

## EXERCISE 3.8

Find the square root of each of the following correct to three places of decimal.

(i) 5 (ii) 7

(iii) 17 (iv) 20

(v) 66 (vi) 427

(vii) 1.7 (viii) 23.1

(ix) 2.5 (x) 237.615

(xi) 15.3215 (xii) 0.9

(xiii) 0.1 (xiv) 0.016

(xv) 0.00064 (xvi) 0.019

(xvii)  $\frac{7}{8}$  (xviii)  $\frac{5}{12}$

(xix)  $2\frac{1}{2}$  (xx)  $287\frac{5}{8}$

**Solution:**

(i) 5

By using long division method

$$\begin{array}{r}
 2.2360 \\
 2 \overline{) 5.000000} \\
 \underline{4} \phantom{000000} \\
 100 \phantom{00000} \\
 \underline{84} \phantom{00000} \\
 1600 \phantom{000} \\
 \underline{1329} \phantom{000} \\
 27100 \phantom{0} \\
 \underline{26796} \phantom{0} \\
 30400
 \end{array}$$

$\therefore$  the square root of 5 is 2.236

(ii) 7

By using long division method

**Myclass24**  
Your Class. Your Pace.

$$\begin{array}{r}
 2.6457 \\
 2 \overline{) 7.000000} \\
 \underline{4} \phantom{000000} \\
 46 \phantom{00000} \\
 \underline{300} \phantom{000} \\
 276 \phantom{000} \\
 524 \phantom{000} \\
 \underline{2400} \phantom{00} \\
 2096 \phantom{00} \\
 5285 \phantom{00} \\
 \underline{30400} \phantom{0} \\
 26425 \phantom{0} \\
 52927 \phantom{0} \\
 \underline{397500} \phantom{0} \\
 370489 \phantom{0} \\
 \underline{27011}
 \end{array}$$

∴ the square root of 7 is 2.646

(iii) 17

By using long division method

$$\begin{array}{r}
 4.123 \\
 4 \overline{) 17.000000} \\
 \underline{16} \phantom{000000} \\
 81 \phantom{00000} \\
 \underline{81} \phantom{00000} \\
 822 \phantom{00000} \\
 \underline{1900} \phantom{000} \\
 1644 \phantom{000} \\
 8243 \phantom{000} \\
 \underline{25600} \phantom{00} \\
 24729 \phantom{00} \\
 82431 \phantom{00} \\
 \underline{87100} \phantom{00} \\
 82431 \phantom{00} \\
 \underline{4669}
 \end{array}$$

∴ the square root of 17 is 4.123

(iv) 20

By using long division method

$$\begin{array}{r}
 4.4721 \\
 4 \overline{) 20.000000} \\
 \underline{16} \phantom{000000} \\
 84 \phantom{000000} \\
 \underline{400} \phantom{00000} \\
 336 \phantom{00000} \\
 887 \phantom{00000} \\
 \underline{6400} \phantom{000} \\
 6209 \phantom{000} \\
 8942 \phantom{000} \\
 \underline{19100} \phantom{00} \\
 17884 \phantom{00} \\
 89441 \phantom{00} \\
 \underline{121600} \phantom{00} \\
 89441 \phantom{00} \\
 \underline{32159}
 \end{array}$$

**Myclass24**  
Your Class. Your Pace.

∴ the square root of 20 is 4.472

(v) 66

$$\begin{array}{r}
 8.1240 \\
 \hline
 8 \overline{) 66.000000} \\
 \underline{64} \phantom{000000} \\
 161 \phantom{000000} \\
 \underline{161} \phantom{000000} \\
 1622 \phantom{000000} \\
 \underline{1622} \phantom{000000} \\
 16244 \phantom{000000} \\
 \underline{16244} \phantom{000000} \\
 162480 \phantom{000000} \\
 \underline{162480} \phantom{000000} \\
 62400
 \end{array}$$

