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

Solution:

The unit digit of square of a number having 'a' at its unit place ends with a×a.

i. The unit digit of the square of a number having digit 1 as unit's place is 1.

∴ Unit digit of the square of number 81 is equal to 1.

ii. The unit digit of the square of a number having digit 2 as unit's place is 4.

∴ Unit digit of the square of number 272 is equal to 4.

iii. The unit digit of the square of a number having digit 9 as unit's place is 1.

∴ Unit digit of the square of number 799 is equal to 1.

iv. The unit digit of the square of a number having digit 3 as unit's place is 9.

∴ Unit digit of the square of number 3853 is equal to 9.

v. The unit digit of the square of a number having digit 4 as unit's place is 6.

∴ Unit digit of the square of number 1234 is equal to 6.

vi. The unit digit of the square of a number having digit 7 as unit's place is 9.

∴ Unit digit of the square of number 26387 is equal to 9.

vii. The unit digit of the square of a number having digit 8 as unit's place is 4.

∴ Unit digit of the square of number 52698 is equal to 4.

viii. The unit digit of the square of a number having digit 0 as unit's place is 01.

∴ Unit digit of the square of number 99880 is equal to 0.

ix. The unit digit of the square of a number having digit 6 as unit's place is 6.

∴ Unit digit of the square of number 12796 is equal to 6.

x. The unit digit of the square of a number having digit 5 as unit's place is 5.

∴ Unit digit of the square of number 55555 is equal to 5.

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

Solution:

We know that natural numbers ending in the digits 0, 2, 3, 7 and 8 are not perfect squares.

i. 1057 $\Longrightarrow$ Ends with 7

ii. 23453 $\Longrightarrow$ Ends with 3

iii. 7928 $\Longrightarrow$ Ends with 8

iv. 222222 $\Longrightarrow$ Ends with 2

v. 64000 $\Longrightarrow$ Ends with 0

vi. 89722 $\Longrightarrow$ Ends with 2

vii. 222000 $\Longrightarrow$ Ends with 0

viii. 505050 $\Longrightarrow$ Ends with 0

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

i. 431

ii. 2826

iii. 7779

iv. 82004

Solution:

We know that the square of an odd number is odd and the square of an even number is even.

i. The square of 431 is an odd number.

ii. The square of 2826 is an even number.

iii. The square of 7779 is an odd number.

iv. The square of 82004 is an even number.

4. Observe the following pattern and find the missing numbers. 11^2 = 121

101^2 = 10201

1001^2 = 1002001

100001^2 = 1 …….2………1

10000001^2 = ……………………..

Solution:

We observe that the square on the number on R.H.S of the equality has an odd number of digits such that the first and last digits both are 1 and middle digit is 2. And the number of zeros between left most digits 1 and the middle digit 2 and right most digit 1 and the middle digit 2 is same as the number of zeros in the given number.

∴ 100001^2 = 10000200001

10000001^2 = 100000020000001

5. Observe the following pattern and supply the missing numbers. 112 = 121

1012 = 10201

101012 = 102030201

10101012 = ………………………

…………2 = 10203040504030201

Solution:

We observe that the square on the number on R.H.S of the equality has an odd number of digits such that the first and last digits both are 1. And, the square is symmetric about the middle digit. If the middle digit is 4, then the number to be squared is 10101 and its square is 102030201.

So, 10101012 =1020304030201

1010101012 =10203040505030201

6. Using the given pattern, find the missing numbers. $1^2 + 2^2 + 2^2 = 3^2$

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

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

$4^2 + 5^2 + \_2 = 21^2$

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

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

Solution:

Given, $1^2 + 2^2 + 2^2 = 3^2$

i.e $1^2 + 2^2 + (1\times2)^2 = (1^2 + 2^2 - 1 \times 2)^2$

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

$\therefore 2^2 + 3^2 + (2\times3)^2 = (2^2 + 3^2 - 2\times3)^2$

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

$\therefore 3^2 + 4^2 + (3\times4)^2 = (3^2 + 4^2 - 3\times4)^2$

$4^2 + 5^2 + (4\times5)^2 = (4^2 + 5^2 - 4\times5)^2$

$\therefore 4^2 + 5^2 + 20^2 = 21^2$

$5^2 + 6^2 + (5\times6)^2 = (5^2 + 6^2 - 5\times6)^2$

$\therefore 5^2 + 6^2 + 30^2 = 31^2$

$6^2 + 7^2 + (6\times7)^2 = (6^2 + 7^2 - 6\times7)^2$

$\therefore 6^2 + 7^2 + 42^2 = 43^2$

7. Without adding, find the sum.

i. 1 + 3 + 5 + 7 + 9

Solution:

