Square Roots And Cube Roots

Exercise 6.1

Q. 1. A. What will be the units digit of the square of the following numbers?

39

Answer : Given a number 39 and need to find out the unit digit of the square of number.

Now, the square of number, $n = n^2$

Since, we have “9” as the unit place in the number “39”.

$\Rightarrow 9^2 = 81$

$\Rightarrow$ 1 will be the unit digit of square of 39.

Hence, the units’ digit of the square of 39 is 1.

Q. 1. B. What will be the units digit of the square of the following numbers?

297

Answer : Given a number 297 and need to find out the unit digit of the square of number.

Now, the square of number, $n = n^2$

Since, we have “7” in the units place in the given number “297” we have to square the number 7

$\Rightarrow 7^2 = 49$ and 9 will be the units’ digit.

Hence, the units digit of the square of 297 is 9.

Q. 1. C. What will be the units digit of the square of the following numbers?

5125

Answer : Given a number 5125 and need to find out the unit digit of the square of number.

Now, the square of number, $n = n^2$

Since, we have “5” in the units place in the given number “5125” we have to square the number 5

⇒ 5^2 = 25 and 5 will be the units’ digit.

Hence, the units digit of the square of 5125 is 5.

Q. 1. D. What will be the units digit of the square of the following numbers?

7286

Answer : Given a number 7286 and need to find out the unit digit of the square of number.

Now, the square of number, n = n^2

Since, we have “6” in the units place in the given number “7286” we have to square the number 6

⇒ 6^2 = 36

⇒ 6 will be the units’ digit.

Hence, the units digit of the square of 7286 is 6.

Q. 1. E. What will be the units digit of the square of the following numbers?

8742

Answer : Given a number 8742 and need to find out the unit digit of the square of number.

Now, the square of number, n = n^2

Since, we have “2” in the units place in the given number “8742” we have to square the number 2

⇒ 2^2 = 4

⇒ 4will be the units’ digit.

Hence, the units digit of the square of 8742 is 4.

Q. 2. A. Which of the following numbers are perfect squares?

121

Answer : Given, a number 121 and need to find out whether it is perfect square or not.

Now, we have the perfect square $m = n * n = n^2$, [T1] where m and n are integers

⇒ 121 is a perfect square as it can be expressed as 11 × 11 form the product of two equal integer.

⇒121 = 11 × [T2] 11

Hence, 121 is a perfect square.

Q. 2. B . Which of the following numbers are perfect squares?

136

Answer : Given a number 136 and need to find out whether it is perfect square or not.

Now, we have the perfect square m = n * n = n^2, where m and n are integers

⇒ 136 is not a perfect square as it cannot be expressed as n × n form the product of two equal integer.

Hence, 136 is not a perfect square.

Q. 2. C. Which of the following numbers are perfect squares?

256

Answer : Given a number 256 and need to find out whether it is perfect square or not.

Now, we have the perfect square m = n * n = n^2, where m and n are integers

⇒ 256 is a perfect square as it can be expressed as 16 × 16 form the product of two equal integer.

⇒ 256 = 16 × 16

Hence, 256 is a perfect square.

Q. 2. D. Which of the following numbers are perfect squares?

321

Answer : Given a number 321 and need to find out whether it is perfect square or not.

Now, we have the perfect square m = n * n = n^2, where m and n are integers

⇒ 321 is not a perfect square as it cannot be expressed as n × n form the product of two equal integer.

Hence, 321 is not a perfect square.

Q. 2. E. Which of the following numbers are perfect squares?

600

Answer : Given a number 600 and need to find out whether it is perfect square or not.

Now, we have the perfect square $m = n * n = n^2$, where m and n are integers

⇒ 600 is not a perfect square as it cannot be expressed as n × n form the product of two equal integer.

Hence, 600 is not a perfect square.

Q. 3. A. The following numbers are not perfect squares. Give reasons?

257

Answer : Given a number 257 is not perfect square. Need to find out the reason.

Now, we have the perfect square $m = n * n = n^2$, where m and n are integers

⇒ 257 is not a perfect square as it cannot be expressed as n × n form the product of two equal integer and the number that have 2,3,7 or 8 in the units place are not perfect squares.

Hence, the given number 257 is not a perfect square.

Q. 3. B. The following numbers are not perfect squares. Give reasons?

4592

Answer : Given a number 4592 is not perfect square. Need to find out the reason.

Now, we have the perfect square $m = n * n = n^2$, where m and n are integers

⇒ 4592 is not a perfect square as it cannot be expressed as n × n form the product of two equal integer and the number that have 2,3,7 or 8 in the units place are not perfect squares.

Hence, the given number 4592 is not a perfect square.

Q. 3. C. The following numbers are not perfect squares. Give reasons?

2433

Answer : Given a number 2433 is not perfect square. Need to find out the reason.

Now, we have the perfect square $m = n * n = n^2$, where m and n are integers

⇒ 2433 is not a perfect square as it cannot be expressed as n × n form the product of two equal integer and the number that have 2,3,7 or 8 in the units place are not perfect squares.

Hence, the given number 2433 is not a perfect square.

Q. 3. D. The following numbers are not perfect squares. Give reasons?

5050

Answer : Given a number 5050 is not perfect square. Need to find out the reason.

Now, we have the perfect square $m = n * n = n^2$, where m and n are integers

⇒ 5050 is not a perfect square as it cannot be expressed as n × n form the product of two equal integer.

Hence, the given number 5050 is not a perfect square.

Q. 3. E. The following numbers are not perfect squares. Give reasons?

6098

Answer : Given a number 6098 is not perfect square. Need to find out the reason.

Now, we have the perfect square $m = n * n = n^2$, where m and n are integers

⇒ 6098 is not a perfect square as it cannot be expressed as n × n form the product of two equal integer and the number that have 2,3,7 or 8 in the units place are not perfect squares.

Hence, the given number 6098 is not a perfect square.

