

CHAPTER 7 – CUBES AND CUBE ROOTS
CLASS 8 NCERT SOLUTION

Exercise 7.1 Page: 114

1. Which of the following numbers are not perfect cubes?

(i) 216

Solution:

By resolving 216 into prime factor,

2	216
2	108
2	54
3	27
3	9
3	3
	1

$$216 = 2 \times 2 \times 2 \times 3 \times 3 \times 3$$

By grouping the factors in triplets of equal factors, $216 = (2 \times 2 \times 2) \times (3 \times 3 \times 3)$

Here, 216 can be grouped into triplets of equal factors,

$$\therefore 216 = (2 \times 3) = 6$$

Hence, 216 is cube of 6.

(ii) 128

Solution:

By resolving 128 into prime factor,

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$$128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

By grouping the factors in triplets of equal factors, $128 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 2$

Here, 128 cannot be grouped into triplets of equal factors, we are left of with one factors 2 .

\therefore 128 is not a perfect cube.

(iii) 1000 Solution:

By resolving 1000 into prime factor,

2	1000
2	500
2	250
5	125
5	25
5	5
	1

$$1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5$$

By grouping the factors in triplets of equal factors, $1000 = (2 \times 2 \times 2) \times (5 \times 5 \times 5)$

Here, 1000 can be grouped into triplets of equal factors,

$$\therefore 1000 = (2 \times 5)^3 = 10^3$$

Hence, 1000 is cube of 10.

(iv) 100 Solution:

By resolving 100 into prime factor,

2	100
2	50
5	25
5	5
	1

$$100 = 2 \times 2 \times 5 \times 5$$

Here, 100 cannot be grouped into triplets of equal factors.

\therefore 100 is not a perfect cube.

(v) 46656

Solution:

By resolving 46656 into prime factor,

2	46656
2	23328
2	11664
2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

$$46656 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$$

By grouping the factors in triplets of equal factors, $46656 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3) \times (3 \times 3 \times 3)$

Here, 46656 can be grouped into triplets of equal factors,

$$\therefore 46656 = (2 \times 2 \times 3 \times 3) = 36$$

Hence, 46656 is cube of 36.

2. Find the smallest number by which each of the following numbers must be multiplied to obtain a perfect cube.

(i) 243

Solution:

By resolving 243 into prime factor,

3	243
3	81
3	27
3	9
3	3
	1

$$243 = 3 \times 3 \times 3 \times 3 \times 3$$

By grouping the factors in triplets of equal factors, $243 = (3 \times 3 \times 3) \times 3 \times 3$

Here, 3 cannot be grouped into triplets of equal factors.

\therefore We will multiply 243 by 3 to get perfect square.

(ii) 256 Solution:

By resolving 256 into prime factor,

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$$256 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

By grouping the factors in triplets of equal factors, $256 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 2 \times 2$

Here, 2 cannot be grouped into triplets of equal factors.

\therefore We will multiply 256 by 2 to get perfect square.

(iii) 72

Solution:

By resolving 72 into prime factor,

2	72
2	36
2	18
3	9
3	3
	1

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

By grouping the factors in triplets of equal factors, $72 = (2 \times 2 \times 2) \times 3 \times 3$

Here, 3 cannot be grouped into triplets of equal factors.

\therefore We will multiply 72 by 3 to get perfect square.

(iv) 675 Solution:

By resolving 675 into prime factor,

3	675
3	225
3	75
5	25
5	5
	1

$$675 = 3 \times 3 \times 3 \times 5 \times 5$$

By grouping the factors in triplets of equal factors, $675 = (3 \times 3 \times 3) \times 5 \times 5$

Here, 5 cannot be grouped into triplets of equal factors.

∴ We will multiply 675 by 5 to get perfect square.

(v) 100 Solution:

By resolving 100 into prime factor,

2	100
2	50
5	25
5	5
	1

$$100 = 2 \times 2 \times 5 \times 5$$

Here, 2 and 5 cannot be grouped into triplets of equal factors.