∴ the square root of 66 is 8.124

(vi) 427

By using long division method

$$\begin{array}{r}
 20.6639 \\
 \hline
 2 \overline{) 427.000000} \\
 \underline{4} \phantom{000000} \\
 40 \phantom{000000} \\
 \underline{40} \phantom{000000} \\
 406 \phantom{000000} \\
 \underline{406} \phantom{000000} \\
 4126 \phantom{000000} \\
 \underline{4126} \phantom{000000} \\
 41323 \phantom{000000} \\
 \underline{41323} \phantom{000000} \\
 413269 \phantom{000000} \\
 \underline{413269} \phantom{000000} \\
 323679
 \end{array}$$

By using long division method

∴ the square root of 427 is 20.664

(vii) 1.7

By using long division method

**Myclass24**  
Your Class. Your Pace.

$$\begin{array}{r}
 1.3038 \\
 1 \overline{) 1.700000} \\
 \underline{1} \phantom{000000} \\
 23 \phantom{000000} \\
 \underline{0.70} \phantom{0000} \\
 69 \phantom{0000} \\
 \underline{260} \phantom{000} \\
 2603 \phantom{00} \\
 \underline{1000} \phantom{0} \\
 7809 \\
 \underline{26068} \\
 208544 \\
 \underline{10556}
 \end{array}$$

∴ the square root of 1.7 is 1.304

(viii) 23.1

By using long division method

$$\begin{array}{r}
 4.8062 \\
 4 \overline{) 23100000} \\
 \underline{16} \phantom{000000} \\
 88 \phantom{000000} \\
 \underline{710} \phantom{0000} \\
 960 \phantom{0000} \\
 \underline{600} \phantom{000} \\
 9606 \phantom{00} \\
 \underline{60000} \phantom{0} \\
 96122 \phantom{0} \\
 \underline{57636} \phantom{0} \\
 96122 \phantom{0} \\
 \underline{236400} \phantom{0} \\
 96122 \phantom{0} \\
 \underline{192244} \phantom{0} \\
 96122 \phantom{0} \\
 \underline{44156}
 \end{array}$$

∴ the square root of 23.1 is 4.806

(ix) 2.5

By using long division method

$$\begin{array}{r}
 1.5811 \\
 1 \overline{) 2.500000} \\
 \underline{1} \phantom{000000} \\
 25 \phantom{000000} \\
 \underline{150} \phantom{00000} \\
 308 \phantom{00000} \\
 \underline{2500} \phantom{000} \\
 3161 \phantom{000} \\
 \underline{2464} \phantom{00} \\
 3161 \phantom{00} \\
 \underline{3600} \phantom{0} \\
 31621 \phantom{0} \\
 \underline{3161} \phantom{0} \\
 31621 \phantom{0} \\
 \underline{43900} \phantom{0} \\
 31621 \phantom{0} \\
 \underline{31621} \phantom{0} \\
 2279
 \end{array}$$

∴ the square root of 2.5 is 1.581

(x) 237.615

	15.4147	
1	237.615000	
	1	
25	137	
	125	
304	1261	
	1216	
3081	4550	
	3081	
30824	146900	
	123296	
308287	2360400	
	2158009	
	202391	

∴ the square root of 237.615 is 15.415

(xi) 15.3215

By using long division method

	3.9142	
3	15321500	
	9	
69	632	
	621	
781	1115	
	781	
7824	33400	
	31296	
78282	210400	
	156564	
	53836	

By using long division method

∴ the square root of 15.3215 is 3.914

(xii) 0.9

By using long division method

$$\begin{array}{r}
 0.9486 \\
 0 \overline{) 0.900000} \\
 \underline{0} \\
 9 \ 090 \\
 \underline{81} \\
 184 \ 900 \\
 \underline{736} \\
 1888 \ 16400 \\
 \underline{15104} \\
 18966 \ 129600 \\
 \underline{113796} \\
 15804
 \end{array}$$

∴ the square root of 0.9 is 0.949

(xiii) 0.1

By using long division method

$$\begin{array}{r}
 0.3162 \\
 0 \overline{) 0.100000} \\
 \underline{0} \\
 3 \ 10 \\
 \underline{9} \\
 61 \ 100 \\
 \underline{61} \\
 626 \ 3900 \\
 \underline{3756} \\
 6322 \ 14400 \\
 \underline{12644} \\
 1756
 \end{array}$$

