

Exercise 3.2

1. (a) 31
Unit digit = 1
 $(1)^2 = 1$
So, unit digit of square of 31 is 1.
 - (b) 122
Unit digit = 2
 $(2)^2 = 4$
So, unit digit of 122 is 4.
 - (c) 389
Unit digit = 9
 $(9)^2 = 81$
81 has 1 as unit digit.
So, unit digit of square of 389 is 1.
 - (d) 3253
Unit digit = 3
 $(3)^2 = 9$
So, unit digit of 3253 is 9.
 - (e) 464
Unit digit = 4
 $(4)^2 = 16$
16 has 6 as unit digit.
So, unit digit of square of 464 is 6.
 - (f) 43487
Unit digit = 7
 $(7)^2 = 49$
49 has 9 as unit digit.
So, unit digit of square of 43487 is 9.
 - (g) 12398
Unit digit = 8
 $(8)^2 = 64$
64 has 4 as unit digit.
So, unit digit of square of 12398 is 4.
 - (h) 111
unit digit 1
 $(1)^2 = 1$
So unit digit of square of 111 is 1.
2. We know that if a number ending with even number of zeros, the number must be a square number.
- and if a number ending with odd number of zeros, the number is never be a perfect square.
- | | |
|---|---------------------------------|
| In 16,0000, number of zeros = 3 (odd) | So, it is not a perfect square. |
| In 25000000, number of zeros = 6 (even) | So, it is a perfect square. |
| In 1000, Number of zeros = 3 (even) | So it is not a perfect square |
| In 100, number of zeros = 2 (even) | So it is a perfect square |
| In 10000 number of zeros = 4 (even) | So it is a perfect square |
| In 16,9000, Number of zeros = 3 (odd) | So, it is not a perfect square. |
3. (a) 13
 $\therefore$ It is an odd number so, its square must be odd.
 - (b) 64
 $\therefore$ It is an even number, so its square must be even.
 - (c) 100 odd number
So, Its square must be odd.
 - (d) 196 even, so its square number even.
 - (e) 459^2 odd number, so its square must be odd.
4. Square numbers from 1 to 400 are as follows :
- | | | | |
|----------------|----------------|----------------|----------------|
| $(1)^2 = 1$ | $(2)^2 = 4$ | $(3)^2 = 9$ | $(4)^2 = 16$ |
| $(5)^2 = 25$ | $(6)^2 = 36$ | $(7)^2 = 49$ | $(8)^2 = 64$ |
| $(9)^2 = 81$ | $(10)^2 = 100$ | $(11)^2 = 121$ | $(12)^2 = 144$ |
| $(13)^2 = 169$ | $(14)^2 = 196$ | $(15)^2 = 225$ | $(16)^2 = 256$ |

- $(17)^2 = 289$, $(18)^2 = 324$, $(19)^2 = 361$, $(20)^2 = 400$.
5. (a) $11^2 = 121$
 $101^2 = 10201$
 $1001^2 = 1002001$
 $10001^2 = 100020001$
 $100001^2 = 10000200001$
 $10000001^2 = 100000020000001$
- (b) $11^2 = 121$
 $101^2 = 10201$
 $10101^2 = 102030201$
 $1010101^2 = 1020304030201$
 $101010101^2 = 10203040504030201$
6. (a) $(25)^2 = (24)^2 + (25 + 24)(25 - 24)$ $(\because a^2 - b^2 = (a + b)(a - b))$
 $(49)(1) = 49$
 (b) $(57)^2 = (56)^2 + (57 + 56)(57 - 56)$ $(513)(1) = 113$
 (c) $(624)^2 = (623)^2 + (624 + 623)(624 - 623)$ $(1247)(1) = 1247$
 (d) $(1000)^2 = (999)^2 + (1000 + 999)(1000 - 999)$ $(1999)(1) = 1999$
 (e) $(1500)^2 = (1499)^2 + (1500 + 1499)(1500 - 1499)$ $(2999)(1) = 2999$
 (f) $(99)^2 = (98)^2 + (99 + 98)(99 - 98)$ $(197)(1) = 197$
7. (i) $m = 4$ then (ii) $m = 6$ then
 $2m = 2 \times 4 = 8$ $2m = 2 \times 6 = 12$
 $m^2 = 1 \times (4)^2 = 16$ $m^2 = 1 \times (6)^2 = 36$
 $m^2 = 1 \times (4)^2 = 16$ $m^2 = 1 \times (6)^2 = 36$
 $8, 15, 17$ $12, 35, 37$
8. $7^2 = 49$
 $67^2 = 4489$
 $667^2 = 44889$
 $6667^2 = 444889$
 $66667^2 = 4444889$