Q. 4. A. Find whether the square of the following numbers are even or odd?

431

Answer : Given a number 431 and need to find out whether it is even or odd

Now, the square of number, $n = n^2$

Consider units digit of a number 431 and square the units digit number.

⇒ Here, Units digit number is 1

⇒ Square of 1 = 1

⇒ Square the unit digit 1 = 1

⇒ 1 is a odd number

⇒ ∴ square of 431 will be again odd number

Hence, 431 is odd number.

Q. 4. B. Find whether the square of the following numbers are even or odd?

2826

Answer : Given a number 2826 and need to find out whether it is even or odd

Now, the square of number, $n = n^2$

Consider units digit of a number 2826 and square the units digit number.

⇒ Here, Units digit number is 6

⇒ Square of 6 = 36

⇒ 6 is a even number

⇒ ∴ square of 2826 will be again even number

Hence, 2826 is even number.

Q. 4. C. Find whether the square of the following numbers are even or odd?

8204

Answer : Given: A number 8204 and need to find out whether it is even or odd

Now, the square of number, $n = n^2$

Consider units digit of a number 8204 and square the units digit number.

⇒ Here, Units digit number is 4

⇒ Square of 4 = 16

⇒ 4 is a even number

⇒ ∴ square of 8204 will be again even number

Hence, 8204 is even number.

Q. 4. D. Find whether the square of the following numbers are even or odd?

17779

Answer : Given a number 17779 and need to find out whether it is even or odd

Now, the square of number, $n = n^2$

Consider units digit of a number 17779 and square the units digit number.

⇒ Here, Units digit number is 9

⇒ Square of 9 = 81

⇒ 9 is a odd number

⇒ ∴ square of 17779 will be again odd number

Hence, 17779 is odd number.

Q. 4. E. Find whether the square of the following numbers are even or odd?

99998

Answer : Given a number 99998 and need to find out whether it is even or odd

Now, the square of number, $n = n^2$

Consider units digit of a number 99998 and square the units digit number.

⇒ Here, Units digit number is 8

⇒ Square of 8 = 64

⇒ 8 is a even number

⇒ ∴ square of 99998 will be again even number

Hence, 99998 is even number.

Q. 5. A. How many numbers lie between the square of the following numbers

25; 26

Answer : Given, two numbers 25 and 26 we need to find out the numbers lie between the squares of the given numbers.

Now, we have numbers lie between the square of n and (n + 1) as 2n i.e 2 × base of first number.

⇒ Numbers between squares of 25 and (25 + 1) = 2 × 25

⇒ 50

Hence, 50 numbers lies between the square of the given numbers.

Q. 5. B. How many numbers lie between the square of the following numbers

56; 57

Answer : Given, two numbers 56 and 57 we need to find out the numbers lie between the squares of the given numbers.

Now, we have numbers lie between the square of n and (n + 1) as 2n i.e 2 × base of first number.

⇒ Numbers between squares of 56 and (56 + 1) = 2 × 56

⇒112

Hence, 112 numbers lies between the square of the given numbers.

Q. 5. C. How many numbers lie between the square of the following numbers

107;108

Answer : Given, two numbers 107 and 108 we need to find out the numbers lie between the squares of the given numbers.

Now, we have numbers lie between the square of n and (n + 1) as 2n i.e 2 × base of first number.

⇒ Numbers between squares of 107 and (107 + 1) = 2 × 107

⇒ 214

Hence, 214 numbers lies between the square of the given numbers.

Q. 6. A. Without adding, find the sum of the following numbers

1 + 3 + 5 + 7 + 9 =

Answer : Given, 5 consecutive odd numbers sum. To find out, the sum of consecutive odd numbers from “1” to “9” without adding.

We have sum of first n odd numbers = n^2.

Here, n = 5

⇒ $1 + 3 + 5 + 7 + 9 = 5^2$

⇒ 1 + 3 + 5 + 7 + 9 = 25

Hence, the sum of 1 + 3 + 5 + 7 + 9 without adding = 25

Q. 6. B. Without adding, find the sum of the following numbers

1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 =

Answer : Given, 9 consecutive odd numbers sum. To find out, the sum of consecutive odd numbers from “1” to “17” without adding.

We have sum of first n odd numbers = n^2.

Here, n = 9

⇒ $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 = 9^2$

⇒ 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 = 81

Hence, the sum of 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 without adding = 81

Q. 6. C. Without adding, find the sum of the following numbers

1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 =

Answer : Given, 13 consecutive odd numbers sum. To find out, the sum of consecutive odd numbers from “1” to “25” without adding.

We have sum of first n odd numbers = n^2.

Here, n = 13

⇒ 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 = 13^2

⇒ 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 = 169

Hence, the sum of 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 without adding = 169

Exercise 6.2

Q. 1. A. Find the square roots of the following numbers by Prime factorization method.

441

Answer : Given, a number as 441. We need to find out the square root using prime factorization method.

Step 1: Resolve the given number into prime factors, we get

7	441
3	63
3	21
	7

⇒7 × 3 × 3 × 7

Step 2: Make pairs of equal factors, we get

⇒ (3 × 3) × (7 × 7)

Step 3: Choosing one factor out of every pair, we get

⇒3 × 7

⇒ 21

Hence, 21 is the square root of the given number 441 using prime factorization method

Q. 1. B. Find the square roots of the following numbers by Prime factorization method.

784

Answer : Given, a number as 784. We need to find out the square root using prime factorization method.

Step 1: Resolve the given number into prime factors, we get

2	784
2	392
2	196
2	98
7	49
	7

⇒ 2 × 2 × 2 × 2 × 7 × 7

Step 2: Make pairs of equal factors, we get

⇒ (2 × 2) × (2 × 2) × (7 × 7)

Step 3: Choosing one factor out of every pair, we get

⇒ 2 × 2 × 7

⇒ 28

Hence, 28 is the square root of the given number 784 using prime factorization method

Q. 1. C. Find the square roots of the following numbers by Prime factorization method.

4096

Answer : Given, a number as 4096. We need to find out the square root using prime factorization method.