Sum of first five odd number = $(5)^2 = 25$

ii. 1 + 3 + 5 + 7 + 9 + I1 + 13 + 15 + 17 +19

Solution:

Sum of first ten odd number = $(10)^2 = 100$

iii. 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23

Solution:

Sum of first thirteen odd number = $(12)^2 = 144$

8. (i) Express 49 as the sum of 7 odd numbers.

Solution:

We know, sum of first n odd natural numbers is n^2 . Since,$49 = 7^2$

$\therefore$ 49 = sum of first 7 odd natural numbers = 1 + 3 + 5 + 7 + 9 + 11 + 13

(ii) Express 121 as the sum of 11 odd numbers.

Solution:

Since, $121 = 11^2$

$\therefore$ 121 = sum of first 11 odd natural numbers = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21

9. How many numbers lie between squares of the following numbers?

i. 12 and 13

ii. 25 and 26

iii. 99 and 100

Solution:

Between n^2 and $(n+1)^2$, there are 2n non–perfect square numbers.

i. 122 and 132 there are 2×12 = 24 natural numbers.

ii. 252 and 262 there are 2×25 = 50 natural numbers.

iii. 992 and 1002 there are 2×99 =198 natural numbers.

EXERCISE 6.2

PAGE: 98

1. Find the square of the following numbers.

i. 32

ii. 35

iii. 86

iv. 93

v. 71

vi. 46

Solution:

i. $(32)^2$

$= (30 + 2)^2$

$= (30)^2 + (2)^2 + 2\times30\times2$ [Since, $(a+b)^2 = a^2+b^2 +2ab$]

$= 900 + 4 + 120$

$= 1024$

ii. $(35)^2$

$= (30+5)^2$

$= (30)^2 + (5)^2 + 2\times30\times5$ [Since, $(a+b)^2 = a^2+b^2 +2ab$]

$= 900 + 25 + 300$

$= 1225$

iii. $(86)^2$

$= (90 - 4)^2$

$= (90)^2 + (4)^2 - 2\times90\times4$ [Since, $(a+b)^2 = a^2+b^2 +2ab$]

$= 8100 + 16 - 720$

$= 8116 - 720$

$= 7396$

iv. $(93)^2$

$= (90+3)^2$

$= (90)^2 + (3)^2 + 2\times90\times3$ [Since, $(a+b)^2 = a^2+b^2 +2ab$]

$= 8100 + 9 + 540$

$= 8649$

v. $(71)^2$

$= (70+1)^2$

$= (70)^2 + (1)^2 + 2\times70\times1$ [Since, $(a+b)^2 = a^2+b^2+2ab$]

$= 4900 + 1 + 140$

$= 5041$

vi. $(46)^2$

$= (50-4)^2$

$= (50)^2 + (4)^2 - 2\times50\times4$ [Since, $(a+b)^2 = a^2+b^2+2ab$]

$= 2500 + 16 - 400$

$= 2116$

2. Write a Pythagorean triplet whose one member is.

i. 6

ii. 14

iii. 16

iv. 18

Solution:

For any natural number m, we know that 2m, m2–1, m2+1 is a Pythagorean triplet.

i. $2m = 6$

$\Rightarrow m = 6/2 = 3$

$m^2-1 = 3^2 - 1 = 9-1 = 8$

$m^2+1 = 3^2+1 = 9+1 = 10$

∴ (6, 8, 10) is a Pythagorean triplet.

ii. $2m = 14$

$\Rightarrow m = 14/2 = 7$

$m^2-1 = 7^2-1 = 49-1 = 48$

$m^2+1 = 7^2+1 = 49+1 = 50$

∴ (14, 48, 50) is not a Pythagorean triplet.

iii. $2m = 16$

$\Rightarrow m = 16/2 = 8$

$m^2-1 = 8^2-1 = 64-1 = 63$

$m^2+1 = 8^2+1 = 64+1 = 65$

∴ (16, 63, 65) is a Pythagorean triplet.

iv. $2m = 18$

⇒ $m = 18/2 = 9$

$m^2-1 = 9^2-1 = 81-1 = 80$

$m^2+1 = 9^2+1 = 81+1 = 82$

∴ (18, 80, 82) is a Pythagorean triplet.

