EXERCISE 6.1

1. What will be the unit digit of the squares of the following numbers?

(i) 81 (ii) 272
(iii) 799 (iv) 3853
(v) 1234 (vi) 26387
(vii) 52698 (viii) 99880
(ix) 12796 (x) 55555

2. The following numbers are obviously not perfect squares. Give reason.

(i) 1057 (ii) 23453
(iii) 7928 (iv) 222222
(v) 64000 (vi) 89722
(vii) 222000 (viii) 505050

3. The squares of which of the following would be odd numbers?

(i) 431 (ii) 2826
(iii) 7779 (iv) 82004

4. Observe the following pattern and find the missing digits.

$11^2 = 121$

$101^2 = 10201$

$1001^2 = 1002001$

$100001^2 = 1 \text{ .... } 2 \text{ .... } 1$

$10000001^2 = \text{...........................}$

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5. Observe the following pattern and supply the missing numbers.

$11^2 = 1\ 2\ 1$

$101^2 = 1\ 0\ 2\ 0\ 1$

$10101^2 = 102030201$

$1010101^2 = \text{..........................}$

$\text{............}^2 = 10203040504030201$

6. Using the given pattern, find the missing numbers.

$1^2 + 2^2 + 2^2 = 3^2$

$2^2 + 3^2 + 6^2 = 7^2$

$3^2 + 4^2 + 12^2 = 13^2$

$4^2 + 5^2 + \_\_\_\_^2 = 21^2$

$5^2 + \_\_\_\_^2 + 30^2 = 31^2$

$6^2 + 7^2 + \_\_\_\_^2 = \_\_\_\_^2$

(iii) 1000^2 and 1001^2

9. Express the following as the sum of two consecutive integers.

(i) 21^2 (ii) 13^2

(iii) 11^2 (iv) 19^2

EXERCISE 6.2

1. Find the square of the following numbers.

(i) 32 (ii) 35

(iii) 86 (iv) 93

(v) 71 (vi) 46

2. Write a Pythagorean triplet whose one member is.

(i) 6 (ii) 14

(iii) 16 (iv) 18

TEST YOURSELF - SSR-2

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1. Find the squares of the following numbers containing 5 in unit's place.

(i) 15 (ii) 95

(iii) 105 (iv) 205

2. Which of the following is a Pythagorean triplet?

(a) (2, 3, 5) (b) (5, 7, 9)

(c) (6, 9, 11) (d) (8, 15, 17)

EXERCISE 6.3

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

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

(i) 153 (ii) 257

(iii) 408 (iv) 441

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

(iii) 36 (iv) 49
(v) 90

2. Find the square root of each of the following numbers by using the method of prime factorisation.
   (i) 225 (ii) 729
   (iii) 2025 (iv) 7056
   (v) 9216 (vi) 15876
3. Find the smallest number by which 252 must be multiplied to get a perfect square. Also, find the square root of the perfect square so obtained.
4. 1225 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.
5. Find the least square number which is exactly divisible by each of the numbers 6, 9, 15 and 20.

EXERCISE 6.4

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1. Find the square root of each of the following numbers by Division method.
   (i) 2304 (ii) 4489
   (iii) 3481 (iv) 529
   (v) 3249 (vi) 1369
   (vii) 5776 (viii) 7921
   (ix) 576 (x) 1024
   (xi) 3136 (xii) 900
2. Find the number of digits in the square root of each of the following numbers (without any calculation).
   (i) 64 (ii) 144
   (iii) 4489 (iv) 27225
   (v) 390625
3. Find the square root of the following decimal numbers.
   (i) 2.56 (ii) 7.29
   (iii) 51.84 (iv) 42.25
   (v) 31.36

ANSWERS

NCERT Textual Exercises and Assignments

Exercise – 6.1

1. (i) The number 81 contains its unit's place digit 1. So, square of 1 is 1. Hence, unit's digit of square of 81 is 1.

