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) 12544
By using long division method

```
            112
     1 |  12544
       |  1
    21 |    25
       |    24
   222 |     444
       |     444
       |       0
```

∴ the square root of 12544
√12544 = 112

(ii) 97344
By using long division method

```
            312
     3 |  97344
       |  9
    61 |    73
       |    61
   622 |    1244
       |    1244
       |       0
```

∴ the square root of 97344
√97344 = 312

(iii) 286225

By using long division method

```
          535
    5 | 286225
        25
  103 |  362
         309
 1065 |  5325
         5325
            0
```

∴ the square root of 286225
√286225 = 535

(iv) 390625
By using long division method

```
          625
    6 | 390625
        36
  122 |  306
         244
 1245 |  6225
         6225
            0
```

∴ the square root of 390625
√390625 = 625

(v) 363609
By using long division method

```
          603
    6 | 363609
        36
 1203 |  3609
         3609
            0
```

∴ the square root of 363609
√36369 = 603

(vi) 974169
By using long division method

```
          987
   9  | 974169
      |   81
  188 |  1641
      |  1504
 1967 |   13769
      |   13769
      |       0
```

∴ the square root of 974169
√974169 = 987

(vii) 120409
By using long division method

```
          347
   3  | 120409
      |   9
  64  |  304
      |  256
  687 |   4809
      |   4809
      |      0
```

∴ the square root of 120409
√120409 = 347

(viii) 1471369
By using long division method

```
          1213
   1  | 1471369
      |   1
  22  |   47
      |   44
  241 |   313
      |   241
 2423 |    7269
      |    7269
      |       0
```

∴ the square root of 1471369
√1471369 = 1213

(ix) 291600
By using long division method

```
       540
   5 | 291600
       25
 104 | 416
       416
1080 |   00
         00
          0
```

∴ the square root of 291600

√291600 = 540

(x) 9653449

By using long division method

```
        3107
   3 | 9653449
       9
  61 | 65
       61
6107 |   43449
         43449
             0
```

∴ the square root of 9653449

√9653449 = 3107

(xi) 1745041

By using long division method

```
        1321
   1 | 1745041
       1
  23 | 74
       69
 262 |  550
        524
2641 |   2641
         2641
            0
```

∴ the square root of 1745041

√1745041 = 1321

(xii) 4008004

By using long division method

```
          2002
      ┌──────────
   2  │ 4008004
      │ 4
      ├──────────
  40  │  000
      │    0
      ├──────────
 400  │   080
      │     0
      ├──────────
4002  │  8004
      │  8004
      ├──────────
      │     0
```

∴ the square root of 4008004
√4008004 = 2002

(xiii) 20657025
By using long division method

```
          4545
      ┌──────────
   4  │ 20657025
      │ 16
      ├──────────
  85  │  465
      │  425
      ├──────────
 904  │   4070
      │   3616
      ├──────────
9085  │    45425
      │    45425
      ├──────────
      │        0
```

∴ the square root of 20657025
√20657025 = 4545

(xiv) 152547201
By using long division method

```
           12351
       ┌──────────
    1  │ 152547201
       │ 1
       ├──────────
   22  │  52
       │  44
       ├──────────
  243  │   854
       │   729
       ├──────────
 2465  │    12572
       │    12325
       ├──────────
27701  │     24701
       │     24701
       ├──────────
       │         0
```

∴ the square root of 152547201
√152547201 = 12351

(xv) 20421361
By using long division method

```
              4519
       ┌─────────────
    4  │ 20421361
       │ 16
       ├─────────────
   85  │   442
       │   425
       ├─────────────
  901  │    1713
       │     901
       ├─────────────
 9029  │     81261
       │     81261
       ├─────────────
       │         0
```

∴ the square root of 20421361
√20421361 = 4519

(xvi) 62504836
By using long division method

```
              7906
       ┌─────────────
    7  │ 62504836
       │ 49
       ├─────────────
  149  │  1350
       │  1341
       ├─────────────
 1580  │    948
       │
       ├─────────────
15806  │     94836
       │     94836
       ├─────────────
       │         0
```

∴ the square root of 62504836
√62504836 = 7906

(xvii) 82264900
By using long division method

```
              9070
        ┌─────────────
    9   │  82264900
        │  81
        ├─────────────
  180   │     126
        │
        ├─────────────
 1807   │   12649
        │   12649
        ├─────────────
14140   │        00
        │         0
        ├─────────────
        │         ×
```