EXERCISE 6.3 PAGE: 102

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

Solution:

i. We know that the unit's digit of the square of a number having digit as unit's

place 1 is 1 and also 9 is 1[9^2=81 whose unit place is 1].

∴ Unit's digit of the square root of number 9801 is equal to 1 or 9.

ii. We know that the unit's digit of the square of a number having digit as unit's

place 6 is 6 and also 4 is 6 [6^2=36 and 4^2=16, both the squares have unit digit 6].

∴ Unit's digit of the square root of number 99856 is equal to 6.

iii. We know that the unit's digit of the square of a number having digit as unit's

place 1 is 1 and also 9 is 1[9^2=81 whose unit place is 1].

∴ Unit's digit of the square root of number 998001 is equal to 1 or 9.

iv. We know that the unit's digit of the square of a number having digit as unit's

place 5 is 5.

∴ Unit's digit of the square root of number 657666025 is equal to 5.

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

i. 153

ii. 257

iii. 408

iv. 441

Solution:

We know that natural numbers ending with the digits 0, 2, 3, 7 and 8 are not perfect square.

i. 153⟹ Ends with 3.

∴, 153 is not a perfect square

ii. 257⟹ Ends with 7

∴, 257 is not a perfect square

iii. 408⟹ Ends with 8

∴, 408 is not a perfect square

iv. 441⟹ Ends with 1

∴, 441 is a perfect square.

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

Solution:

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

Here, we have performed subtraction ten times.

∴ √100 = 10

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

Here, we have performed subtraction thirteen times.

∴ $\sqrt{169} = 13$

4. Find the square roots of the following numbers by the Prime Factorisation Method.

i. 729

ii. 400

iii. 1764

iv. 4096

v. 7744

vi. 9604

vii. 5929

viii. 9216

ix. 529

x. 8100

Solution:

i.

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

$729 = 3\times3\times3\times3\times3\times3\times1$

$\Rightarrow 729 = (3\times3)\times(3\times3)\times(3\times3)$

$\Rightarrow 729 = (3\times3\times3)\times(3\times3\times3)$

$\Rightarrow 729 = (3\times3\times3)^2$

$\Rightarrow \sqrt{729} = 3\times3\times3 = 27$

ii.

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

400 = 2×2×2×2×5×5×1

⇒ 400 = (2×2)×(2×2)×(5×5)

⇒ 400 = (2×2×5)×(2×2×5)

⇒ 400 = $(2×2×5)^2$

⇒ √400 = 2×2×5 = 20

iii.

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

1764 = 2×2×3×3×7×7

⇒ 1764 = (2×2)×(3×3)×(7×7)

⇒ 1764 = (2×3×7)×(2×3×7)

⇒ 1764 = $(2×3×7)^2$

⇒ √1764 = 2 ×3×7 = 42

iv.

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

4096 = 2×2×2×2×2×2×2×2×2×2×2×2

⇒ 4096 = (2×2)×(2×2)×(2×2)×(2×2)×(2×2)×(2×2)

⇒ 4096 = (2×2×2×2×2×2)×(2×2×2×2×2×2)

⇒ $4096 = (2\times2\times2\times2\times2\times2)^2$

⇒ √4096 = 2×2×2 ×2×2×2 = 64

v.

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

7744 = 2×2×2×2×2×2×11×11×1

⇒ 7744 = (2×2)×(2×2)×(2×2)×(11×11)

⇒ 7744 = (2×2×2×11)×(2×2×2×11)

⇒ $7744 = (2\times2\times2\times11)^2$

⇒ $\sqrt{7744}$ = 2×2×2×11 = 88

vi.

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

9604 = 62 × 2 × 7 × 7 × 7 × 7

⇒ 9604 = (2 × 2) × (7 × 7) × (7 × 7)

⇒ 9604 = (2 × 7 ×7) × (2 × 7 ×7)

⇒ $9604 = (2\times7\times7)^2$

⇒ $\sqrt{9604}$ = 2×7×7 = 98

vii.

