

Exercise 3.5

Q.1 Find the square root of each of the following by long division Method.

(i) 12544

(ii) 97344

(iii) 286225

(iv) 390625

(v) 363609

(vi) 974169

(vii) 120409

(viii) 1471369

(ix) 291600

(x) 9653449

(xi) 1745041

(xii) 4008004

(xiii) 20657025

(xiv) 152547201

(xv) 20421361

(xvi) 62504836

(xvii) 82264900

(xviii) 3226694416

(xix) 6407522209

(xx) 3915380329

Solution (i)

$$\begin{array}{r}
 112 \\
 \hline
 1 \overline{) 12544} \\
 \underline{+1} \quad -1 \\
 21 025 \\
 \underline{+1} \quad -21 \\
 222 444 \\
 \underline{-444} \\
 0
 \end{array}$$

$$\therefore \sqrt{12544} = 112$$

(ii) 97344

$\therefore \sqrt{97344} = 312$

	312
3	<u>97344</u>
+3	9
61	<u>073</u>
+1	-61
622	<u>1244</u>
	1244
	X

(iii) 286225

$\therefore \sqrt{286225} = 535$

	535
5	<u>286225</u>
+5	25
103	<u>362</u>
+3	309
1065	<u>5325</u>
	5325
	0

(iv) 390625

	625
6	<u>390625</u>
+6	-36
122	<u>306</u>
+2	-244
1245	<u>6225</u>
	6225
	0

$\therefore \sqrt{390625} = 625$

(v) 363609

By long division method.

$$\begin{array}{r}
 603 \\
 6 \overline{) 363609} \\
 \underline{+6} \quad -36 \\
 1203 \\
 \underline{1203} \\
 03609 \\
 \underline{3609} \\
 0
 \end{array}$$

$$\therefore \sqrt{363609} = 603$$

(vi)

$$\begin{array}{r}
 987 \\
 9 \overline{) 974169} \\
 \underline{+9} \quad -81 \\
 188 \\
 \underline{188} \\
 1641 \\
 \underline{1641} \\
 0
 \end{array}$$

$$\therefore \sqrt{974169} = 987$$

(vii)

$$\begin{array}{r}
 347 \\
 3 \overline{) 120409} \\
 \underline{+3} \quad +9 \\
 964 \\
 \underline{964} \\
 256 \\
 \underline{256} \\
 0
 \end{array}$$

$$\therefore \sqrt{120409} = 347$$

(viii) 1471369

By using long division method.

	1213
1	1471369
+1	1
22	47
+2	-44
241	330
+1	-241
2423	7269
	7269
	0

$$\therefore \sqrt{1471369} = 1213$$

(ix)

	540
5	291600
+5	25
104	416
+4	416
1080	00
	00
	0

$$\therefore \sqrt{291600} = 540$$

(x)

	3107
3	9653449
+3	9
61	65
+1	-61
6207	43449
	43449
	0

$$\therefore \sqrt{9653449} = 3107$$

(xi)

	1321
1	1745041
+1	1
23	74
+3	-69
262	550
+2	524
2641	2641
	2641
	0

$$\therefore \sqrt{1745041} = 1321$$

(xii)

	2002
2	4008004
+2	4
40	000
	0
400	080
	0
4002	8004
	8004
	0

$$\therefore \sqrt{4008004} = 2002$$

(xiii)

	4545
4	20657025
+4	16
85	465
+5	425
904	4070
	3616
9085	45425
	45425

$$\therefore \sqrt{20657025} = 4545$$

(XIV)

	12351
1	152547201
+1	1
22	52
+2	-44
243	854
+3	729
2465	12572
+5	12325
24701	24701
	24701
	0

$$\therefore \sqrt{152547201} = 12351$$

(XV)

	4519
4	20421361
+4	16
85	442
+5	425
901	1713
+1	901
902	81261
	81261
	0

$$\therefore \sqrt{20421361} = 4519$$

(Xvi)

	7906
7	62504836
+7	49
149	1350
+9	1341
1580	948
15806	94836
	94836
	0

$$\therefore \sqrt{62504836} = 7906$$

(Xvii)

	9070
9	82264900
+9	81
1807	12649
+7	12649
18140	0

$$\therefore \sqrt{82264900} = 9070$$

(viii)

	56804
5	<u>3226694416</u>
+5	25
106	726
+6	636
1128	9069
+8	9024
11360	4544
+0	0
113604	454416
	454416
	0

$$\therefore \sqrt{3226694416} = 56804$$

(ix)

