Exercise 6.3

Question 1:

What could be the possible 'one's' digits of the square root of each of the following numbers:

(i) 9801 (ii) 99856 (iii) 998001 (iv) 657666025

Answer 1:

Since, Unit's digits of square of numbers are 0, 1, 4, 5, 6 and 9. Therefore, the possible unit's digits of the given numbers are:

(i) 1 (ii) 6 (iii) 1 (iv) 5

Question 2:

Without doing any calculation, find the numbers which are surely not perfect squares:

(i) 153 (ii) 257 (iii) 408 (iv) 441

Answer 2:

Since, all perfect square numbers contain their unit's place digits 0, 1, 4, 5, 6 and 9.

(i) But given number 153 has its unit digit 3. So it is not a perfect square number.
(ii) Given number 257 has its unit digit 7. So it is not a perfect square number.
(iii) Given number 408 has its unit digit 8. So it is not a perfect square number.
(iv) Given number 441 has its unit digit 1. So it would be a perfect square number

Question 3:

Find the square roots of 100 and 169 by the method of repeated subtraction.

Answer 3:

By successive subtracting odd natural numbers from 100,

100 – 1 = 99 99 – 3 = 96 96 – 5 = 91 91 – 7 = 84
84 – 9 = 75 75 – 11 = 64 64 – 13 = 51 51 – 15 = 36
36 – 17 = 19 19 – 19 = 0

This successive subtraction is completed in 10 steps. Therefore $\sqrt{100} = 10$

By successive subtracting odd natural numbers from 169,

169 – 1 = 168 168 – 3 = 165 165 – 5 = 160 160 – 7 = 153
153 – 9 = 144 144 – 11 = 133 133 – 13 = 120 120 – 15 = 105
105 – 17 = 88 88 – 19 = 69 69 – 21 = 48 48 – 23 = 25
25 – 25 = 0

This successive subtraction is completed in 13 steps. Therefore $\sqrt{169} = 13$

Question 4:

Find the square roots of the following numbers by the Prime Factorization method:

(i) 729 (ii) 400 (iii) 1764 (iv) 4096 (v) 7744
(vi) 9604 (vii) 5929 (viii) 9216 (ix) 529 (x) 8100

Answer 4:

(i) 729

$\sqrt{729} = \sqrt{3\times3\times3\times3\times3\times3}$

= 3 x 3 x 3

= 27

3	729
3	243
3	81
3	27
3	9
3	3
	1

(ii) 400

$\sqrt{400} = \sqrt{2\times2\times2\times2\times5\times5}$

= 2 x 2 x 5

= 20

2	400
2	200
2	100
2	50
5	25
5	5
	1

(iii) 1764

$\sqrt{1764} = \sqrt{2\times2\times3\times3\times7\times7}$

= 2 x 3 x 7

= 42

2	1764
2	882
3	441
3	147
7	49
7	7
	1

(iv) 4096

$\sqrt{4096} = \sqrt{2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2}$

= 2 x 2 x 2 x 2 x 2 x 2

= 64

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

(v) 7744

$\sqrt{7744} = \sqrt{2\times2\times2\times2\times2\times2\times11\times11}$

= 2 x 2 x 2 x 11

= 88

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

(vi) 9604

$\sqrt{9604} = \sqrt{2\times2\times7\times7\times7\times7}$

= 2 x 7 x 7

= 98

2	9604
2	4802
7	2401
7	343
7	49
7	7
	1

(vii) 5929

$\sqrt{5929} = \sqrt{7\times7\times11\times11}$

= 7 x 11

= 77

7	5929
7	847
11	121
11	11
	1

(viii) 9216

$\sqrt{9216} = \sqrt{2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times3\times3}$

= 2 x 2 x 2 x 2 x 2 x 3

= 96

2	9216
2	4608
2	2304
2	1152
2	576
2	288
2	144
2	72
2	36
2	18
3	9
3	3
	1

(ix) 529

$\sqrt{529} = \sqrt{23 \times 23}$

$= 23$

23	529
23	23
	1

(x) 8100

$\sqrt{8100} = \sqrt{2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5}$

$= 2 \times 3 \times 3 \times 5$

$= 90$

2	8100
2	4050
3	2025
3	675
3	225
3	75
5	25
5	5
	1

Question 5:

For each of the following numbers, find the smallest whole number by which it should be multiplied so as to get a perfect square number. Also, find the square root of the square number so obtained:

(i) 252 (ii) 180

(iii) 1008 (iv) 2028

(v) 1458 (vi) 768

Answer 5:

(i) $252 = 2 \times 2 \times 3 \times 3 \times 7$

Here, prime factor 7 has no pair. Therefore 252 must be multiplied by 7 to make it a perfect square.

$\therefore$ $252 \times 7 = 1764$

And $\sqrt{1764} = 2 \times 3 \times 7 = 42$

2	252
2	126
3	63
3	21
7	7
	1

(ii) $180 = 2 \times 2 \times 3 \times 3 \times 5$

Here, prime factor 5 has no pair. Therefore 180 must be multiplied by 5 to make it a perfect square.

$\therefore$ $180 \times 5 = 900$

And $\sqrt{900} = 2 \times 3 \times 5 = 30$

2	180
2	90
3	45
3	15
5	5
	1

(iii) $1008 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7$

Here, prime factor 7 has no pair. Therefore 1008 must be multiplied by 7 to make it a perfect square.

$\therefore$ $1008 \times 7 = 7056$

And $\sqrt{7056} = 2 \times 2 \times 3 \times 7 = 84$

2	1008
2	504
2	252
2	126
3	63
3	21
7	7
	1

(iv) $2028 = 2 \times 2 \times 3 \times 13 \times 13$

Here, prime factor 3 has no pair. Therefore 2028 must be multiplied by 3 to make it a perfect square.