∴ the square root of 82264900
√82264900 = 9070

(xviii) 3226694416
By using long division method

```
              56804
        ┌─────────────
    5   │  3226694416
        │  25
        ├─────────────
  106   │    726
        │    636
        ├─────────────
 1128   │     9069
        │     9024
        ├─────────────
11360   │      4544
        │         0
        ├─────────────
113604  │    454416
        │    454416
        ├─────────────
        │         ×
```

∴ the square root of 3226694416
√3226694416 = 56804

(xix) 6407522209
By using long division method

```
          80047
    8 | 6407522209
        64
  160 |   07
         0
 1600 |    752
         00
16004 |    75222
         64016
160087 |  1120609
          1120609
             ×
```

∴ the square root of 6407522209
√6407522209 = 80047

(xx) 3915380329
By using long division method

```
          62573
    6 | 3915380329
        36
  122 |   315
         244
 1245 |   07138
          6225
12507 |    91303
           87549
125143 |   0375429
           375429
             ×
```

∴ the square root of 3915380329
√3915380329 = 62573

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) 161605
(v) 4401624
Solution:
(i) 2361
By using long division method

```
       48
   ┌──────────
 4 │  2361
   │  16
   ├──────────
88 │    761
   │    704
   ├──────────
   │     57
```

∴ 57 has to be subtracted from 2361 to get a perfect square.

(ii) 194491
By using long division method

```
        441
    ┌──────────
  4 │ 194491
    │  16
    ├──────────
 84 │   344
    │   336
    ├──────────
881 │     891
    │     881
    ├──────────
    │      10
```

∴ 10 has to be subtracted from 194491 to get a perfect square.

(iii) 26535
By using long division method

```
        162
    ┌──────────
  1 │ 26535
    │  1
    ├──────────
 26 │  165
    │  156
    ├──────────
322 │    935
    │    644
    ├──────────
    │    291
```

∴ 291 has to be subtracted from 26535 to get a perfect square.

(iv) 161605
By using long division method

```
           402
      ┌─────────
    9 │ 161605
      │ 16
  ────┤
  802 │   1605
      │   1604
      ├─────────
      │      1
```

∴ 1 has to be subtracted from 161605 to get a perfect square.

(v) 4401624
By using long division method

```
             2098
       ┌──────────────
     2 │ 4401624
       │ 4
  ─────┤
    40 │   40
       │    0
  ─────┤
   409 │   4016
       │   3681
  ─────┤
  4188 │     33524
       │     33504
       ├──────────────
       │        20
```

∴ 20 has to be subtracted from 4401624 to get a perfect square.

**3. Find the least number which must be added to the following numbers to make
them a perfect square:**
(i) 5607
(ii)4931
(iii) 4515600
(iv) 37460
(v) 506900
Solution:
(i) 5607
By using long division method

```
          74
      ┌──────────
    7 │ 5607
      │ 49
      │ ────────
  144 │   707
      │   576
      │ ────────
      │   131
```

The remainder is 131
Since, $(74)^2 < 5607$
We take, the next perfect square number i.e., $(75)^2$
$(75)^2 = 5625 > 5607$
So, the number to be added $= 5625 - 5607 = 18$

(ii) 4931
By using long division method

```
          70
      ┌──────────
    7 │ 4931
      │ 49
      │ ────────
  140 │   31
      │    0
      │ ────────
      │   31
```

The remainder is 31
Since, $(70)^2 < 4931$
We take, the next perfect square number i.e., $(71)^2$
$(71)^2 = 5041 > 4931$
So, the number to be added $= 5041 - 4931 = 110$

(iii) 4515600
By using long division method

```
             2124
       ┌──────────────
     2 │ 4515600
       │ 4
       │ ──────────
    41 │   51
       │   41
       │ ──────────
   422 │  1056
       │   844
       │ ──────────
  4244 │   21200
       │   16976
       │ ──────────
       │    4224
```

The remainder is 4224
Since, $(2124)^2 < 4515600$
We take, the next perfect square number i.e., $(2125)^2$
$(2125)^2 = 4515625 > 4515600$
So, the number to be added $= 4515625 – 4515600 = 25$

(iv) 37460
By using long division method

```
            193
      ┌──────────
    1 │ 37460
      │ 1
      ├──────────
   29 │ 274
      │ 261
      ├──────────
  383 │   1360
      │   1149
      ├──────────
      │    211
```

The remainder is 211
Since, $(193)^2 < 37460$
We take, the next perfect square number i.e., $(194)^2$
$(194)^2 = 37636 > 37460$
So, the number to be added $= 37636 – 37460 = 176$

(v) 506900
By using long division method

```
              711
       ┌──────────────
     7 │ 506900
       │ 49
       ├──────────────
   141 │   169
       │   141
       ├──────────────
  1421 │    2800
       │    1421
       ├──────────────
       │    1379
```