Step 1: Resolve the given number into prime factors, we get

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

⇒2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2

Step 2: Make pairs of equal factors, we get

⇒ (2 × 2) × (2 × 2) × (2 × 2) × (2 × 2) × (2 × 2) × (2 × 2)

Step 3: Choosing one factor out of every pair, we get

⇒ 2 × 2 × 2 × 2 × 2 × 2

⇒ 64

Hence, 64 is the square root of the given number 4096 using prime factorization method

Q. 1. D. Find the square roots of the following numbers by Prime factorization method.

7056

Answer : Given, a number as 7056. We need to find out the square root using prime factorization method.

Step 1: Resolve the given number into prime factors, we get

2	7056
2	3528
2	1764
2	882
7	441
7	63
3	9
	3

⇒ 2 × 2 × 2 × 2 × 7 × 7 × 3 × 3

Step 2: Make pairs of equal factors, we get

⇒ (2 × 2) × (2 × 2) × (7 × 7) × (3 × 3)

Step 3: Choosing one factor out of every pair, we get

⇒ 2 × 2 × 7 × 3

⇒ 84

Hence, 84 is the square root of the given number 7056 using prime factorization method

Q. 2. Find the smallest number by which 3645 must be multiplied to get a perfect square.

Answer : Given, a number as 3645. We need to find out a number which if multiplied by the given number we should get a perfect square.

Step 1: Resolve 3645 into prime factors

5	3645
9	729
9	81
3	9
	3

We get, 5 × 9 × 9 × 3 × 3

Step 2: Pair the factors obtained

⇒ (9 × 9) × (3 × 3) × 5

Step 3: multiply the number with the factor which is alone.

Here, 9,3 are in pair and 5 is alone.

So, we must multiply the given number by 5 to get a perfect square.

⇒ 3645 × 5 = 18225.

Hence, 5 should be multiplied to the given number “3645” to make it perfect square.

Q. 3. Find the smallest number by which 2400 is to be multiplied to get a perfect square and also find the square root of the resulting number.

Answer : Given, a number as 2400. We need to find out a number which if multiplied by the given number we should get a perfect square.

To find out square root of the resulting number

Step 1: Resolve 2400 into prime factors

3	2400
2	800
5	400
2	80
5	40
2	8
2	4
	2

We get, 3 × 2 × 5 × 2 × 5 × 2 × 2 × 2

Step 2: Pair the factors obtained

⇒ (2 × 2) × (5 × 5) × (2 × 2) × 3 × 2

Step 3: multiply the number with the factor which is alone.

Here, 2,5 are in pairs and 3,2 are alone.

So, we must multiply the given number by 3 × 2 to get a perfect square.

⇒ 2400 × 3 × 2 = 2400 × 6 = 14400.

Step 4: The resulting number obtained is 14400

2	14400
2	7200
2	3600
2	1800
3	900
3	300
2	100
2	50
5	25
	5

Square root is found out using common factors

$$\Rightarrow \sqrt{14400} = \sqrt{(5*5)*(2*2)*(3*3)*(2*2)*(2*2)}$$

= 5 × 2 × 3 × 2 × 2

= 120

Hence, 6 should be multiplied to the given number “2400” to make it perfect square. The square root of the resulting number is 120.

Q. 4. Find the smallest number by which 7776 is to be divided to get a perfect square.

Answer : Given, a number as 7776. We need to find out a number which if divided by the given number we should get a perfect square.

Step 1: Resolve 7776 into prime factors

2	7776
2	3888
2	1944
2	972
2	486
3	243
3	81
3	27
3	9
	3

We get, 2 × 2 × 2 × 2 × 2 × 3 × 3 × 3 × 3 × 3

Step 2: Pair the factors obtained

⇒ (2 × 2) × (2 × 2) × (3 × 3) × (3 × 3) × 3 × 2

Step 3: divide the number with the factor which are alone.

Here, 2,3are in pairs and 3,2 are alone.

⇒ 3 × 2 = 6

⇒ $\frac{7776}{6}$ = 1296.

Hence, 6 is the smallest number which is to be multiplied to the given number to get perfect square.

Q. 5. 1521 trees are planted in a garden in such a way that there are as many trees in each row as there are rows in the garden. Find the number of rows and number of trees in each row.

Answer : Given, 1521 trees are planted in a garden. We need to find out number of rows and number of trees.

Let us assume the number of trees in each row = x.

Since, we know that number of trees in each row = number of rows in the garden.

Total number of trees planted in a garden = x × x = x^2

Calculate x value.

∴ x^2 = 1521

Calculate, prime factors for 1521.

3	1521
3	507
13	169
	13

We know from pairing the factors

⇒ x^2 = (3 × 3) × (13 × 13)

$\Rightarrow x^2 = 3 \times 13$

$\Rightarrow X = 39$

Hence, the number of trees in each row is 39 and number of rows in the garden is also 39.

Q. 6. A school collected ` 2601 as fees from its students. If fee paid by each student and number students in the school were equal, how many students were there in the school?

Answer : Given, 2601 fees collected from the students. We need to find out number of students and fees paid by each student.

Let us assume the number of students in a school = x.

Since, we know that fee paid by each student = number of students in the school.

Total number of fees collected by the student = $x \times x = x^2$

Calculate x value.

$\therefore x^2 = 2601$

Calculate prime factors for 2601.

51	2601
	51

We know from pairing the factors

$\Rightarrow x^2 = (51 \times 51)$

$\Rightarrow X = 51$

Hence, the number of students in the school is 51.

Q. 7. The product of two numbers is 1296. If one number is 16 times the other, find the two numbers?

Answer : Given, the product of two numbers = 1296 and one number is 16 times the other.