(ii) The number 272 contains its unit's place digit 2. So, square of 2 is 4. Hence, unit's digit of square of 272 is 4.

(iii) The number 799 contains its unit's place digit 9. So, square of 9 is 81. Hence, unit's digit of square of 799 is 1.

(iv) The number 3853 contains its unit's place digit 3. So, square of 3 is 9. Hence, unit's digit of square of 3853 is 9.

(v) The number 1234 contains its unit's place digit 4. So, square of 4 is 16. Hence, unit's digit of square of 1234 is 6.

(vi) The number 26387 contains its unit's place digit 7. So, square of 7 is 49. Hence, unit's digit of square of 26387 is 9.

(vii) The number 52698 contains its unit's place digit 8. So, square of 8 is 64. Hence, unit's digit of square of 52698 is 4.

(viii) The number 99880 contains its unit's place digit 0. So, square of 0 is 0. Hence, unit's digit of square of 99880 is 0.

(ix) The number 12796 contains its unit's place digit 6. So, square of 6 is 36. Hence, unit's digit of square of 12796 is 6.

(x) The number 55555 contains its unit's place digit 5. So, square of 5. is 25. Hence, unit's digit of square of 55555 is 5.

2. (i) Since, perfect square numbers contain their unit's place digit 1, 4, 5, 6, 9 and even numbers of 0.

Therefore, 1057 is not a perfect square because its unit's place digit is 7.

(ii) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore, 23453 is not a perfect square because its unit's place digit a 3.

(iii) Since. perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore, 7928 is not a perfect square because its unit's place digit is 8.

(iv) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore, 222222 is not a perfect square because its unit's place digit is 2.

(v) Since, perfect square numbers contain their unit's place digit 0, 1, 4, 5, 6, 9 and even number of 0. Therefore, 64000 is not a perfect square because it contains odd numbers of zeros.

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9. (i) Since, non-perfect square numbers between n^2 and $(n+1)^2$ are $2n$.
Here, $n = 12$
Therefore, non-perfect square numbers between 12 and 13 = $2n = 2 \times 12 = 24$

(ii) Since, non-perfect square number between n^2 and $(n+1)^2$ are $2n$.
Here, $n = 25$
Therefore, non-perfect square numbers between 25 and 26 = $2n = 2 \times 25 = 50$

(iii) Since, non-perfect square numbers between n^2 and $(n+1)^2$ are $2n$.
Here, $n = 99$
Therefore, non-perfect square numbers between 99 and 100 = $2n = 2 \times 99 = 198$

Test Yourself - SSR-1

1. (i) 36
(ii) There is no perfect square between the given numbers.

2. (i) Not a perfect square (ii) Not a perfect square
(iii) Not a perfect square (iv) Not a perfect square
(v) May be a perfect square (vi) May be a perfect square

3. 161^2 and 109^2 will end with digit 1.

4. 24^2, 26^2, 36^2 and 34^2 would have digit 6 at unit place

5. (i) 6 (ii) 9
(iii) 4 (iv) 0
(v) 4 (vi) 6

6. (i) Two zeros (ii) Four zeros

7. 18 and 22

8. (i) 200 (ii) 180
(iii) 2000

9. (i) 220 and 221 (ii) 84 and 85
(iii) 60 and 61 (iv) 180 and 181

Exercise – 6.2

1. (i) $(32)^2 = (30+2)^2 = (30)^2 + 2 \times 30 \times 2 + (2)^2$ $[\because (a+b)^2 = a^2 + 2ab + b^2]$
$= 900 + 120 + 4 = 1024$

(ii) Here in 35, unit digit is 5.
$(35)^2 = (3)(3+1)$ hundred $+ (5)^2 = 3 \times 4 \times 100 + 25 = 1200 + 25 = 1225$
$(35)^2 = 1225$

(iii) $(86)^2 = (80+6)^2 = (80)^2 + 2 \times 80 \times 6 + (6)^2$ $[\because (a+b)^2 = a^2 + 2ab + b^2]$
$= 6400 + 960 + 36 = 7386$

Exercise – 6.3

1. (i) If the number ends with 1, then the one's digit of the square root of that number may be 1 or 9. Therefore, 9801 may have 1 or 9 as its one's digit.