7	5929
7	847
11	121
11	11
	1

5929 = 7×7×11×11

⇒ 5929 = (7×7)×(11×11)

⇒ 5929 = (7×11)×(7×11)

⇒ 5929 = $(7×11)^2$

⇒ √5929 = 7×11 = 77

viii.

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

9216 = 2×2×2×2×2×2×2×2×2×2×3×3×1

⇒ 9216 = (2×2)×(2×2) × (2 × 2) × (2 × 2) × (2 × 2) × (3 × 3)

⇒ 9216 = (2 × 2 × 2 × 2 × 2 × 3) × (2 × 2 × 2 × 2 × 2 × 3)

⇒ 9216 = 96 × 96

⇒ 9216 = $(96)^2$

⇒ √9216 = 96

ix.

23	529
23	23
	1

529 = 23×23

529 = $(23)^2$

√529 = 23

x.

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

8100 = 2×2×3×3×3×3×5×5×1

⇒ 8100 = (2×2) ×(3×3)×(3×3)×(5×5)

⇒ 8100 = (2×3×3×5)×(2×3×3×5)

⇒ 8100 = 90×90

⇒ 8100 = $(90)^2$

⇒ √8100 = 90

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

Solution:

i.

2	252
2	126
3	63
3	21
7	7
	1

252 = 2×2×3×3×7

= (2×2)×(3×3)×7

Here, 7 cannot be paired.

∴ We will multiply 252 by 7 to get perfect square.

New number = 252 × 7 = 1764

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

1764 = 2×2×3×3×7×7

⇒ 1764 = (2×2)×(3×3)×(7×7)

⇒ 1764 = $2^2 \times 3^2 \times 7^2$

⇒ 1764 = $(2\times3\times7)^2$

⇒ √1764 = 2×3×7 = 42

ii.

2	180
2	90
3	45
3	15
5	5
	1

180 = 2×2×3×3×5

= (2×2)×(3×3)×5

Here, 5 cannot be paired.

∴ We will multiply 180 by 5 to get perfect square.

New number = 180 × 5 = 900

2	900
2	450
3	225
3	75
5	25
5	5
	1

900 = 2×2×3×3×5×5×1

⇒ 900 = (2×2)×(3×3)×(5×5)

⇒ 900 = $2^2 \times 3^2 \times 5^2$

⇒ 900 = $(2\times3\times5)^2$

⇒ $\sqrt{900} = 2\times3\times5 = 30$

iii.

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

$1008 = 2\times2\times2\times2\times3\times3\times7$

$= (2\times2)\times(2\times2)\times(3\times3)\times7$

Here, 7 cannot be paired.

∴ We will multiply 1008 by 7 to get perfect square.

New number = $1008\times7 = 7056$

2	7056
2	3528
2	1764
2	882
3	441
3	147
7	49
7	7
	1

$7056 = 2\times2\times2\times2\times3\times3\times7\times7$

⇒ $7056 = (2\times2)\times(2\times2)\times(3\times3)\times(7\times7)$

⇒ $7056 = 2^2\times2^2\times3^2\times7^2$

⇒ $7056 = (2\times2\times3\times7)^2$

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

iv.

2	2028
2	1014
3	507
13	169
13	13
	1

$2028 = 2\times2\times3\times13\times13$

$= (2\times2)\times(13\times13)\times3$

Here, 3 cannot be paired.

∴ We will multiply 2028 by 3 to get perfect square. New number = $2028\times3 = 6084$

2	6084
2	3042
3	1521
3	507
13	169
13	13
	1

$6084 = 2\times2\times3\times3\times13\times13$

⇒ $6084 = (2\times2)\times(3\times3)\times(13\times13)$

⇒ $6084 = 2^2\times3^2\times13^2$

⇒ $6084 = (2\times3\times13)^2$

⇒ $\sqrt{6084} = 2\times3\times13 = 78$

v.

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

1458 = 2×3×3×3×3×3×3

= (3×3)×(3×3)×(3×3)×2

Here, 2 cannot be paired.

