Exercise 3.8

Q.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) 0.1 (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.

$$
\begin{array}{r|l}
 & 2.2360 \\
\hline
2 & 5.\overline{00}\,\overline{00}\,\overline{00} \\
+2 & 4 \\
\hline
42 & 1\overline{00} \\
+4 & 84 \\
\hline
443 & 1600 \\
+3 & 1329 \\
\hline
4466 & 27100 \\
+6 & 26796 \\
\hline
44720 & 30400
\end{array}
$$

$\therefore$ the $\sqrt{5} = 2.236$.

(ii) $\sqrt{7}$

By using long division Method.

	2·6457
2	7·00 00 00
+2	4
46	300
+6	276
524	2400
+4	2096
5285	30400
+5	26425
52927	397500
	370489
	27011

$\therefore \sqrt{7} = 2.646$

(iii) $\sqrt{17}$

By long division Method.

$\therefore \sqrt{17} = 4.123$

	4·123
4	17·00 00 00
+4	16
81	100
+1	81
822	1900
+2	1644
8243	25600
+3	24729
28461	87100
	82431
	4669

(iv) 20

	4.4721
4	20.000000
+4	16
84	400
+4	336
887	6400
+7	6209
8942	19100
+2	17884
89441	121600
	89441
	32159

$\therefore \sqrt{20} = 4.472$

(v) 66

	8.1240
8	66.000000
+8	64
161	200
+1	161
1622	3900
+2	3244
16244	65600
+4	64976
162480	62400

$\therefore \sqrt{66} = 8.124$

(vi) 427

	20.6639
2	427.000000
+2	4
406	2700
+6	2436
4126	26400
+6	24756
41323	164400
+3	123969
413269	4043100
	3719421
	323679

$\therefore \sqrt{427} = 20.664$

(vii) 1.7

By using long division method.

	1.3038
1	1.700000
+1	1
23	70
+3	69
2603	10000
+3	7809
26068	219100
	208544
	10556

$\therefore \sqrt{1.7} = 1.3038$

(viii) $\underline{23.1}$

$\therefore \sqrt{23.1} = 4.806$

	4.8062
4	$23.\overline{10}\,\overline{00}\,\overline{00}$
+4	16
88	710
+8	704
9606	60000
+6	57636
96122	236400
	192244
	44156

(ix) $\underline{2.5}$

$\therefore \sqrt{2.5} = 1.581$

	1.5811
1	$2.\overline{50}\,\overline{00}\,\overline{00}$
+1	1
25	150
+5	125
308	2500
+8	2464
3161	3600
+1	3161
3162	43900
	31621
	2279

(X) 237.615

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

(XI) 15.3215

$\sqrt{15.3215} = 3.914$

	3.9142
3	15.32150
+3	9
69	632
+9	621
781	1115
+1	781
7824	33400
+4	31296
78282	210400
	156564
	53836

(xii) 0.9

By using long division Method.

$\therefore \sqrt{0.9} = 0.9486$

	0.9486
0	0.$\overline{90}\,\overline{00}\,\overline{00}$
	0
9	90
+9	81
184	900
+4	736
1888	16400
+8	15104
18966	129600
	113796
	15804

$\therefore \sqrt{0.9} = 0.949$

(xiii) 0.1

By using long division Method

$\therefore \sqrt{0.1} = 0.316$

	0.3162
0	0.$\overline{10}\,\overline{00}\,\overline{00}$
	0
3	10
+3	9
61	100
+1	61
626	3900
+6	3756
6322	14400
	12644
	1756.

(*v) $\sqrt{0.00064}$

$\therefore \sqrt{0.00064} = 0.025$

	0252
0	0·00 06 40
	0
2	06
+2	4
45	240
+5	225
502	1500
	1004
	496

(xvi) $\sqrt{0.019} = 0.138$

	0·1378
1	0·01 90 00
+1	1
23	90
+3	69
267	2100
+7	1869
2748	23100
	21984
	1116

(xvii)

	0·9354
0	0·87 50 00
	0
9	87
	81
183	650
+3	549
1865	10100
+5	9325
18704	77500
	74816
	2684

$\therefore \sqrt{0.875} = 0.935$

(xviii) $\frac{5}{12}$

By using long division method.