(ii) if the number ends with 6, then the one's digit of the square root of that number may be 4 or 6. Therefore, 99856 may have 4 or 6 as its one's digit.

(iii) if the number ends with 1, then the one's digit of the square root of that number may be 1 or 9. Therefore, 998001 may have 1 or 9 as its one's digit.

(iv) If the number ends with 5, then the one's digit of the square root of that number is 5. Therefore, 657666025 has 5 as its one's digit.

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

(i) 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.

3. By subtracting successive 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 subtraction successive is completed in 10 steps. $\therefore \sqrt{100} = 10$

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By subtracting successive 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. $\therefore \sqrt{169} = 13$

4. (i) 729

$\sqrt{729} = \sqrt{\underline{3 \times 3} \times \underline{3 \times 3} \times \underline{3 \times 3}}$

$= 3 \times 3 \times 3$

$= 27$

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

(v) 7744

$\sqrt{7744} = \sqrt{\underline{2\times2}\times\underline{2\times2}\times\underline{2\times2}\times\underline{11\times11}}$

$= 2 \times 2 \times 2 \times 11$

$= 88$

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

(vi) 9604

$\sqrt{9604} = \sqrt{\underline{2\times2}\times\underline{7\times7}\times\underline{7\times7}}$

$= 2 \times 7 \times 7$

$= 98$

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

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(vii) 5929

$\sqrt{5929} = \sqrt{\underline{7\times7}\times\underline{11\times11}}$

$= 7 \times 11$

$= 77$

7	5929
7	847
11	121
11	11
	1

$\therefore\ 252 \times 7 = 1764$

and $\sqrt{1764} = 2\times3\times7 = 42$

2	252
2	126
3	63
3	21
7	7
	1

(ii) $180 = \underline{2 \times 2} \times \underline{3 \times 3} \times 5$

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 $\sqrt{900} = 2\times3\times5 = 30$

2	180
2	90
3	45
3	15
5	5
	1

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(iii) $1008 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{3 \times 3} \times 7$

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 $\sqrt{7056} = 2\times2\times3\times7 = 84$

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

(iv) $2028 = \underline{2 \times 2} \times 3 \times \underline{13 \times 13}$

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

6. (i) $252 = \underline{2 \times 2} \times \underline{3 \times 3} \times 7$

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) $2925 = \underline{3 \times 3} \times \underline{5 \times 5} \times 13$

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

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(iii) $396 = \underline{2 \times 2} \times \underline{3 \times 3} \times 11$

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) $2645 = 5 \times \underline{23 \times 23}$

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

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

$\Rightarrow \quad x = \sqrt{2025} = \sqrt{\underline{3\times3}\times\underline{3\times3}\times\underline{5\times5}}$

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

Hence, each row contains 45 plants.

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

9. L.C.M. of 4, 9 and 10 is 180.

Prime factors of 180 = $\underline{2 \times 2} \times \underline{3 \times 3} \times 5$

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

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

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

10. L.C.M. of 8, 15 and 20 is 120.

Prime factors of 120 = $\underline{2 \times 2} \times 2 \times 3 \times 5$

Here, prime factors 2, 3 and 5 have no pair. Therefore, 120 must be multiplied by $2 \times 3 \times 5$ 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

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Test Yourself - SSR-3

1. (i) 11 (ii) It is not a perfect square
(iii) 6 (iv) 7
(v) It is not a perfect square

2. (i) 15 (ii) 27
(iii) 45 (iv) 84
(v) 96 (vi) 126

3. 7, 42

4. 35, 35

5. 900

(vii) 5776

Hence, the square root of 5776 is 76.

	76
7	$\overline{57}\ \overline{76}$
	49
146	876
	876
	0

(viii) 7921

Hence, the square root of 7921 is 89.