$\therefore$ $2028 \times 3 = 6084$

And $\sqrt{6084} = 2 \times 2 \times 3 \times 3 \times 13 \times 13 = 78$

2	2028
2	1014
3	507
13	169
13	13
	1

(v) $1458 = 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

Here, prime factor 2 has no pair. Therefore 1458 must be multiplied by 2 to make it a perfect square.

$\therefore$ $1458 \times 2 = 2916$

And $\sqrt{2916} = 2 \times 3 \times 3 \times 3 = 54$

2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

(vi) $768 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$

Here, prime factor 3 has no pair. Therefore 768 must be multiplied by 3 to make it a perfect square.

$\therefore$ $768 \times 3 = 2304$

And $\sqrt{2304} = 2 \times 2 \times 2 \times 2 \times 3 = 48$

2	768
2	384
2	192
2	96
2	48
2	24
2	12
2	6
3	3
	1

Question 6:

For each of the following numbers, find the smallest whole number by which it should be divided so as to get a perfect square. Also, find the square root of the square number so obtained:

(i) 252 (ii) 2925
(iii) 396 (iv) 2645
(v) 2800 (vi) 1620

Answer 6:

(i) $252 = 2 \times 2 \times 3 \times 3 \times 7$

Here, prime factor 7 has no pair. Therefore 252 must be divided by 7 to make it a perfect square.

$\therefore$ $252 \div 7 = 36$

And $\sqrt{36} = 2 \times 3 = 6$

2	252
2	126
3	63
3	21
7	7
	1

(ii) $2925 = 3 \times 3 \times 5 \times 5 \times 13$

Here, prime factor 13 has no pair.
Therefore 2925 must be divided by 13 to make it a perfect square.

$\therefore$ $2925 \div 13 = 225$

And $\sqrt{225} = 3 \times 5 = 15$

3	2925
3	975
5	325
5	65
13	13
	1

(iii) $396 = 2 \times 2 \times 3 \times 3 \times 11$

Here, prime factor 11 has no pair. Therefore 396 must be divided by 11 to make it a perfect square.

$\therefore$ $396 \div 11 = 36$

And $\sqrt{36} = 2 \times 3 = 6$

2	396
2	198
3	99
3	33
11	11
	1

(iv) $2645 = 5 \times 23 \times 23$

Here, prime factor 5 has no pair. Therefore 2645 must be divided by 5 to make it a perfect square.

$\therefore$ $2645 \div 5 = 529$

And $\sqrt{529} = 23 \times 23 = 23$

5	2645
23	529
23	23
	1

(v) $2800 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 7$

Here, prime factor 7 has no pair. Therefore 2800 must be divided by 7 to make it a perfect square.

$\therefore$ $2800 \div 7 = 400$

And $\sqrt{400} = 2 \times 2 \times 5 = 20$

2	2800
2	1400
2	700
2	350
5	175
5	35
7	7
	1

(vi) $1620 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5$

Here, prime factor 5 has no pair. Therefore 1620 must be divided by 5 to make it a perfect square.

$\therefore$ $1620 \div 5 = 324$

And $\sqrt{324} = 2 \times 3 \times 3 = 18$

2	1620
2	810
3	405
3	135
3	45
3	15
5	5
	1

Question 7:

The students of Class VIII of a school donated ₹2401 in all, for Prime Minister's National Relief Fund. Each student donated as many rupees as the number of students in the class. Find the number of students in the class.

Answer 7:

Here, Donated money = ₹ 2401

Let the number of students be x.

Therefore donated money = $x \times x$

According to question,

$x^2 = 2401$

7	2401
7	343
7	49
7	7
	1

$\Rightarrow$ $x = \sqrt{2401} = \sqrt{7 \times 7 \times 7 \times 7}$

$\Rightarrow$ $x = 7 \times 7 = 49$

Hence, the number of students is 49.

Question 8:

2025 plants are to be planted in a garden in such a way that each row contains as many plants as the number of rows. Find the number of rows and the number of plants in each row.

Answer 8:

3	2025
3	675
3	225
3	75
5	25
5	5
	1

Here, Number of plants = 2025
Let the number of rows of planted plants be x.
And each row contains number of plants = x
According to question,

$x^2 = 2025$

$\Rightarrow \quad x = \sqrt{2025} = \sqrt{3\times3\times3\times3\times5\times5}$

$\Rightarrow \quad x = 3 \times 3 \times 5 = 45$

Hence, each row contains 45 plants.

Question 9:

Find the smallest square number that is divisible by each of the numbers 4, 9 and 10.

Answer 9:

2	180
2	90
3	45
3	15
5	5
	1

L.C.M. of 4, 9 and 10 is 180.
Prime factors of 180 = 2 x 2 x 3 x 3 x 5
Here, prime factor 5 has no pair. Therefore 180 must be multiplied by 5 to make it a perfect square.

$\therefore \quad 180 \times 5 = 900$

Hence, the smallest square number which is divisible by 4, 9 and 10 is 900.

Question 10:

Find the smallest square number that is divisible by each of the numbers 8, 15 and 20.

Answer 10:

2	120
2	60
3	30
3	15
5	5
	1

L.C.M. of 8, 15 and 20 is 120.
Prime factors of 120 = 2 x 2 x 2 x 3 x 5
Here, prime factor 2, 3 and 5 has no pair. Therefore 120 must be multiplied by
2 x 3 x 5 to make it a perfect square.

$\therefore \quad 120 \times 2 \times 3 \times 5 = 3600$

Hence, the smallest square number which is divisible by 8, 15 and 20 is 3600.