	80047
8	<u>6407522209</u>
+8	64
160	07
	0
1600	752
	00
16004	75222
+4	64016
160087	1120609
	1120609
	x

$$\therefore \sqrt{6407522209} = 80047$$

(xx)

$$\begin{array}{r}
 62573 \\
 \hline
 6 \quad \overline{3915380329} \\
 +6 \quad 36 \\
 \hline
 122 \quad 315 \\
 +2 \quad 244 \\
 \hline
 1245 \quad 07138 \\
 +5 \quad -6225 \\
 \hline
 12507 \quad 91303 \\
 +7 \quad -87549 \\
 \hline
 125143 \quad 0375429 \\
 \quad \quad 375429 \\
 \hline
 \quad \quad 0
 \end{array}$$

$$\therefore \sqrt{3915380329} = 62573$$

Q.2 Find the least number which must be subtracted from the following numbers to make them a perfect square.

(i) 2361

(ii) 194491

(iii) 26535

(iv) 16160

(v) 4401624

Solution

(I) 2361

By long division Method

$$\begin{array}{r}
 48 \\
 4 \overline{) 2361} \\
 \underline{+4} 16 \\
 88 761 \\
 \underline{704} \\
 57
 \end{array}$$

$\therefore$ 57 has to be subtracted to get perfect square.

(II) 194491

By long division Method.

$$\begin{array}{r}
 441 \\
 4 \overline{) 194491} \\
 \underline{+4} 16 \\
 84 344 \\
 \underline{+4} 336 \\
 881 891 \\
 \underline{881} \\
 10
 \end{array}$$

$\therefore$ 10 should be subtracted to get perfect square.

(iii)

	162
1	26535
+1	1
26	165
+6	156
322	935
	-644
	291

∴ 291 must be subtracted to get perfect square.

(iv)

	402
4	161605
+4	16
802	1605
	1604
	1

∴ 1 must be subtracted to get perfect square.

(v)

	2
2	4401624
+2	4
40	40
	0
409	4016
+9	3681
4188	33524
	33504
	20

∴ 20 must be subtracted to get perfect square.

Q.3 Find the least number which must be added to the following numbers to make them a perfect square.

- (i) 5607 (ii) 4931 (iii) 451500 (iv) 37460
(v) 506900

Solution: (i) By long division method

$$(74)^2 < 5607 < (75)^2$$

$$\therefore 75^2 = 5625$$

$$\therefore \text{required no.} = 5625 - 5607 = 18$$

hence, 18 should be added to get a perfect square.

	74	
7		5607
+7	-49	
144		707
+4		576
		131

(ii)

$$\therefore (70)^2 < 4931 < (71)^2$$

$$\therefore 71^2 = 5041$$

$$\text{hence, no. should be added} = 5041 - 4931 = 110$$

	70	
7		4931
+7	49	
140		31
		0
		31

(iii)

	2124	
2	4	515600
+2	+4	
41	51	
+1	-41	
422	1056	
+2	-844	
4244	21200	
	16796	
	4224	

$$\therefore (2124)^2 < 4515600 < (2125)^2$$

$$\therefore 2125^2 = 4515625$$

$$\text{Therefore required no. to be added} = 4515625 - 4515600 = 25$$

(iv)

	193	
1	3	7460
+1	1	
29	274	
+9	261	
383	1360	
	1149	
	211	

$$\therefore (193)^2 < 37460 < (194)^2$$

$$\therefore (194)^2 = 37636$$

$$\therefore \text{required no. to be added} = 37636 - 37460 = 176$$

(v)

	711	506900
7		49
+7		169
141		141
+1		2800
1421		1421
		1379

$$\therefore (711)^2 < 506900 < (712)^2$$

$$\Rightarrow \therefore (712)^2 = 506944$$

$$\therefore \text{required no} = 506944 - 506900 = 44.$$

Q.4 Find the greatest number of 5 digits which is a perfect square.

Solution: greatest number of 5 digits = 99999

	316	99999
3		9
+3		99
61		61
+1		3899
62		3766
		143

$\therefore$ required no.

$$= 99999 - 143$$

$$= 99856$$

Q.5 Find the least number of 4 digits which is a perfect square.