	89
8	$\overline{79}\ \overline{21}$
	64
169	1521
	1521
	0

(ix) 576

Hence, the square root of 576 is 24.

	24
2	$\overline{5}\ \overline{76}$
	4
44	176
	176
	0

(x) 1024

Hence, the square root of 1024 is 32.

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	32
3	$\overline{10}\ \overline{24}$
	9
62	124
	124
	0

(xi) 3136

Hence, the square root of 3136 is 56.

	56
5	$\overline{31}\ \overline{36}$
	25
106	636
	636
	0

(xii) 900

Hence, the square root of 900 is 30.

	30
3	$\overline{9}\ \overline{00}$
	9
00	000
	000
	0

(v) 31.36

Hence, the square root of 31.36 is 5.6.

	5.6
5	$\overline{31}\,.\,\overline{36}$
	25
106	636
	636
	0

4. (i) 402

We know that, if we subtract the remainder from the number, we get a perfect square.

Here, we get remainder 2. Therefore, 2 must be subtracted form 402 to get a perfect square.

$\therefore$ 402 – 2 = 400

	20
2	$\overline{4}\ \ \overline{02}$
	4
40	02
	00
	2

	20
2	$\overline{4}\ \ \overline{00}$
	4
00	00
	00
	0

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Hence, the square root of 400 is 20.

(ii) 1989

We know that, if we subtract the remainder from the number, we get a perfect square.

Here, we get remainder 53. Therefore, 53 must be subtracted form 1989 to get a perfect square.

$\therefore$ 1989 –53 = 1936

	44
4	$\overline{19}\ \ \overline{89}$
	16
84	389
	336
	53

	44
4	$\overline{19}\ \ \overline{36}$
	16
84	336
	336
	0

Hence, the square root of 1936 is 44.

(iii) 3250

We know that, if we subtract the remainder from the number, we get a perfect square.

Here, we get remainder 1. Therefore, 1 must be subtracted form 3250 to get a perfect square.

$\therefore$ 3250 –1 = 3249

	57
5	$\overline{32}\ \ \overline{50}$
	25
107	750
	749
	1

(ii) 1750

Since remainder is 69. Therefore, $41^2 < 1750$

Next perfect square number $42^2 = 1764$

Hence, number to be added

$= 1764 - 1750 = 14$

$\therefore\ 525 + 4 = 529$

Hence, the square root of 529 is 23.

	41
4	$\overline{17}\ \overline{50}$
	16
81	150
	81
	69

(iii) 252

Since remainder is 27. Therefore, $15^2 < 252$

Next perfect square number $16^2 = 256$

Hence, number to be added

$= 256 - 252 = 4$

$\therefore\ 252 + 4 = 256$

Hence, the square root of 256 is 16.

	15
1	$\overline{2}\ \overline{52}$
	1
25	152
	125
	27

(iv) 1825

Since remainder is 61 Therefore, $42^2 < 1825$

Next perfect square number $43^2 = 1849$

Hence, number to be added

$= 1849 - 1825 = 24$

$\therefore\ 1825 + 24 = 1849$

Hence, the square root of 1849 is 43.

	42
4	$\overline{18}\ \overline{25}$
	16
82	225
	164
	61

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(v) 6412

Since remainder is 12 Therefore, $80^2 < 6412$

Next perfect square number $81^2 = 6561$

Hence, number to be added

$= 6561 - 6412 = 149$

$\therefore\ 6412 + 149 = 6561$

Hence, the square root of 6561 is 81.

	80
8	$\overline{64}\ \overline{12}$
	64
160	0012
	0000
	12

6. Let the length of side of a square be x meter.

Area of square = $(\text{side})^2 = x^2$

According to questions,

$x^2 = 441$

$\Rightarrow\quad x = \sqrt{441} = \sqrt{\underline{3\times 3}\times \underline{7\times 7}} = 3\times 7$

$\Rightarrow\quad x = 21$ m

Hence, the length of the side of a square is 21 m.