Let us, consider the number as x and other number as 16x.

Now, the product of two numbers = 1296

$$\Rightarrow x * 16x = 1296$$

$$\Rightarrow 16x^2 = 1296$$

$$\Rightarrow x^2 = \frac{1269}{16}$$

$$\Rightarrow x^2 = 81$$

$$\Rightarrow x = \sqrt{81}$$

$$\Rightarrow x = 9$$

Another number is 16x = 144

∴ The numbers are 9 and 144

Q. 8. 7921 soldiers sat in an auditorium in such a way that there are as many soldiers in a row as there are rows in the auditorium. How many rows are there in the auditorium?

Answer : Given, 7921 soldiers in a auditorium. We need to find out number of rows and number of soldiers.

Let us assume the number of soldiers in each row = x.

Since, we know that number of soldiers in each row = number of rows in the auditorium.

Total number of soldiers = x × x = x^2

Calculate x value.

∴ x^2 = 7921

Calculate prime factors for 7921.

89	7921
	89

We know from pairing the factors

$\Rightarrow x^2 = (89 \times 89)$

$\Rightarrow X = 89$

Hence, number of rows in the auditorium is 89.

Q. 9. The area of a square field is 5184 m^2. Find the area of a rectangular field, whose perimeter is equal to the perimeter of the square field and whose length is twice of its breadth.

Answer : Given, the area of a square field as 5184m^2

We need to find out the area of a rectangular field.

We know that perimeter of a rectangular field = perimeter of the square field and length = twice breadth.

Now, Area of a square field = 5184m^2

Area of a square = s × s, where s is side

$\Rightarrow \sqrt{5184} = 72$

Perimeter of a square field = 4 × s

= 4 × 72 = 288m

Perimeter of a square field = 288m = perimeter of a rectangular field.

Let breadth (b) = x and length (l) = 2x

We know that perimeter = 2 × (l + b)

= 2 × (2x + x)

= 2 × (3x)

= 6x

Here, 6x = 288m

⇒ 6x = 288

$$\Rightarrow x = \frac{288}{6}$$

⇒ x = 48m

Hence, breadth is 48m and length is 2 × 48 = 96m

Exercise 6.3

Q. 1. A. Find the square roots of the following numbers by division method.

1089

Answer : Given, a number as 1089.

We need to find out the square root using division method

Step 1: Pair the given digit number, starting from units place to left as 10 and 89

Step 2: Find the largest number whose square is less than or equal to the first pair or single digit from left. Here we get 3 × 3 = 9

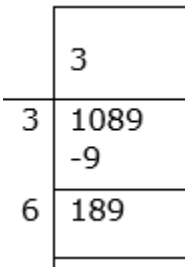
	3
3	1089 -9

Step 3: Subtract the resulted value 9 from the number

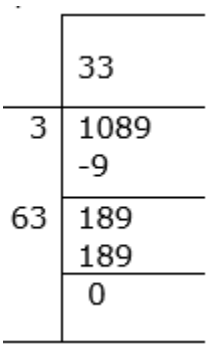
Step 4 : Bring down the second pair 89 to the right of the remainder

	3
3	1089 -9
	189

Step 5: double the quotient 3



Step 6: Guess the possible value such that the product is equal to or less than new dividend



Hence, the square root of 1089 is 33

Q. 1. B. Find the square roots of the following numbers by division method.

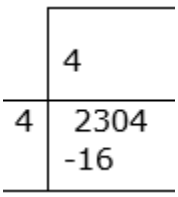
2304

Answer : Given, a number as 2304.

We need to find out the square root using division method

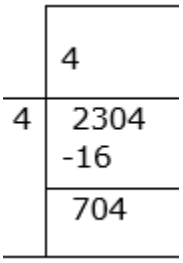
Step 1: Pair the given digit number, starting from units place to left as 23 and 04

Step 2: Find the largest number whose square is less than or equal to the first pair or single digit from left.

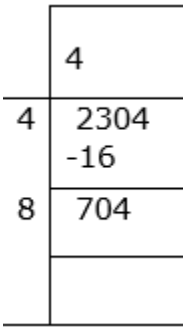


Step 3: Subtract the resulted value 16 from the given number

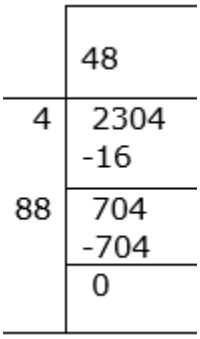
Step 4 : Bring down the second pair 04 to the right of the remainder



Step 5: double the quotient 4 + 4 = 8



Step 6: Guess the possible value such that the product is equal to or less than new dividend



Hence, the square root of 2304 is 48

Q. 1. C. Find the square roots of the following numbers by division method.

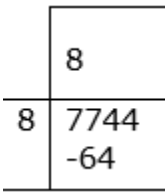
7744

Answer : Given, a number as 7744.

We need to find out the square root using division method

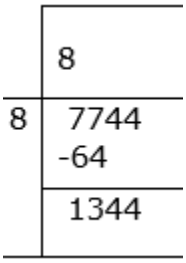
Step 1: Pair the given digit number, starting from units place to left as 77 and 44

Step 2: Find the largest number whose square is less than or equal to the first pair or single digit from left.

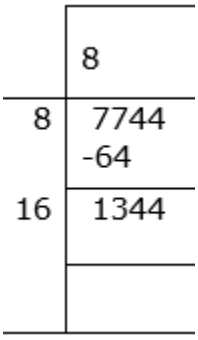


Step 3: Subtract the resulted value 64 from the given number

Step 4 : Bring down the second pair 04 to the right of the remainder



Step 5: double the quotient 8 + 8 = 16



Step 6: Guess the possible value such that the product is equal to or less than new dividend

	88
8	7744
	-64
168	1344
	-1344
	0

Hence, the square root of 7744 is 88

Q. 1. D. Find the square roots of the following numbers by division method.

6084

Answer : Given, a number as 6084.