∴ We will multiply 1458 by 2 to get perfect square. New number = 1458 × 2 = 2916

2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

2916 = 2×2×3×3×3×3×3×3

⇒ 2916 = (3×3)×(3×3)×(3×3)×(2×2)

⇒ 2916 = $3^2 \times 3^2 \times 3^2 \times 2^2$

⇒ 2916 = $(3\times3\times3\times2)^2$

⇒ √2916 = 3×3×3×2 = 54

vi.

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

768 = 2×2×2×2×2×2×2×2×3

= (2×2)×(2×2)×(2×2)×(2×2)×3

Here, 3 cannot be paired.

∴ We will multiply 768 by 3 to get perfect square.

New number = 768×3 = 2304

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

2304 = 2×2×2×2×2×2×2×2×3×3

⇒ 2304 = (2×2)×(2×2)×(2×2)×(2×2)×(3×3)

⇒ 2304 = $2^2×2^2×2^2×2^2×3^2$

⇒ 2304 = $(2×2×2×2×3)^2$

⇒ √2304 = 2×2×2×2×3 = 48

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

Solution:

i.

2	252
2	126
3	63
3	21
7	7
	1

252 = 2×2×3×3×7

= (2×2)×(3×3)×7

Here, 7 cannot be paired.

∴ We will divide 252 by 7 to get perfect square. New number = 252 ÷ 7 = 36

2	36
2	18
3	9
3	3
	1

36 = 2×2×3×3

⇒ 36 = (2×2)×(3×3)

⇒ 36 = $2^2 \times 3^2$

⇒ 36 = $(2\times3)^2$

⇒ √36 = 2×3 = 6

ii.

3	2925
3	975
5	325
5	65
13	13
	1

2925 = 3×3×5×5×13

= (3×3)×(5×5)×13

Here, 13 cannot be paired.

∴ We will divide 2925 by 13 to get perfect square. New number = 2925 ÷ 13 = 225

3	225
3	75
5	25
5	5
	1

225 = 3×3×5×5

⇒ 225 = (3×3)×(5×5)

⇒ 225 = 3^2×5^2

⇒ 225 = $(3×5)^2$

⇒ √36 = 3×5 = 15

iii.

2	396
2	198
3	99
3	33
11	11
	1

396 = 2×2×3×3×11

= (2×2)×(3×3)×11

Here, 11 cannot be paired.

∴ We will divide 396 by 11 to get perfect square. New number = 396 ÷ 11 = 36

2	36
2	18
3	9
3	3
	1

36 = 2×2×3×3

⇒ 36 = (2×2)×(3×3)

⇒ 36 = 2^2×3^2

⇒ 36 = $(2×3)^2$

⇒ √36 = 2×3 = 6

iv.

5	2645
23	529
23	23
	1

2645 = 5×23×23

⇒ 2645 = (23×23)×5

Here, 5 cannot be paired.

∴ We will divide 2645 by 5 to get perfect square.

New number = 2645 ÷ 5 = 529

23	529
23	23
	1

529 = 23×23

⇒ 529 = $(23)^2$

⇒ √529 = 23

v.

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

2800 = 2×2×2×2×5×5×7

= (2×2)×(2×2)×(5×5)×7

Here, 7 cannot be paired.

∴ We will divide 2800 by 7 to get perfect square. New number = 2800 ÷ 7 = 400

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

400 = 2×2×2×2×5×5

⇒ 400 = (2×2)×(2×2)×(5×5)

⇒ 400 = $(2×2×5)^2$

⇒ √400 = 20

vi.

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

1620 = 2×2×3×3×3×3×5

= (2×2)×(3×3)×(3×3)×5

Here, 5 cannot be paired.

∴ We will divide 1620 by 5 to get perfect square. New number = 1620 ÷ 5 = 324

2	324
2	162
3	81
3	27
3	9
3	3
	1

324 = 2×2×3×3×3×3

⇒ 324 = (2×2)×(3×3)×(3×3)

⇒ 324 = $(2×3×3)^2$

⇒ √324 = 18

7. The students of Class VIII of a school donated Rs 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.

Solution:

Let the number of students in the school be, x.

∴ Each student donate Rs.x .

Total amount contributed by all the students= x×x=x^2 Given, x^2 = Rs.2401

7	2401
7	343
7	49
7	7
	1

x^2 = 7×7×7×7

⇒ x^2 = (7×7)×(7×7)

⇒ x^2 = 49×49

⇒ x = √(49×49)

⇒ x = 49

∴ The number of students = 49

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.

