$

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

$$= 40$$

R.H.S

$$= \sqrt{64} \times \sqrt{25}$$

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

$$\sqrt{5 \times 5}$$

$$= \sqrt{2^2 \times 2^2 \times 2^2} \times$$

$$\sqrt{5^2}$$

$$= \sqrt{(2 \times 2 \times 2)^2} \times$$

$$5$$

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

$$= 40$$

It is proved that

$$L.H.S = R.H.S$$

$$L.H.S = R.H.S.$$

$$\sqrt{\frac{256}{4}} = \frac{\sqrt{256}}{\sqrt{4}}$$

Sol

L.H.S

$$= \sqrt{\frac{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}{2 \times 2}}$$

$$\text{Square root} = \sqrt{\frac{2^2 \times 2^2 \times 2^2 \times 2^2}{2^2}}$$

$$= \sqrt{\frac{2 \times 2 \times 2 \times 2}{2}}$$

$$= \frac{2 \times 2 \times 2 \times 2}{2}$$

$$= \frac{16}{2}$$

$$= 8$$

$$= 8$$

R.H.S

$$= \sqrt{\frac{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}{2 \times 2 \times 2 \times 2}}$$

$$\sqrt{2 \times 2}$$

Square root

$$\sqrt{\frac{2^2 \times 2^2 \times 2^2 \times 2^2}{2^2}}$$

$$\sqrt{2^2}$$

$$= \sqrt{\frac{2 \times 2 \times 2 \times 2}{2}}$$

$$\sqrt{(2)^2}$$

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

$$\frac{16}{2}$$

$$= 8$$

$$\sqrt{\frac{484}{121}} = \frac{\sqrt{484}}{\sqrt{121}}$$

L.H.S. R.H.S.

$$= \frac{\sqrt{2 \times 2 \times 11 \times 11}}{11}$$

Square root =

$$= \frac{\sqrt{2^2 \times 11^2}}{11}$$

$$= \frac{\sqrt{(2 \times 11)^2}}{11}$$

$$= \frac{2 \times 11}{11}$$

$$= 2$$

$$= \frac{\sqrt{2 \times 2 \times 11 \times 11}}{\sqrt{11 \times 11}}$$

Square root

$$= \frac{\sqrt{2 \times 2 \times 11 \times 11}}{11}$$

$$= \frac{\sqrt{2^2 \times 11^2}}{11}$$

$$= \frac{\sqrt{(2 \times 11)^2}}{11}$$

$$= \frac{2 \times 11}{11}$$

$$= 2$$

$$L.H.S. = R.H.S.$$

2	484
2	242
11	121
11	11
	1

$$\begin{aligned}
 \text{Sol: -} &= \sqrt[2]{144} & \sqrt{144} \\
 &= \sqrt[2]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3} \\
 &= \sqrt[2]{2 \times 2 \times 2 \times 2 \times 3 \times 3} \\
 &= \text{Square root} = \sqrt[2]{\frac{2^2 \times 2^2 \times 2^2 \times 3^2}{2^2 \times 2^2 \times 3^2}} \\
 &= \sqrt[2]{\left(\frac{2 \times 2 \times 2 \times 3}{2 \times 2 \times 3}\right)^2} \\
 &= \sqrt[2]{\frac{2 \times 2 \times 2 \times 3}{2 \times 2 \times 3}} \\
 &= \frac{2 \times 2 \times 3}{2 \times 2 \times 3} \\
 &= 1 \times 1 \times 1 \\
 &= 2
 \end{aligned}$$

R.H.S =

$$\begin{aligned}
 &= \sqrt[2]{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3} \\
 &= \sqrt[2]{2 \times 2 \times 2 \times 2 \times 3 \times 3} \\
 &= \sqrt[2]{\frac{2^2 \times 2^2 \times 2^2 \times 3^2}{2^2 \times 2^2 \times 3^2}}
 \end{aligned}$$

$$= \frac{\sqrt{(2 \times 2 \times 2 \times 3)^2}}{\sqrt{(2 \times 2 \times 3)^2}}$$

=

$$\sqrt{2 \times 2 \times 2 \times 3}$$

$$\sqrt{2 \times 2 \times 3}$$

$$= \frac{\cancel{24} \times \cancel{6}}{\cancel{12} \times 6}$$

$$= 2$$

$$L.H.S = R.H.S$$