Exercise 3.3

1. (a) 9801

3	9801
3	3267
3	1089
3	363
11	121
11	11
	1

9801 $(3 \ 3) \ (3 \ 3) \ (11 \ 11)$
 Square root of 9801 $3 \ 3 \ 11$
 99

(b) 4624

2	4624
2	2312
2	1156
2	578
17	289
17	17
	1

4624 $(2 \ 2) \ (2 \ 2) \ (17 \ 17)$
 Square root of 4624 $2 \ 2 \ 17$
 68

(c) 7744

2	7744
2	3872
2	1936
2	968
2	484
2	242
11	121
11	11
	1

7744 (2 2) (2 2)
(2 2) (11 11)
2 2 11
square root of 7744 44

2. (a) 97344

	312
3	$\overline{9\ 73\ 44}$
3	-9
61	73
1	- 61
622	1244
	- 1244
	0

312
(c) 8464

	92
9	9464
+ 9	81
182	364
+ 2	364
184	0

92

(d) 11025

3	11025
3	3675
5	1225
5	245
7	49
7	7
	1

11025 (3 3) (5 5) (7 7)
Square root of 11025 3 5 7 105

(b) 974169

	987
9	$\overline{97\ 41\ 69}$
+ 9	- 81
188	1641
+ 8	- 1504
1967	13769
	- 13769
	0

987
(d) 720801

	849
8	$\overline{72\ 08\ 01}$
+ 8	- 64
164	808
+ 4	- 656
1689	15201
	- 15205
	0

849

3. (a) Let us find the square root of 2361 since 2361 is more the 48^2
 The next square number will be 49^2
 clearly 48^2 2361 49^2
 as 49 49 2401
 Required number 2401 2361 40
 obtained 2401 ; 40 added to 2361
 The required number is 40.

	48
4	$\overline{23\ 61}$
+ 4	- 16
88	761
+ 8	- 704
96	57

- (b) Let us find the square root of 645 since 645 is more than 25^2
 The next square number will be 26^2
 clearly 25^2 645 26^2
 as 26 26 676
 Required number 676 645 31
 obtained 676 ; 31 added to 645.
 The required numbers is 31.

	25
2	$\overline{6\ 45}$
+ 2	- 4
45	245
+ 5	- 225
50	20

- (c) Let us find the square rot of 1525
 Since 1525 is more than 39^2
 The next square number will be 40^2
 clearly 39^2 1525 40^2
 as 40 40 1600
 Required number 1600 1525 75
 obtained 1600 ; 75 added to 1525.

	39
3	$\overline{15\ 25}$
+ 3	- 9
69	625
+ 9	- 621
78	4

- (d) Let us find the square root of 194491
 Since 194491 is more than 441^2
 The next square number will be 442^2
 clearly 441^2 194491 442^2
 442 442 195364
 Required number
 195364 194491 873
 obtained 195364 ; 873 added to 194491

	441
4	$\overline{19\ 44\ 91}$
+ 4	- 16
84	344
+ 4	- 336
801	- 891
+ 1	- 881
882	10

- (e) Let us find the square root of 273682
 Since 273682 is more than 523^2
 The next square number will be 524^2
 clearly 523^2 273682 524^2
 524 525 274576
 Required number
 274576 273682 894
 obtained 274576 ; 894 added to 273682.