Solution

Let the number of rows be, x.

∴ the number of plants in each rows = x.

Total plants to be planted in the garden = x × x =x^2

Given,

x_2 = Rs.2025

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

x^2 = 3×3×3×3×5×5

⇒ x^2 = (3×3)×(3×3)×(5×5)

⇒ x2 = (3×3×5)×(3×3×5)

⇒ x2 = 45×45

⇒ x = √45×45

⇒ x = 45

∴ The number of rows = 45 and the number of plants in each rows = 45.

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

Solution:

2	4, 9 , 10
	2, 9, 5

L.C.M of 4, 9 and 10 is (2×2×9×5) 180.

180 = 2×2×9×5

= (2×2)×3×3×5

= (2×2)×(3×3)×5

Here, 5 cannot be paired.

∴ we will multiply 180 by 5 to get perfect square.

Hence, the smallest square number divisible by 4, 9 and 10 = 180×5 = 900

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

Solution:

2	8, 15, 20
2	4, 15, 10
5	2, 15, 5
	2, 3, 1

L.C.M of 8, 15 and 20 is (2×2×5×2×3) 120.

120 = 2×2×3×5×2

= (2×2)×3×5×2

Here, 3, 5 and 2 cannot be paired.

∴ We will multiply 120 by (3×5×2) 30 to get perfect square.

Hence, the smallest square number divisible by 8, 15 and 20 =120×30 = 3600

EXERCISE 6.4 PAGE: 107

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

Solution:

i.

	48
4	$\overline{23}\,\overline{04}$
+4	16
88	704
+8	704
96	0

∴ √2304 = 48

ii.

	67
6	$\overline{44}\,\overline{89}$
+ 6	36
127	889
+7	889
134	0

∴ √4489 = 67

iii.

	59
5	$\overline{34}\,\overline{81}$
+5	25
109	981
+9	981
118	0

∴ √3481 = 59

iv.

	23
2	$5\,\overline{29}$
+2	4
43	129
+3	129
46	0

∴ √529 = 23

v.

	57
5	3249
+5	25
107	749
+7	749
114	0

∴ √3249 = 57

vi.

	37
3	1369
+3	9
67	469
+7	469
74	0

∴ √1369 = 37

vii.

	76
7	5776
+7	49
146	876
+6	876
152	0

∴ √5776 = 76

viii.

	89
8	7921
+ 8	64
169	1521
+ 9	1521
178	0

∴ √7921 = 89

ix.

	24
2	576
+2	4
44	176
+4	176
48	0

∴ √576 = 24

x.

	32
3	1024
+3	9
62	124
+2	124
64	0

∴ √1024 = 32

xi.

	56
5	$\overline{31}\,\overline{36}$
+5	25
106	636
+6	636
112	0

∴ √3136 = 56

xii.

	30
3	$9\overline{00}$
+3	9
60	00

∴ √900 = 30

2. Find the number of digits in the square root of each of the following numbers (without any calculation).64

i. 144

ii. 4489

iii. 27225

iv. 390625

Solution:

i.

	12
1	144
+1	1
22	44
+2	44
24	0

∴ √144 = 12

Hence, the square root of the number 144 has 2 digits.

ii.

	67
6	4489
+6	36
127	889
+7	889
134	0

∴ √4489 = 67

Hence, the square root of the number 4489 has 2 digits.

iii.

	165
1	27225
+1	1
26	172
+6	156
325	1625
+5	1625
350	0

√27225 = 165

Hence, the square root of the number 27225 has 3 digits.

iv.

	625
6	390625
+6	36
122	306
+ 2	244
1245	6225
+5	6225
1250	0

∴ √390625 = 625

Hence, the square root of the number 390625 has 3 digits.

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

Solution:

i.

	1.6
1	$2.\overline{56}$
+1	1
26	156
+6	156
32	0

∴ √2.56 = 1.6

ii.

	2.7
2	$7.\overline{29}$
+2	4
47	329
+7	329
54	0

∴ √7.29 = 2.7

iii.

	7.2
7	51.84
+7	49
142	284
+2	284
144	0

∴ √51.84 = 7.2

iv.

