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

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

= 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
23

(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
2
3
3
3
3
5
5

Question 5:

For each of the following numbers, find the smallest whole number by which it s multiplied so as to get a perfect square number. Also, find the square root of th 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
2
3
3
7

(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.

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

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.

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

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.

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

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.

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

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.

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

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

(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.

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

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

Question 7:

The students of Class VIII of a school donated ` 2401 in all, for Prime Minis Relief Fund. Each student donated as many rupees as the number of studen 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,

$x^2 = 2401$

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

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

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:

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.

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

Question 9:

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

Answer 9:

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.

2	180
2	90
3	45
3	15
5	5
	1

Question 10:

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

Answer 10:

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.

2	**120**
2	60
3	30
3	15
5	5
	1