We need to find out the square root using division method

Step 1: Pair the given digit number, starting from units place to left as 60 and 84

Step 2: Find the largest number whose square is less than or equal to the first pair or single digit from left.

	7
7	6084
	-49

Step 3: Subtract the resulted value 49 from the given number

Step 4 : Bring down the second pair 84 to the right of the remainder

	7
7	6084
	-49
	1184

Step 5: double the quotient 7 + 7 = 14

	7
7	6084 -49
14	1184

Step 6: Guess the possible value such that the product is equal to or less than new dividend

	78
8	6084 -49
148	1184 -1184
	0

Hence, the square root of 6084 is 78

Q. 1. E. Find the square roots of the following numbers by division method.

9025

Answer : Given, a number as 9025.

We need to find out the square root using division method

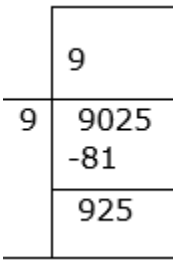
Step 1: Pair the given digit number, starting from units place to left as 90 and 25

Step 2: Find the largest number whose square is less than or equal to the first pair or single digit from left.

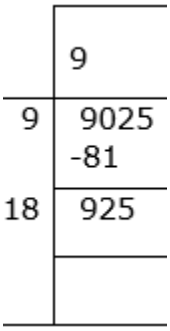
	9
9	9025 -81

Step 3: Subtract the resulted value 81 from the given number

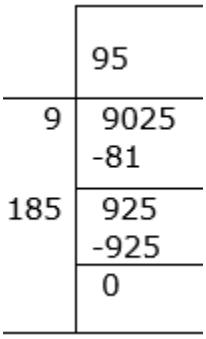
Step 4 : Bring down the second pair 25 to the right of the remainder



Step 5: double the quotient 9 + 9 = 18



Step 6: Guess the possible value such that the product is equal to or less than new dividend



Hence, the square root of 9025 is 95

Q. 2. A. Find the square roots of the following decimal numbers.

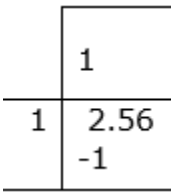
2.56

Answer : Given, a decimal number as 2.56.

We need to find out the square root using division method

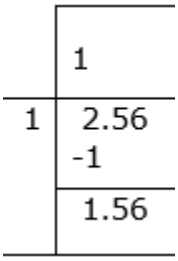
Step 1: Pair the given digit number, starting from units place to left as 2 and 56

Step 2: Find the largest number whose square is less than or equal to the first pair or single digit from left.

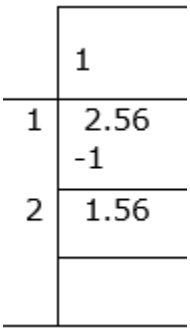


Step 3: Subtract the resulted value 1 from the given number

Step 4 : Bring down the second pair .56 to the right of the remainder



Step 5: double the quotient 1 + 1 = 2



Step 6: Guess the possible value such that the product is equal to or less than new dividend

	1.6
1	2.56 -1
2.6	1.56 -1.56
	0

Hence, the square root of 2.56 is 1.6

Q. 2. B. Find the square roots of the following decimal numbers.

18.49

Answer : Given, a decimal number as 18.49.

We need to find out the square root using division method

Step 1: Pair the given digit number, starting from units place to left as 18 and 49

Step 2: Find the largest number whose square is less than or equal to the first pair or single digit from left.

	4
4	18.49 -16

Step 3: Subtract the resulted value 16 from the given number

Step 4 : Bring down the second pair .49 to the right of the remainder

	4
4	18.49 -16
	2.49

Step 5: double the quotient 4 + 4 = 8

	4
4	18.49 -16
8	2.49

Step 6: Guess the possible value such that the product is equal to or less than new dividend

	4.3
4	18.49 -16
8.3	2.49 -2.49
	0

Hence, the square root of 18.49 is 4.3

Q. 2. C. Find the square roots of the following decimal numbers.

68.89

Answer : Given, a decimal number as 68.89.

We need to find out the square root using division method

Step 1: Pair the given digit number, starting from units place to left as 68 and 89

Step 2: Find the largest number whose square is less than or equal to the first pair or single digit from left.

	8
8	68.89 -64

Step 3: Subtract the resulted value 64 from the given number

Step 4 : Bring down the second pair .89 to the right of the remainder

	8
8	68.89 -64
	4.89

Step 5: double the quotient 8 + 8 = 16

	8
8	68.89 -64
16	4.89

Step 6: Guess the possible value such that the product is equal to or less than new dividend

	8.3
8	68.89 -64
16.3	4.89 -4.89
	0

Hence, the square root of 68.89 is 8.3

Q. 2. D. Find the square roots of the following decimal numbers.

84.64

Answer : Given, a decimal number as 84.64.

We need to find out the square root using division method

Step 1: Pair the given digit number, starting from units place to left as 84 and 64

Step 2: Find the largest number whose square is less than or equal to the first pair or single digit from left.

	9
9	84.64 -81

Step 3: Subtract the resulted value 81 from the given number

Step 4 : Bring down the second pair .64 to the right of the remainder

	9
9	84.64 -81
	3.64

Step 5: double the quotient 9 + 9 = 18

	9
9	84.64 -81
18	3.64

Step 6: Guess the possible value such that the product is equal to or less than new dividend

	9.2
9	84.64 -81
18.2	3.64 -3.64
	0

Hence, the square root of 84.64 is 9.2

Q. 3. Find the least number that is to be subtracted from 4000 to make it perfect square

Answer : Given, a number as 4000.

Need to find out the least number which must be subtracted to make it a perfect square.

Now, using by division method we get

	63
6	4000 -36
123	400 -369
	31

That means if we subtract 31 from 4000 we get perfect square

⇒ 4000 – 31 = 3969.