The remainder is 1379
Since, $(711)^2 < 506900$
We take, the next perfect square number i.e., $(712)^2$
$(712)^2 = 506944 > 506900$
So, the number to be added $= 506944 – 506900 = 44$

4. Find the greatest number of 5 digits which is a perfect square.
Solution:
We know that the greatest 5 digit number is 99999
By using long division method

```
              316
        ┌─────────
      3 │ 99999
        │ 9
        ├─────────
     61 │    99
        │    61
        ├─────────
    626 │  3899
        │  3766
        ├─────────
        │   143
```

The remainder is 143
So, the greatest 5 digit perfect square number is:
99999 – 143 = 99856
∴ 99856 is the required greatest 5 digit perfect square number.

5. Find the least number of 4 digits which is a perfect square.
Solution:
We know that the least 4 digit number is 1000
By using long division method

```
             31
        ┌─────────
      3 │ 1000
        │ 9
        ├─────────
     61 │  100
        │   61
        ├─────────
        │   39
```

The remainder is 39
Since, $(31)^2 < 1000$
We take, the next perfect square number i.e., $(32)^2$
$(32)^2 = 1024 > 1000$
∴ 1024 is the required least number 4 digit number which is a perfect square.

6. Find the least number of six digits which is a perfect square.
Solution:
We know that the least 6 digit number is 100000
By using long division method

```
        316
   3 | 100000
        9
  61 |   100
          61
 626 |  3900
        3756
         144
```

The remainder is 144
Since, $(316)^2 < 100000$
We take, the next perfect square number i.e., $(317)^2$
$(317)^2 = 100489 > 100000$
∴ 100489 is the required least number 6 digit number which is a perfect square.

7. Find the greatest number of 4 digits which is a perfect square.
Solution:
We know that the greatest 4 digit number is 9999
By using long division method

```
        91
   9 | 9999
        81
  89 | 1899
       1701
        198
```

The remainder is 198
So, the greatest 4 digit perfect square number is:
9999 – 198 = 9801
∴ 9801 is the required greatest 4 digit perfect square number.

8. A General arranges his soldiers in rows to form a perfect square. He finds that in doing so, 60 soldiers are left out. If the total number of soldiers be 8160, find the number of soldiers in each row
Solution:
We know that the total number of soldiers = 8160
Number of soldiers left out = 60
Number of soldiers arranged in rows to form a perfect square = 8160 – 60 = 8100

∴ number of soldiers in each row = √8100
= √ (9×9×10×10)
= 9×10
= 90

9. The area of a square field is 60025m². A man cycles along its boundary at 18 Km/hr. In how much time will he return at the starting point?
Solution:
We know that the area of square field = 60025 m²
Speed of cyclist = 18 km/h
= 18 × (1000/60×60)
= 5 m/s²
Area = 60025 m²
Side² = 60025
Side = √60025
= 245
We know, Total length of boundary = 4 × Side
= 4 × 245
= 980 m
∴ Time taken to return to the starting point = 980/5
= 196 seconds
= 3 minutes 16 seconds

10. The cost of levelling and turning a square lawn at Rs 2.50 per m² is Rs13322.50 Find the cost of fencing it at Rs 5 per metre.
Solution:
We know that the cost of levelling and turning a square lawn = 2.50 per m²
Total cost of levelling and turning = Rs. 13322.50
Total area of square lawn = 13322.50/2.50
= 5329 m²
Side² = 5329
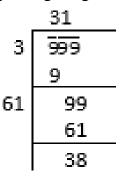Side of square lawn = √5329
= 73 m
So, total length of lawn = 4 × 73
= 292 m
∴ Cost of fencing the lawn at Rs 5 per metre = 292 × 5
= Rs. 1460

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

Solution:
We know that the greatest 3 digit number is 999
By using long division method

```
            31
        ┌──────
     3  │ 999
        │ 9
   ────────────
    61  │   99
        │   61
        ├──────
        │   38
```

The remainder is 38
So, the greatest 3 digit perfect square number is:
999 – 38 = 961
∴ 961 is the required greatest 3 digit perfect square number.

12. Find the smallest number which must be added to 2300 so that it becomes a perfect square.
Solution:
By using long division method let's find the square root of 2300

```
          47
      ┌──────
   4  │ 2300
      │ 16
  ────────────
  87  │  700
      │  700
      ├──────
      │   91
```

The remainder is 91
Since, $(47)^2 < 2300$
We take, the next perfect square number i.e., $(48)^2$
$(48)^2 = 2304 > 2300$
∴ The smallest number required to be added to 2300 to get a perfect square is
2304 – 2300 = 4