	6.5
6	42.25
+6	36
125	625
+5	625
130	0

∴ √42.25 = 6.5

v.

	5.6
5	31.36
+5	25
106	636
+6	636
112	0

∴ √31.36 = 5.6

4. Find the least number which must be subtracted from each of the following numbers so as to get a perfect square. Also find the square root of the perfect square so obtained.

i. 402

ii. 1989

iii. 3250

iv. 825

v. 4000

Solution:

i.

	2
2	$4\overline{02}$
+2	4
4	02

∴ √402 = 20

∴ We must subtract 2 from 402 to get a perfect square.

New number = 402 – 2 = 400

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

∴ √400 = 20

ii.

	44
4	$\overline{19}\,\overline{89}$
+4	16
84	389
+4	336
88	53

∴ We must subtract 53 from 1989 to get a perfect square. New number = 1989 – 53 = 1936

	44
4	$\overline{19}\,\overline{36}$
+4	16
84	336
+4	336
88	0

∴ √1936 = 44

iii.

	57
5	$\overline{32}\,\overline{50}$
+ 5	25
107	750
+7	749
114	1

∴ We must subtract 1 from 3250 to get a perfect square.

New number = 3250 – 1 = 3249

	57
5	$\overline{32}\,\overline{49}$
+ 5	25
107	749
+7	749
114	0

∴ √3249 = 57

iv.

	28
2	$\overline{8}\,\overline{25}$
+2	4
48	425
+8	384
56	41

∴ We must subtract 41 from 825 to get a perfect square.

New number = 825 – 41 = 784

	28
2	$\overline{7}\,\overline{84}$
+2	4
48	384
+8	384
56	0

∴ √784 = 28

	63
6	4000
+6	36
123	400
+3	369
126	31

∴ We must subtract 31 from 4000 to get a perfect square. New number = 4000 – 31 = 3969

∴ √3969 = 63

5. Find the least number which must be added to each of the following numbers so as to get a perfect square. Also find the square root of the perfect square so obtained.

(i) 525

(ii) 1750

(iii) 252

(iv)1825

(v)6412

Solution:

(i)

	22
2	525
+2	4
42	125
+2	84
44	41

	23
2	525
+2	4
43	125
+3	129

Here, $(22)^2 < 525 > (23)^2$

We can say 525 is $(129 - 125)^4$ less than $(23)^2$.

∴ If we add 4 to 525, it will be a perfect square. New number = 525 + 4 = 529

	23
2	529
+2	4
43	129
+3	129
46	0

∴ √529 = 23

(ii)

	41
4	$\overline{17}\,\overline{50}$
+4	16
81	150
+1	81
82	69

	42
4	$\overline{17}\,\overline{50}$
4	16
82	150
+2	164

Here, $(41)^2 < 1750 > (42)^2$

We can say 1750 is (164 – 150) ^{14} less than $(42)^2$.

∴ If we add 14 to 1750, it will be perfect square.

New number = 1750 + 14 = 1764

	42
4	$\overline{17}\,\overline{64}$
4	16
82	164
+2	164

∴√1764 = 42

(iii)

	15
1	252
+1	1
25	152
+5	125
30	27

	16
1	252
+1	1
26	152
+6	156

Here, $(15)^2 < 252 > (16)^2$

We can say 252 is (156 – 152) ^{4} less than $(16)^2$.

∴ If we add 4 to 252, it will be perfect square.

New number = 252 + 4 = 256

	16
1	256
+1	1
26	156
+6	156
32	0

∴ $\sqrt{256} = 16$

(iv)

	42
4	$\overline{18}\,\overline{25}$
+4	16
82	225
+2	162
84	63

	43
4	$\overline{18}\,\overline{25}$
+4	16
83	225
+3	249

Here, $(42)^2 < 1825 > (43)^2$

We can say 1825 is (249 – 225) ^{24} less than $(43)^2$.

∴ If we add 24 to 1825, it will be perfect square.

New number = 1825 + 24 = 1849

	43
4	$\overline{18}\,\overline{49}$
+4	16
83	249
+3	249
86	0

∴ √1849 = 43

(v)

	80
8	$\overline{64}\,\overline{12}$
+8	64
160	120
0	0

	81
8	$\overline{64}\,\overline{12}$
+8	64
161	12
+1	161

Here, $(80)^2 < 6412 > (81)^2$

We can say 6412 is (161 – 12) ^{149} less than $(81)^2$.