$\sqrt{3969} = 63.$

Hence, 31 must be subtracted from the given number to get a perfect square

Q. 4. Find the length of the side of a square whose area is 4489 sq.cm.

Answer : Given, area of square as 4489 sq.cm

We need to find out the length.

Now, we know that area = l × l

Area = l^2

$\Rightarrow l^2 = 4489$

$\Rightarrow l = \sqrt{4489}$

$= \sqrt{(67 * 67)}$

$\Rightarrow l = 67$ cm

Hence, the length of the side of a given square is 67cm

Q. 5. A gardener wishes to plant 8289 plants in the form of a square and found that there were 8 plants left. How many plants were planted in each row?

Answer : Given, 8289 plants are to be planted in the form of square with 8 left to be planted.

We need to find out number of plants planted in each row.

Since, 8 plants are left from the given number of plants

= 8289 – 8

= 8281

To form a square number of plants planted in each row = number of rows.

Consider it as x

⇒ x × x = 8281

$\Rightarrow X^2 = 8281$

X = 91.

Hence, 91 plants are planted in each row.

Q. 6. Find the least perfect square with four digits.

Answer : We need to find out the least perfect square with four digits

Let us consider a four digit number as 1000 which is not a perfect square.

Now, we must find out a number when it is added to this number the resultant number will be a perfect square.

Using division method we get

	31
3	1000 -9
61	100 -61
	39

We know that 1000 lies between 31^2 and 32^2

$\Rightarrow 31^2 < 1000 < 32^2$

$\Rightarrow 32^2 – 1000$

$= 1024 – 1000$

$= 24$

24 must be added to 1000 we get 1024

Hence, the least perfect square with four digit is 1024

Q. 7. Find the least number which must be added to 6412 to make it a perfect square?

Answer : Given, a number as 6412.

Need to find out the least number which must be added to make it a perfect square.

Now, using by division method we get

	80
8	6412 -64
16	0012

This shows that 6412 lies between 80^2 and 81^2

$\Rightarrow 80^2 < 6412 < 81^2$

$\therefore$ The number to be added is $81^2 - 6412$

$= 6561 - 6412$

$= 149$

Hence, 149 must be added to make the given number as perfect square.

Q. 8. A. Estimate the value of the following numbers to the nearest whole number

$\sqrt{97}$

Answer : Given, a number as 97. We need to estimate the value of the number to the nearest whole number.

97 lies between 81 and 100

$\Rightarrow 9^2 = 81$ and $10^2 = 100$

$\therefore 81 < 97 < 100$

$\Rightarrow 9 < \sqrt{97} < 10$

Thus, the approximate value of $\sqrt{97}$ is 9

Q. 8. B. Estimate the value of the following numbers to the nearest whole number

$\sqrt{250}$

Answer : Given, a number as 250. We need to estimate the value of the number to the nearest whole number.

250 lies between 225 and 256

$\Rightarrow 15^2 = 225$ and $16^2 = 256$

$\therefore 225 < 250 < 256$

$\Rightarrow 15 < \sqrt{250} < 16$

Thus, the approximate value of $\sqrt{250}$ is 15

Q. 8. C. Estimate the value of the following numbers to the nearest whole number

$\sqrt{780}$

Answer : Given, a number as 780. We need to estimate the value of the number to the nearest whole number.

780 lies between 729 and 784

$\Rightarrow 27^2 = 729$ and $28^2 = 784$

$\therefore 729 < 780 < 784$

$\Rightarrow 27 < \sqrt{780} < 28$

Thus, the approximate value of $\sqrt{780}$ is 27

Exercise 6.4

Q. 1. A. Find the cubes of the following numbers

8

Answer : Given, a number as 8. We need to find out the cube of the number.

Now, we know cube of a number as n^3

$\Rightarrow 8^3$

$\Rightarrow 512$

Hence, the cube of a given number 8 is 512.

Q. 1. B. Find the cubes of the following numbers

16

Answer : Given, a number as 16. We need to find out the cube of the number.

Now, we know cube of a number as n^3

$\Rightarrow 16^3$

$\Rightarrow 4096$

Hence, the cube of a given number 16 is 4096.

Q. 1. C. Find the cubes of the following numbers

21

Answer : Given, a number as 21. We need to find out the cube of the number.

Now, we know cube of a number as n^3

$\Rightarrow 21^3$

$\Rightarrow 9261$

Hence, the cube of a given number 21 is 9261.

Q. 1. D. Find the cubes of the following numbers

30

Answer : Given, a number as 30. We need to find out the cube of the number.

Now, we know cube of a number as n^3

$\Rightarrow 30^3$

$\Rightarrow 27000$

Hence, the cube of a given number 30 is 27000.

Q. 2. A. Test whether the given numbers are perfect cubes or not.

243

Answer : Given, a number 243 and need to find out whether it is perfect cube or not.

Now, we have the perfect cube $m = n * n * n = n^3$, where m and n are integers

⇒ 243 is not a perfect cube as it cannot be expressed as n × n × n form the product of three equal integer.

Hence, 243 is not a perfect cube.

Q. 2. B. Test whether the given numbers are perfect cubes or not.

516

Answer : Given, a number 516 and need to find out whether it is perfect cube or not.

Now, we have the perfect cube $m = n * n * n = n^3$, where m and n are integers

⇒ 516 is not a perfect cube as it cannot be expressed as n × n × n form the product of three equal integer.

Hence, 516 is not a perfect cube

Q. 2. C. Test whether the given numbers are perfect cubes or not.

729

Answer : Given, a number 729 and need to find out whether it is perfect cube or not.

Now, we have the perfect cube $m = n * n * n = n^3$, where m and n are integers

⇒ 729 is a perfect cube as it can be expressed as

n × n × n form the product of three equal integer.

⇒ 729 = 9 × 9 × 9

Hence, 729 is a perfect cube.