∴ the square root of 0.1 is 0.316

(xiv) 0.016

By using long division method

$$\begin{array}{r}
 0.1264 \\
 0 \overline{) 0.016000} \\
 \underline{0} \\
 1 \ 001 \\
 \underline{1} \\
 22 \ 060 \\
 \underline{44} \\
 246 \ 1600 \\
 \underline{1476} \\
 2524 \ 12400 \\
 \underline{10096} \\
 2304
 \end{array}$$

∴ the square root of 0.016 is 0.126

(xv) 0.00064

$$\begin{array}{r}
 0.0252 \\
 0 \overline{) 0.000640} \\
 \underline{0} \\
 0 \ 0.00 \\
 \underline{0} \\
 2 \ 006 \\
 \underline{4} \\
 45 \ 240 \\
 \underline{225} \\
 502 \ 1500 \\
 \underline{1004} \\
 496
 \end{array}$$

∴ the square root of 0.00064 is 0.025

(xvi) 0.019

By using long division method

$$\begin{array}{r}
 0.1378 \\
 0 \overline{) 0.019000} \\
 \underline{0} \\
 1 \ 01 \\
 \underline{1} \\
 23 \ 090 \\
 \underline{69} \\
 267 \ 2100 \\
 \underline{1869} \\
 2748 \ 23100 \\
 \underline{21984} \\
 1116
 \end{array}$$

By using long division method

∴ the square root of 0.019 is 0.138

(xvii) 7/8

By using long division method

$$\begin{array}{r}
 0.9354 \\
 0 \overline{) 0.875000} \\
 \underline{0} \\
 9 \overline{) 087} \\
 \underline{81} \\
 183 \overline{) 650} \\
 \underline{549} \\
 1865 \overline{) 10100} \\
 \underline{9325} \\
 18704 \overline{) 77500} \\
 \underline{74816} \\
 2684
 \end{array}$$

∴ the square root of  $7/8$  is 0.935

(xviii)  $5/12$

By using long division method

$$\begin{array}{r}
 0.6454 \\
 0 \overline{) 0.416666} \\
 \underline{0} \\
 6 \overline{) 41} \\
 \underline{36} \\
 124 \overline{) 566} \\
 \underline{496} \\
 1285 \overline{) 7066} \\
 \underline{6245} \\
 12904 \overline{) 64100} \\
 \underline{51616} \\
 12484
 \end{array}$$

∴ the square root of  $5/12$  is 0.645

(xix)  $2 \frac{1}{2}$

By using long division method

**Myclass24**  
Your Class. Your Pace.

$$\begin{array}{r}
 1.5811 \\
 \hline
 1 \quad \overline{) 2.500000} \\
 \underline{1} \phantom{000000} \\
 25 \phantom{00000} \\
 \underline{150} \phantom{0000} \\
 308 \phantom{0000} \\
 \underline{2500} \phantom{000} \\
 3161 \phantom{000} \\
 \underline{3600} \phantom{00} \\
 3161 \phantom{00} \\
 \underline{31621} \phantom{0} \\
 31621 \\
 \underline{43900} \phantom{0} \\
 31621 \\
 \underline{31621} \\
 12279
 \end{array}$$

∴ the square root of  $5/2$  is 1.581

(xx)  $287 \frac{5}{8}$

By using long division method

$$\begin{array}{r}
 16.9593 \\
 \hline
 1 \quad \overline{) 287.62} \\
 \underline{1} \phantom{000000} \\
 26 \phantom{00000} \\
 \underline{187} \phantom{0000} \\
 329 \phantom{0000} \\
 \underline{3162} \phantom{000} \\
 3385 \phantom{000} \\
 \underline{2961} \phantom{00} \\
 3385 \\
 \underline{20100} \phantom{00} \\
 33909 \\
 \underline{16925} \phantom{00} \\
 33909 \\
 \underline{317500} \phantom{00} \\
 339183 \\
 \underline{305181} \phantom{00} \\
 339183 \\
 \underline{1231900} \phantom{00} \\
 339183 \\
 \underline{1017549} \phantom{00} \\
 339183 \\
 \underline{214351}
 \end{array}$$

∴ the square root of  $2301/8$  is 16.960

**2. Find the square root of 12.0068 correct to four decimal places.**

**Solution:**

By using long division method



	3.46508
3	12.0068
	9
64	300
	256
686	4468
	4116
6925	35200
	34625
693008	5750000
	5544064
	205936