Sol: least number of 4 digits = 1000

$$\begin{array}{r}
 31 \\
 \hline
 3 \overline{) 1000} \\
 \underline{+3} 9 \\
 61 100 \\
 \underline{ 61} \\
 39
 \end{array}$$

$$\therefore (31)^2 < 1000 < (32)^2$$

$$\therefore (32)^2 = 1024$$

hence least 4 digit perfect square no = 1024.

Q.6 Find the least number of 6 digits which is a perfect square.

Sol: least number of 6 digits = 100000

$$\begin{array}{r}
 316 \\
 \hline
 3 \overline{) 100000} \\
 \underline{+3} 9 \\
 61 100 \\
 \underline{+1} 61 \\
 626 3900 \\
 \underline{ 3756} \\
 144
 \end{array}$$

$$\therefore (316)^2 < 100000 < (317)^2$$

$$\therefore (317)^2 = 100489$$

hence required no. = 100489

Q7 Find the greatest number of 4 digits which is a perfect square.

Sol: greatest number of 4 digits = 9999

$$\begin{array}{r} 99 \\ 9 \overline{) 9999} \\ \underline{+9} 81 \\ 189 1899 \\ \underline{1701} 198 \end{array}$$

$$\begin{aligned} \therefore \text{greatest 4 digit perfect square number} \\ &= 9999 - 198 \\ &= 9801 \end{aligned}$$

Q8 A General arranges his soldiers in rows to form a perfect square. He finds that in doing so, 60 soldiers were left out. If the total no. of soldiers be 8160, find the no. of soldiers in each row.

Sol:

$$\text{Total Soldiers} = 8160$$

$$\text{No. of soldier left out} = 60$$

$$\therefore \text{No. of soldiers arranged in square} = 8160 - 60 = 8100$$

$$\text{Let no. of rows} = x$$

$$\text{no. of soldiers in each row} = x$$

$$\therefore x^2 = 8100 = (90)^2$$

$$\Rightarrow x = 90$$

hence, there are 90 soldiers in each row.

Q.9 The area of square field is 60025 m^2 . A man cycles along its boundary at 18 km/hr . In how much time will he return at the starting point.

Solution:

$$\text{Area of field} = 60025 \text{ m}^2$$

$$(\text{side})^2 = 60025$$

$$\Rightarrow \text{side} = \sqrt{60025} = 245$$

	245	
2	60025	
+2	4	
44	200	
+4	176	
485	2425	
	2425	

Distance covered to take one

$$\text{round} = 4 \times 245 \text{ m} = 980 \text{ m}.$$

$$\begin{aligned}
 \therefore \text{Speed} &= 18 \text{ km/h} \\
 &= 18 \times \frac{5}{18} \text{ m/sec} \\
 &= 5 \text{ m/sec}
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Time taken} &= \frac{\text{Distance}}{\text{Speed}} = \frac{980}{5} \\
 &= 196 \text{ seconds} \\
 &= 3 \text{ min } 16 \text{ seconds.}
 \end{aligned}$$

Q.10 The cost of levelling and turfing a square lawn at Rs 2.50 per m^2 is Rs. 13322.50. Find the cost of fencing it at Rs. 5/metre.

Solution: Rate of levelling square lawn = Rs 2.5/ m^2
 Total Cost = Rs 13322.50.

$$\begin{aligned}
 \therefore \text{Area of lawn} &= \frac{13322.5}{2.5} \\
 (\text{side})^2 &= 5329 \text{ m}^2
 \end{aligned}$$

$$\Rightarrow \text{side} = \sqrt{5329} = 73 \text{ m.}$$

$$\text{Now Perimeter of square} = 4 \times 73 = 292 \text{ m.}$$

$$\begin{aligned}
 \therefore \text{Cost of fencing @ Rs 5/metre} &= 292 \times 5 \\
 &= \text{Rs } 1460
 \end{aligned}$$

Q.11 Find the greatest number of three digits which is a perfect square.

Sol:

greatest number of 3 digits = 999

$$\begin{array}{r} 31 \\ \hline 999 \\ - 38 \\ \hline 961 \end{array}$$

$$\therefore \text{Required no.} = 999 - 38 \\ = 961$$

Q.12 Find the smallest number which must be added to 2300 so that it becomes a perfect square.

Solution:

$$\begin{array}{r} 47 \\ \hline 4 \overline{) 2300} \\ +4 \quad 16 \\ \hline 87 \quad 700 \\ -609 \\ \hline 91 \end{array}$$

$$\therefore (47)^2 < 2300 < (48)^2$$

$$\text{Smallest no. to be added} = 2304 - 2300 \\ = 4$$