Q. 2. D. Test whether the given numbers are perfect cubes or not.

8000

Answer : Given, a number 8000 and need to find out whether it is perfect cube or not.

Now, we have the perfect cube $m = n * n * n = n^3$, where m and n are integers

⇒ 8000 is a perfect cube as it can be expressed as

n × n × n form the product of three equal integer.

⇒ 8000 = 20 × 20 × 20

Hence, 8000 is a perfect cube.

Q. 2. E. Test whether the given numbers are perfect cubes or not.

2700

Answer : Given, a number 2700 and need to find out whether it is perfect cube or not.

Now, we have the perfect cube $m = n * n * n = n^3$, where m and n are integers

⇒ 2700 is not a perfect cube as it cannot be expressed as n × n × n form the product of three equal integer.

Hence, 2700 is not a perfect cube

Q. 3. Find the smallest number by which 8788 must be multiplied to obtain a perfect cube?

Answer : Given, a number as 8788. We need to find out a number which if multiplied by the given number we get a perfect cube.

Step 1: Resolve 8788 into prime factors

2	8788
2	4394
13	2197
13	169
	13

We get, 2 × 2 × 13 × 13 × 13

Step 2: Pair the factors obtained in the group of three

⇒ (2 × 2) × (13 × 13 × 13)

Step 3: multiply the number with the factor which is alone.

Here, 13 is in group of three and 2 is alone.

⇒ 8788 × 2 = 17576

Hence, 2 is the smallest number which is to be multiplied to the given number for perfect cube.

Q. 4. What smallest number should 7803 be multiplied with so that the product becomes a perfect cube?

Answer : Given, a number as 7803. We need to find out a number which if multiplied by the given number we get a perfect cube.

Step 1: Resolve 7803 into prime factors

3	7803
3	2601
3	867
17	289
	17

We get, 3 × 3 × 3 × 17 × 17

Step 2: Pair the factors obtained in the group of three

⇒ (3 × 3 × 3) × (17 × 17)

Step 3: multiply the number with the factor which is alone.

Here, 3 is in group of three and 17 is alone.

⇒ 7803 × 17 = 132651

Hence, 17 is the smallest number which is to be multiplied to the given number for perfect cube.

Q. 5. Find the smallest number by which 8640 must be divided so that the quotient is a perfect cube?

Answer : Given, a number as 8640. We need to find out a number which if divided by the given number we get quotient as a perfect cube.

Step 1: Resolve 8640 into prime factors

2	8640
2	4320
2	2160
2	1080
2	540
2	270
5	135
3	27
3	9
	3

We get, 2 × 2 × 2 × 2 × 2 × 2 × 5 × 3 × 3 × 3

Step 2: Pair the factors obtained in the group of three

⇒ (2 × 2 × 2) × (2 × 2 × 2) × (3 × 3 × 3) × 5

Step 3: divide the number with the factor which is alone.

Here, 2, 3 is in group of three and 5 is alone.

$$\Rightarrow \frac{8640}{5} = 1728$$

Hence, 5 is the smallest number which is to be divided to the given number for perfect cube.

Q. 6. Ravi made a cuboid of plasticine of dimensions 12cm, 8cm and 3cm. How many minimum numbers of such cuboids will be needed to form a cube?

Answer : Given, a cubiod with sides as 12cm, 8 cm and 3cm

To find out number of cuboids required to form a cube.

Volume of the cubiod = 12 × 8 × 3 cm^3

The cube is formed by stacking many such cuboids and it will have side lengths which are multiple of 12,8,3 cm

The smallest such cube will have a side length of LCM(12,8,3)

LCM is found out as follows:

3	3,8,12
4	1,8,4
2	1,2,1
	1,1,1

LCM is 3 × 4 × 2 = 24 cm

And a volume = (24 × 24 × 24)cm

$$\therefore \text{Number of cuboids to fit in a cube} = \frac{24*24*24}{12*8*3}$$

= 2 × 24

= 48

Hence, 48 cuboids are needed to form a cube

Q. 7. Find the smallest prime number dividing the sum $3^{11} + 5^{13}$.

Answer : Given, the sum of 3^{11} and 5^{13}

We need to find out smallest prime numbers.

We know that sum of two odd numbers is even and any even number is divisible by 2.

Hence, the sum of 3^{11} and 5^{13} is divisible by 2 which is the smallest prime number.

Exercise 6.5

Q. 1. A. Find the cube root of the following numbers by prime factorization method.

343

Answer : Given, a number as 343. We need to find out the cube root using prime factorization method.

Step 1: Resolve the given number into prime factors, we get

7	343
7	49
7	7
	1

343 = 7 × 7 × 7 × 1

Step 2: Make pairs of equal factors, we get

⇒ (7 × 7 × 7) × 1

Step 3: Choosing one factor out of every pair, we get

⇒ 7

Hence, 7 is the cube root of the given number 343 using prime factorization method

Q. 1. B. Find the cube root of the following numbers by prime factorization method.

729

Answer : Given, a number as 729. We need to find out the cube root using prime factorization method.

Step 1: Resolve the given number into prime factors, we get

3	729
3	243
3	81
3	27
3	9
	3

⇒ 3 × 3 × 3 × 3 × 3 × 3

Step 2: Make pairs of equal factors, we get

⇒ (3 × 3 × 3) × (3 × 3 × 3)

Step 3: Choosing one factor out of every pair, we get

⇒ 3 × 3

⇒ 9

Hence, 9 is the cube root of the given number 729 using prime factorization method

Q. 1. C. Find the cube root of the following numbers by prime factorization method.

1331

Answer : Given, a number as 1331. We need to find out the cube root using prime factorization method.

Step 1: Resolve the given number into prime factors, we get

11	1331
11	121
	11

⇒ 11 × 11 × 11

Step 2: Make pairs of equal factors, we get

⇒ (11 × 11 × 11)

Step 3: Choosing one factor out of every pair, we get

⇒ 11

Hence, 11 is the cube root of the given number 1331 using prime factorization method

Q. 1. D. Find the cube root of the following numbers by prime factorization method.

2744

Answer : Given, a number as 2744. We need to find out the cube root using prime factorization method.