∴ the square root of 12.0068 is 3.4651

**3. Find the square root of 11 correct to five decimal places.**

**Solution:**

By using long division method

	3.316624
3	11.000000
	9
63	200
	189
661	1100
	661
6626	43900
	39756
66326	414400
	398196
663322	1620400
	1327444
6633244	29295600
	26532976
	2762624

∴ the square root of 11 is 3.31662

**4. Give that:  $\sqrt{2} = 1.414$ ,  $\sqrt{3} = 1.732$ ,  $\sqrt{5} = 2.236$  and  $\sqrt{7} = 2.646$ , evaluate each of the following:**

**(i)  $\sqrt{144/7}$**

**(ii)  $\sqrt{2500/3}$**

**Solution:**

**(i)  $\sqrt{144/7}$**

Now let us simplify the given equation

$$\begin{aligned}\sqrt{(144/7)} &= \sqrt{(12 \times 12)/7} \\ &= 12/2.646 \\ &= 4.535\end{aligned}$$

(ii)  $\sqrt{(2500/3)}$

Now let us simplify the given equation

$$\begin{aligned}\sqrt{(2500/3)} &= \sqrt{(5 \times 5 \times 10 \times 10)/3} \\ &= 5 \times 10/1.732 \\ &= 50/1.732 \\ &= 28.867\end{aligned}$$

**5. Given that  $\sqrt{2} = 1.414$ ,  $\sqrt{3} = 1.732$ ,  $\sqrt{5} = 2.236$  and  $\sqrt{7} = 2.646$  find the square roots of the following:**

(i)  $196/75$

(ii)  $400/63$

(iii)  $150/7$

(iv)  $256/5$

(v)  $27/50$

**Solution:**

(i)  $196/75$

Let us find the square root for  $196/75$

$$\begin{aligned}\sqrt{(196/75)} &= \sqrt{(196)/\sqrt{(75)}} \\ &= \sqrt{(14 \times 14)/\sqrt{(5 \times 5 \times 3)}} \\ &= 14/(5\sqrt{3}) \\ &= 14/(5 \times 1.732) \\ &= 14/8.66 \\ &= 1.617\end{aligned}$$

(ii)  $400/63$

Let us find the square root for  $400/63$

$$\begin{aligned}\sqrt{(400/63)} &= \sqrt{(400)/\sqrt{(63)}} \\ &= \sqrt{(20 \times 20)/\sqrt{(3 \times 3 \times 7)}} \\ &= 20/(3\sqrt{7}) \\ &= 20/(3 \times 2.646) \\ &= 20/7.938 \\ &= 2.520\end{aligned}$$

(iii)  $150/7$

Let us find the square root for  $150/7$

$$\begin{aligned}\sqrt{(150/7)} &= \sqrt{(150)} / \sqrt{(7)} \\ &= \sqrt{(3 \times 5 \times 5 \times 2)} / \sqrt{(7)} \\ &= (5\sqrt{3} \times \sqrt{2}) / (\sqrt{7}) \\ &= 5 \times 1.732 \times 1.414 / (2.646) \\ &= 12.245 / 2.646 \\ &= 4.628\end{aligned}$$

**(iv)** 256/5

Let us find the square root for 256/5

$$\begin{aligned}\sqrt{(256/5)} &= \sqrt{(256)} / \sqrt{(5)} \\ &= \sqrt{(16 \times 16)} / \sqrt{(5)} \\ &= 16 / (\sqrt{5}) \\ &= 16 / 2.236 \\ &= 7.155\end{aligned}$$

**(v)** 27/50

Let us find the square root for 27/50

$$\begin{aligned}\sqrt{(27/50)} &= \sqrt{(27)} / \sqrt{(50)} \\ &= \sqrt{(3 \times 3 \times 3)} / \sqrt{(5 \times 5 \times 2)} \\ &= (3\sqrt{3}) / (5\sqrt{2}) \\ &= (3 \times 1.732) / (5 \times 1.414) \\ &= 5.196 / 7.07 \\ &= 0.735\end{aligned}$$