∴ If we add 149 to 6412, it will be perfect square.

New number = 6412 + 149 = 656

	81
8	$\overline{65}\,\overline{61}$
+8	64
161	161
+1	161
162	0

∴ $\sqrt{6561} = 81$

6. Find the length of the side of a square whose area is 441 m^2.

Solution:

Let the length of each side of the field = a Then, area of the field = 441 m^2

⇒ $a^2 = 441\ m^2$

⇒$a = \sqrt{441}$ m

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

∴ The length of each side of the field = a m = 21 m.

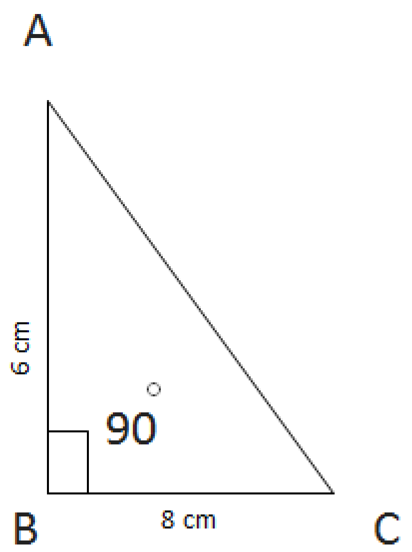
7. In a right triangle ABC, ∠B = 90°.

a. If AB = 6 cm, BC = 8 cm, find AC

b. If AC = 13 cm, BC = 5 cm, find AB

Solution:

a.



Given, AB = 6 cm, BC = 8 cm

Let AC be x cm.

∴ $AC^2 = AB^2 + BC^2$

$$AC = \sqrt{AB^2 + BC^2}$$

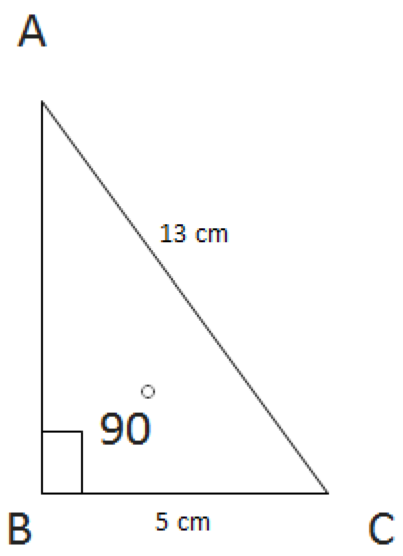
$$= \sqrt{6^2 + 8^2}$$

$$= \sqrt{36 + 64}$$

$$= \sqrt{100} = 10$$

Hence, AC = 10 cm.

b.



Given, AC = 13 cm, BC = 5 cm

Let AB be x cm.

∴ $AC^2 = AB^2 + BC^2$

⇒ $AC^2 - BC^2 = AB^2$

$$AB = \sqrt{AC^2 - BC^2}$$

$$= \sqrt{13^2 - 5^2}$$

$$= \sqrt{169 - 25}$$

$$= \sqrt{144} = 12$$

Hence, AB = 12 cm

8. A gardener has 1000 plants. He wants to plant these in such a way that the number of rows

and the number of columns remain same. Find the minimum number of plants he needs more for this.

Solution:

Let the number of rows and column be, x.

∴ Total number of row and column= x× x = x^2 As per question, x^2 = 1000

⇒ x = √1000

	31
3	$\overline{10}\,\overline{00}$
+3	9
61	100
+1	61

	32
3	$\overline{10}\,\overline{00}$
+3	9
62	100
+2	124

Here, $(31)^2$ < 1000 > $(32)^2$

We can say 1000 is (124 – 100) ^{24} less than $(32)^2$.

∴ 24 more plants are needed.

9. There are 500 children in a school. For a P.T. drill they have to stand in such a manner that the number of rows is equal to number of columns. How many children would be left out in this arrangement.

Solution:

Let the number of rows and column be, x.

∴ Total number of row and column= x × x = x^2 As per question, x^2 = 500

x = √500

	22
2	$\overline{5}\,\overline{00}$
+2	4
42	100
+2	84
44	16

Hence, 16 children would be left out in the arrangement