Step 1: Resolve the given number into prime factors, we get

2	2744
2	1372
2	686
7	343
7	49
	7

⇒ 2 × 2 × 2 × 7 × 7 × 7

Step 2: Make pairs of equal factors, we get

⇒ (2 × 2 × 2) × (7 × 7 × 7)

Step 3: Choosing one factor out of every pair, we get

⇒ 2 × 7 = 14

Hence, 14 is the cube root of the given number 2744 using prime factorization method

Q. 2. A. Find the cube root of the following numbers through estimation?

512

Answer : Given number as 512. We need to find out the cube root using estimation method.

Step 1: start making groups of three digits starting from the units place.

⇒ 512 as first group and it has no second group

Step 2: first group will give us the units digit of the cube root.

⇒ 512 ends with 2, cube of 2 = 2^3 = 8

∴ 8 will go in units place

Step 3: Now, we do not have second group to calculate

8 becomes the required cube root.

$\therefore \sqrt[3]{512} = 8$

Hence, the cube root of 512 using estimation method is 8

Q. 2. B. Find the cube root of the following numbers through estimation?

2197

Answer : Given number as 2197. We need to find out the cube root using estimation method.

Step 1: start making groups of three digits starting from the units place.

⇒ 197 as first group and 2 as second group

Step 2: first group will give us the units digit of the cube root.

⇒ 197 ends with 7, cube of 7 = 7^3 = 343

∴ 3 will go in units place

Step 3: Now, take second group. i.e 2

⇒ We know $1^3 < 2 < 3^3$

As the smallest number is 1, it becomes the tens place of the required cube root.

$$\therefore \sqrt[3]{2197} = 13$$

Hence, the cube root of 2197 using estimation method is 13

Q. 2. C. Find the cube root of the following numbers through estimation?

3375

Answer : Given number as 3375. We need to find out the cube root using estimation method.

Step 1: start making groups of three digits starting from the units place.

⇒ 375 as first group and 3 as second group

Step 2: first group will give us the units digit of the cube root.

⇒ 375 ends with 5, cube of 5 = 5^3 = 125

∴ 5 will go in units place

Step 3: Now, take second group. i.e 3

⇒ We know $1^3 < 3 < 2^3$

As the smallest number is 1, it becomes the tens place of the required cube root.

$$\therefore \sqrt[3]{3375} = 15$$

Hence, the cube root of 3375 using estimation method is 15

Q. 2. D. Find the cube root of the following numbers through estimation?

5832

Answer : Given number as 5832. We need to find out the cube root using estimation method.

Step 1: start making groups of three digits starting from the units place.

⇒ 832 as first group and 5 as second group

Step 2: first group will give us the units digit of the cube root.

⇒ 832 ends with 2, cube of 2 = 2^3 = 8

∴ 8 will go in units place

Step 3: Now, take second group. i.e 5

⇒ We know $1^3 < 5 < 2^3$

As the smallest number is 1, it becomes the tens place of the required cube root.

$\therefore \sqrt[3]{5832} = 18$

Hence, the cube root of 5832 using estimation method is 18

Q. 3. A. State true or false?

Cube of an even number is an odd number

Answer : The given statement is false

Consider cube of even numbers

⇒ $2^3 = 8$, $4^3 = 64$,$6^3 = 216$ all are even numbers.

Hence, it is false that the cube of an even number is an odd number

Q. 3. B. State true or false?

A perfect cube may end with two zeros

Answer : The given statement is false

Since, a perfect cube ends with three zeros

⇒ Consider $10^3 = 1000, 20^3 = 8000$

Hence, it is false that a perfect cube may end with two zeros.

Q. 3. C. State true or false?

If a number ends with 5, then its cube ends with 5

Answer : The given statement is true.

Consider a number 5

⇒ Cube of $5 = 5^3 = 125$

Hence, it is true that number ends with 5, then its cube ends with 5

Q. 3. D. State true or false?

Cube of a number ending with zero has three zeros at its right

Answer : The given statement is true.

⇒ Consider a number ending with zero as 10

⇒ Cube of that number is $10^3 = 1000$ (Has three zeros at its right)

Hence, it is true that a number ending with zero has three zeros at its right.

Q. 3. E. State true or false?

The cube of a single digit number may be a single digit number.

Answer : The given statement is true.

Consider a single digit number “2” which is second smallest single digit number.

Cube of $2 = 2^3 = 8$.

⇒ 8 is a single digit number

Hence, it is true that the cube of a single digit number may be a single digit number.

Q. 3. F. State true or false?

There is no perfect cube which ends with 8

Answer : The given statement is false

Since, cube of 2 = 2^3 = 8

Hence, it is false that no perfect cube ends with 8

Q. 3. G. State true or false?

The cube of a two-digit number may be a three-digit number.

Answer : The given statement is false.

⇒ Let us consider, the smallest two-digit number 10

⇒ Cube of 10 = 10^3

⇒ 1000 (not a three-digit number)

Hence, it is false that the cube of a two-digit number may be a three-digit number.

Q. 4. Find the two-digit number which a square number is and also a cubic number.

Answer : Need to find out a two-digit number which is a square number and also a cubic number.

⇒ A number which is a square must equal to = x^2

⇒ A number which is a cube must equal to = y^3

⇒ Number must be sixth power of an integer = z^6

∴ We can have $x = z^3$ and $y = z^2$ so $x^2 = z^6$ and $y^3 = z^6$

By trial and error method $1^6 = 1$, $2^6 = 64$ and $3^6 = 729$ (need two digit number).

So, 64 is the number.

⇒ $8^2 = 64 = 4^3$

Hence, 64 is the two-digit number which is a square number and also cubic number.