	523
5	$\overline{27\ 36\ 82}$
+ 5	- 25
102	236
+ 2	- 204
1043	3282
+ 3	- 3129
1046	153

4. (a) Let us find the square root of 5678.

Since 5678 is more than 75^2

the next square number will be 76^2

clearly 75^2 5678 76^2

As 76 76 5776

required number 5776 5678 98

obtain 5776, 98 added to 5678.

The required number is 98.

	75
7	$\overline{56\ 78}$
+ 7	- 49
145	778
	- 725
	53

- (b) Let us find the root of 9991.

Since 9991 is more than $(99)^2$

the next square number will be $(100)^2$

$(99)^2$ 9991 $(100)^2$

$(100)^2$ 100 100 10000

Required number 10000 9991 9

So, to obtain 10000, 9 must be added in 9991.

Hence, required number is 9.

	99
9	$\overline{99\ 91}$
+ 9	- 81
189	1891
	- 1701
	190

- (c) 4215

Let us find the root of 4215

Since, 4215 is more than $(64)^2$

the next square number will be $(65)^2$.

$$\therefore (64)^2 \quad 4215 \quad (65)^2$$

$(65)^2$ 4225

Required number 4225 4215 10

To obtain 4225, 10 must be added to 4215.

Hence, the required number is 10.

	64
6	$\overline{42\ 15}$
+ 6	- 36
124	615
	- 496
	119

- (d) 306452

Let us find the root of 306452

Since 306452 is more than $(553)^2$

the next square number will be $(554)^2$.

$(553)^2$ 306452 $(554)^2$

$(554)^2$ 306916

required number 306916 306452

464

So, to obtain 306916, 464 must be added to 306452.

Hence, the required number is 464.

	553
5	$\overline{30\ 64\ 52}$
+ 5	- 25
105	564
+ 5	- 525
1103	3952
	- 3309
	643

- (e) 92700

Let us find the square root of 92700.

Since 92700 is more than $(304)^2$,

the next square number will be $(305)^2$

305 305 93025

Required number 93025 92700 325

to obtain 93025, 325 must be added to 92700.

$\sqrt{93025}$ 305

	304
3	92700
+ 3	- 9
604	2700
+ 4	- 2416
	284

Hence, the required number is 325.

5. Greatest 4 digit number = 9999

Now we need to find the least number

which subtracted from 9999 to given a perfect square

Required number 9999 198 **9801**

$\therefore \sqrt{9801} \quad 99$

	99
9	99 99
+ 9	- 81
189	1899
+ 4	- 1701
	198

6. The least number of 6 digits = 100000

We observe that

$$(316)^2 \quad 100000 \quad (317)^2$$

the number to be added $(317)^2 \quad 100000$

$$100489 \quad 100000 \quad 489$$

Required perfect square 100000 489

$$100489$$

$$\sqrt{100489} \quad 317$$

Hence, the required number is 100489.

	316
3	$\overline{10 \ 00 \ 00}$
+ 3	- 9
61	100
+ 1	- 61
636	3900
	- 3816
	84

7. Area of a square field = 8649 m^2

$$(\text{side})^2 = 8649 \text{ m} = 93 \text{ m}$$

Perimeter of square $4 \times \text{side}$

$$4 \quad 93 = 372$$

Now, suppose length of rectangle $2x$

breadth of rectangle x

the perimeter of rectangle perimeter of squares (Given)

$$2(2x \ x) \quad 372 \text{ m}$$

$$4x \quad 2x \quad 372 \text{ m}$$

$$x \quad \frac{372}{6} \quad 62 \text{ m}$$

$$\text{length of rectangle } 62 \quad 2 \text{ m} = 124 \text{ m}$$

and breadth of rectangle = 62 m

$$\text{then area of rectangle } 124 \text{ m} \times 62 \text{ m} = 7688 \text{ m}^2.$$

8. First we need to find root of 9811.

This shows that $(99)^2$ is less than 9811 by 10.

