

EXERCISE 3.8
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1. 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) $7/8$ (xviii) $5/12$
(xix) $2\frac{1}{2}$ (xx) $287\frac{5}{8}$
Solution:
(i) 5

By using long division method

$$\begin{array}{r}
 2.2360 \\
 \overline{2 \ 5.000000} \\
 \underline{4} \\
 42 \\
 \underline{100} \\
 443 \\
 \underline{1600} \\
 4466 \\
 \underline{27100} \\
 44720 \\
 \underline{26796} \\
 44720 \\
 \underline{30400} \\

 \end{array}$$

 \therefore the square root of 5 is 2.236

(ii) 7

By using long division method

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

\therefore the square root of 7 is 2.646

(iii) 17

By using long division method

$$\begin{array}{r}
 4.123 \\
 4 \overline{) 17.000000} \\
 \underline{16} \\
 81 \\
 \underline{1.00} \\
 81 \\
 822 \\
 \underline{1900} \\
 1644 \\
 8243 \\
 \underline{25600} \\
 24729 \\
 82431 \\
 \underline{87100} \\
 82431 \\
 \underline{4669}
 \end{array}$$

\therefore the square root of 17 is 4.123

(iv) 20

By using long division method

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

∴ the square root of 20 is 4.472

(v) 66

By using long division method

$$\begin{array}{r}
 8.1240 \\
 8 \overline{) 66.000000} \\
 \underline{64} \\
 161 \\
 \underline{161} \\
 1622 \\
 \underline{1624} \\
 16244 \\
 \underline{16248} \\
 62400
 \end{array}$$

∴ the square root of 66 is 8.124

(vi) 427

By using long division method

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

∴ the square root of 427 is 20.664

(vii) 1.7

By using long division method

$$\begin{array}{r}
 1.3038 \\
 1 \overline{) 1.700000} \\
 \underline{1} \\
 23 \\
 \underline{0.70} \\
 69 \\
 \underline{100} \\
 260 \\
 \underline{0} \\
 2603 \\
 \underline{10000} \\
 7809 \\
 \underline{219100} \\
 26068 \\
 \underline{208544} \\
 10556
 \end{array}$$

∴ the square root of 1.7 is 1.304

(viii) 23.1

By using long division method

$$\begin{array}{r}
 4.8062 \\
 4 \overline{) 23100000} \\
 \underline{16} \\
 88 \\
 \underline{710} \\
 960 \\
 \underline{600} \\
 9606 \\
 \underline{57636} \\
 96122 \\
 \underline{236400} \\
 192244 \\
 \underline{44156}
 \end{array}$$

∴ the square root of 23.1 is 4.806

(ix) 2.5

By using long division method

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

∴ the square root of 2.5 is 1.581

(x) 237.615

By using long division method

	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

∴ 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

By using long division method

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

∴ the square root of 0.00064 is 0.025

(xvi) 0.019

By using long division method

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

∴ the square root of 0.019 is 0.138

(xvii) 7/8

By using long division method

	0.9354
0	0.875000
	0
9	087
	81
183	650
	549
1865	10100
	9325
18704	77500
	74816
	2684

∴ the square root of $7/8$ is 0.935

(xviii) $5/12$

By using long division method

	0.6454
0	0.416666
	0
6	41
	36
124	566
	496
1285	7066
	6245
12904	64100
	51616
	12484

∴ the square root of $5/12$ is 0.645

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

By using long division method

$$\begin{array}{r}
 1.5811 \\
 \hline
 1 \quad \overline{) 2.500000} \\
 \underline{1} \\
 150 \\
 \underline{125} \\
 308 \\
 \underline{2500} \\
 3161 \\
 \underline{3600} \\
 3161 \\
 \hline
 31621 \\
 \underline{43900} \\
 31621 \\
 \hline
 12279
 \end{array}$$

∴ the square root of $5/2$ is 1.581

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

By using long division method

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

∴ 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

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

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

Now let us simplify the given equation

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

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

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