$\therefore \frac{5}{12} = 0.416666...$

	0.6954
0	$0.\overline{416666}$
	0
6	41
+6	36
124	566
+4	496
1285	7066
+5	6245
12904	64100
	51616
	12484

$\therefore \sqrt{\frac{5}{12}} = 0.645$

(xix) $\sqrt{2\frac{1}{2}} = \sqrt{\frac{5}{2}} = \sqrt{2.5}$

$\therefore \sqrt{2.5} = 1.581$

	1.5811
1	$\overline{2}.\overline{500000}$
+1	1
25	150
+5	125
308	2500
+8	2464
3161	3600
+1	3161
31621	43900
	31621
	12279

(xx) $\sqrt{287\frac{5}{8}} = \sqrt{287.62}$

```
                16.9593
          ┌──────────────
      1   | 287.620000
          |  1
     ─────┼──────────────
     26   |  187
          |  156
     ─────┼──────────────
    329   |  3162
          |  2961
    ──────┼──────────────
   3385   |  20100
          |  16925
   ───────┼──────────────
  33909   |  317500
          |  305181
  ────────┼──────────────
 339183   |  1231900
          |  1017549
          |
  ────────┼──────────────
          |  214351
```

$\therefore \sqrt{287.62} = 16.960$

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

Solution

$\therefore \sqrt{12.0068} = 3.4650$

```
                3.46508
          ┌──────────────
      3   | 12.0068
          |  9
     ─────┼──────────────
     64   |  300
          |  256
     ─────┼──────────────
    686   |  4468
          |  4116
    ──────┼──────────────
   6925   |  35200
          |  34625
   ───────┼──────────────
  69300 8 |  5750000
          |  5544064
          |
  ────────┼──────────────
          |  205936
```

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

Solution By long division Method

$$
\begin{array}{r|l}
 & 3.316624 \\
\hline
3 & 11.000000 \\
 & 9 \\
\hline
63 & 200 \\
 & 189 \\
\hline
661 & 1100 \\
 & 661 \\
\hline
6626 & 43900 \\
 & 39756 \\
\hline
66326 & 414400 \\
 & 398196 \\
\hline
663322 & 1620400 \\
 & 1327444 \\
\hline
6633244 & 29295600 \\
 & 26532976 \\
\hline
 & 2762624
\end{array}
$$

$\therefore \sqrt{11} = 3.31662$

Q.4 Given that $\sqrt{2} = 1.414$, $\sqrt{3} = 1.732$, $\sqrt{5} = 2.236$ & $\sqrt{7} = 2.646$. evaluate each of the following.

(i) $\sqrt{\frac{144}{7}}$ (ii) $\sqrt{\frac{2500}{3}}$

Solution

(i) $\sqrt{\frac{144}{7}} = \frac{\sqrt{144}}{\sqrt{7}} = \frac{12}{2.646} = 4.535$

(ii) $\sqrt{\frac{2500}{3}} = \frac{\sqrt{2500}}{\sqrt{3}} = \frac{50}{\sqrt{3}} = \frac{50}{1.732} = 28.867$

Q.5 Given that $\sqrt{2} = 1.414$, $\sqrt{3} = 1.732$, $\sqrt{5} = 2.236$.

$\sqrt{7} = 2.646$, find the value of square roots of the following.

(i) $\frac{196}{75}$ (ii) $\frac{400}{63}$ (iii) $\frac{150}{7}$ (iv) $\frac{256}{5}$

(v) $\frac{27}{50}$

Sol (i) $\sqrt{\frac{196}{75}} = \frac{\sqrt{196}}{\sqrt{75}} = \frac{14}{\sqrt{5\times5\times3}} = \frac{14}{5\sqrt{3}}$

$= \frac{14}{5\times1.732} = \frac{14}{8.66} = 1.617$

(ii) $\sqrt{\frac{400}{63}} = \frac{\sqrt{400}}{\sqrt{63}} = \frac{20}{\sqrt{3\times3\times7}} = \frac{20}{3\sqrt{7}} = \frac{20}{3\times2.646}$

$= \frac{20}{7.938} = 2.520$

(iii) $\sqrt{\frac{150}{7}} = \frac{\sqrt{3\times5\times5\times2}}{\sqrt{7}} = \frac{5\sqrt{3}\times\sqrt{2}}{\sqrt{7}}$

$= \frac{5\times1.732\times1.414}{2.646}$

$= \frac{12.245}{2.646} = 4.628$

(iv) $\sqrt{\frac{256}{5}} = \frac{\sqrt{16\times16}}{\sqrt{5}} = \frac{16}{\sqrt{5}} = \frac{16}{2.236} = 7.155$

(v) $\sqrt{\frac{27}{50}} = \frac{\sqrt{3\times3\times3}}{\sqrt{5\times5\times2}} = \frac{3\sqrt{3}}{5\sqrt{2}} = \frac{3\times1.732}{5\times1.414}$

$= \frac{5.196}{7.07} = 0.735$