So, the number of men left = 10

then, the number of man are arranged in rows

$$9811 \quad 10 \quad 9801$$

Number of men in each row x

and number of rows x

Then, $x \ x \ 9801$

$$x \quad \sqrt{9801} \quad \sqrt{99 \ 99}$$

So, number of men in each row 99

	93
9	$\overline{86 \ 49}$
+ 9	- 81
183	549
	- 549
	0

	45
4	$\overline{20 \ 25}$
+ 4	- 16
85	425
	- 425
	0

9. Area of square 2025 m^2
 side 45 m
 Thus dimension of a square is 45 m

	99
9	$\overline{99\ 11}$
+ 9	- 81
183	1711
	- 1710
	0

Exercise 3.4

1. (a) $\sqrt{\frac{441}{961}}$

	21
2	441
+ 2	- 4
41	41
+ 1	- 41
42	0

$$\sqrt{\frac{441}{961}} = \frac{\sqrt{441}}{\sqrt{961}}$$

$$\frac{21}{31}$$

(c) $\sqrt{6\frac{115}{289}}$ $\sqrt{\frac{1849}{289}}$

	43
4	1849
+ 4	- 16
83	249
+ 3	- 249
86	0

$$\sqrt{\frac{1849}{289}} = \frac{\sqrt{1849}}{\sqrt{289}}$$

$$\frac{43}{17}$$

(b) $\sqrt{\frac{7225}{1089}}$

	85
8	$\overline{72\ 25}$
+ 8	- 64
165	825
	- 825
	0

$$\sqrt{\frac{7225}{1089}} = \frac{\sqrt{7225}}{\sqrt{1089}}$$

$$\frac{85}{33}$$

(d) $\sqrt{\frac{998001}{5476}}$

	999
9	$\overline{99\ 80\ 01}$
+ 9	- 81
189	1880
+ 9	- 1701
1989	17901
+ 9	- 17901
1998	0

$$\sqrt{\frac{998001}{5476}} = \frac{\sqrt{998001}}{\sqrt{5476}}$$

$$\frac{999}{74}$$

	33
3	$\overline{10\ 89}$
+ 3	- 9
63	189
	- 189
	0

	74
7	$\overline{54\ 76}$
+ 7	- 49
144	576
+ 4	- 576
148	0

2. (a) $\sqrt{25 \ 169} \quad \sqrt{25} \quad \sqrt{169}$

	5
5	25
	- 25
	0

	13
1	169
+ 1	- 1
23	69
	- 69
	0

$$\sqrt{25} \quad \sqrt{169} \quad 5 \quad 13$$

(c) $\sqrt{25.6 \ 52.9} \quad \sqrt{1354.24}$

	36.8
3	13 54 . 24
+ 3	- 9
66	454
+ 6	- 396
728	5824
	5824
	0

$$\sqrt{1354.24} \quad 36.8$$

3. (a) 84.64

	9.2
9	84 . 64
+ 9	- 81
182	364
	- 364
	0

$$\sqrt{84.64} \quad 9.2$$

(b) $\sqrt{45} \quad \sqrt{20} \quad \sqrt{45 \ 20} \quad \sqrt{900}$

	30
3	900
+ 3	- 9
60	00
	- 00
	0

$$\sqrt{900} \quad 30$$

(d) $\sqrt{\frac{0.4225}{0.0169}} \quad \frac{\sqrt{0.4225}}{\sqrt{0.0169}}$

	0.65
3	0.42 25
+ 3	- 36
66	625
+ 6	- 625
728	0

	0.13
1	0.0169
+ 1	- 1
23	69
+ 3	- 69
26	0

$$\sqrt{\frac{0.4225}{0.0169}} \quad \frac{\sqrt{0.4225}}{\sqrt{0.0169}} \quad \frac{0.65}{0.13} \quad 5$$

(b) 180.0964

	13.42
3	1 80 . 09 64
+ 3	- 1
66	80
+ 6	- 69
728	1109
	1056
	5364
	- 5364
	0

$$\sqrt{180.0964} \quad 13.42$$

(c) 1785.0625

	42.25
4	17 85 . 06 25
+ 4	- 16
82	185
+ 2	- 164
842	2106
+ 2	- 1684
8445	42225
	- 42225
	0

$\sqrt{1785.0625}$ 42.25

(d) 0.104976

	0.324
3	0.10 49 76
+ 3	- 9
62	149
+ 2	- 124
644	2576
	2576
	0

$\sqrt{0.104976}$ 0.324

4. (a) 6.24

	2.499
4	6 . 24 00 00
+ 4	- 4
82	224
+ 2	- 176
842	4800
+ 2	- 4401
8445	39900
	- 34909
	499100
	- 449541
	49559

$\sqrt{6.24}$ 2.498

(b) 24.8

	4.9799
4	24 . 80 00 00 00
+ 4	- 16
82	880
+ 2	- 801
842	7900
+ 2	- 6909
8445	99100
	- 89541
	955900
	- 896301
	59599

$\sqrt{24.8}$ 4.980 (approx)

(c) 625.5956

	25.0119
2	625.59560000
+ 2	- 4
45	225
+ 5	- 225
500	059
+ 0	- 00
5001	5956
+ 1	- 5001

50021	95500
+ 1	- 50021
500229	4547900
	- 450261
	45389

$\sqrt{625.5956}$ 25.012 (aprox)

(d) 15525.28

	124.6004
1	155 25 28
+ 1	− 1
22	55
+ 2	− 44
244	1125
+ 4	− 976
2486	14928
+ 6	− 14916
24920004	12000000
	− 9996800
	2032000

$\sqrt{15525.28}$ 124.600 (approx)

5. (a) 3

	1.7320
1	3 . 00 00 00 00
+ 1	− 1
27	200
+ 7	− 189
343	1100
+ 3	− 1029
3462	7100
+ 2	− 6924
34640	17600
+ 0	− 0
34640	17600

$\sqrt{3}$ 1.732 (aprox)

(c) 125

	11.1803
1	12500000000
+ 1	− 1
21	025
+ 1	− 21

(b) 11

	3.3166
3	11 . 00 00 00
+ 3	− 9
63	200
+ 3	− 189
661	1100
+ 1	− 661
6626	43960
	− 39756
	4144

$\sqrt{11}$ 3.317 (aprox)

221	400
+ 1	– 221
2228	17900
+ 8	– 17824
22360	7600
+ 0	– 0
223603	760000
	– 670809
	89191

$$\sqrt{125} \quad 11.180(\text{approx})$$

(d) 3460

	588217
5	34 60 . 00 00
+ 5	– 25
108	960
+ 8	– 864
1168	9600
+ 8	– 9344
11762	25600
+ 2	– 23524
117641	207600
+ 1	– 117641
1176427	8995900
	– 8234989
	760911

$$\sqrt{3460} \quad 58.821(\text{approx})$$

6. Area of square = side $\times$ side

	20.63
2	425.5969
+ 2	– 4
40	25
	– 0
406	2559
+ 6	– 2436
4123	12369
	– 12369
	0

$$(\text{side})^2 = 425.5969 \text{ m}^2$$

$$\text{side} = \sqrt{425.5969} \text{ m}$$

$$= 20.63 \text{ m}$$

Length of each side = 20.63 m

MCQ's

1. (b) 2. (c) 3. (a) 4. (b) 5. (d) 6. (b)
7. (b) 8. (a) 9. (b) 10. (c)