∴ We will multiply 100 by (2×5) 10 to get perfect square.

3. Find the smallest number by which each of the following numbers must be divided to obtain a perfect cube.

(i) 81

Solution:

By resolving 81 into prime factor,

3	81
3	27
3	9
3	3
	1

$$81 = 3 \times 3 \times 3 \times 3$$

By grouping the factors in triplets of equal factors, $81 = (3 \times 3 \times 3) \times 3$

Here, 3 cannot be grouped into triplets of equal factors.

∴ We will divide 81 by 3 to get perfect square.

(ii) 128 Solution:

By resolving 128 into prime factor,

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$$128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

By grouping the factors in triplets of equal factors, $128 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 2$

Here, 2 cannot be grouped into triplets of equal factors.

∴ We will divide 128 by 2 to get perfect square.

(iii) 135 Solution:

By resolving 135 into prime factor,

3	135
3	45
3	15
5	5
	1

$$135 = 3 \times 3 \times 3 \times 5$$

By grouping the factors in triplets of equal factors, $135 = (3 \times 3 \times 3) \times 5$

Here, 5 cannot be grouped into triplets of equal factors.

\therefore We will divide 135 by 5 to get perfect square.

(iv) 192 Solution:

By resolving 192 into prime factor,

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

$$192 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$$

By grouping the factors in triplets of equal factors, $192 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 3$

Here, 3 cannot be grouped into triplets of equal factors.

\therefore We will divide 192 by 3 to get perfect square.

(v) 704 Solution:

By resolving 704 into prime factor,

2	704
2	352
2	176
2	88
2	44
2	22
11	11
	1

$$704 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 11$$

By grouping the factors in triplets of equal factors, $704 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 11$

Here, 11 cannot be grouped into triplets of equal factors.

∴ We will divide 704 by 11 to get perfect square.

4. Parikshit makes a cuboid of plasticine of sides 5 cm, 2 cm, 5 cm. How many such cuboids will he need to form a cube?

Solution:

Given, side of cube is 5 cm, 2 cm and 5 cm.

∴ Volume of cube = $5 \times 2 \times 5 = 50$

2	50
5	25
5	5
	1

$$50 = 2 \times 5 \times 5$$

Here, 2, 5 and 5 cannot be grouped into triplets of equal factors.

\therefore We will multiply 50 by $(2 \times 2 \times 5)$ 20 to get perfect square. Hence, 20 cuboid is needed.

Exercise 7.2 Page: 116

1. Find the cube root of each of the following numbers by prime factorisation method.

(i) 64

Solution:

$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

By grouping the factors in triplets of equal factors, $64 = (2 \times 2 \times 2) \times (2 \times 2 \times 2)$

Here, 64 can be grouped into triplets of equal factors,

$$\therefore 64 = 2 \times 2 = 4$$

Hence, 4 is cube root of 64.

(ii) 512

Solution:

$$512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

By grouping the factors in triplets of equal factors, $512 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2)$

Here, 512 can be grouped into triplets of equal factors,

By grouping the factors in triplets of equal factors,

$$13824 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3)$$

Here, 13824 can be grouped into triplets of equal factors,

$$\therefore 13824 = (2 \times 2 \times 2 \times 3) = 24$$

Hence, 24 is cube root of 13824.

(vii) 110592

Solution:

$$110592 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$$

By grouping the factors in triplets of equal factors,

$$110592 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3)$$

Here, 110592 can be grouped into triplets of equal factors,

$$\therefore 110592 = (2 \times 2 \times 2 \times 2 \times 3) = 48$$

Hence, 48 is cube root of 110592.

(viii) 46656

Solution:

$$46656 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$$

By grouping the factors in triplets of equal factors,

$$46656 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3) \times (3 \times 3 \times 3)$$

Here, 46656 can be grouped into triplets of equal factors,

$$\therefore 46656 = (2 \times 2 \times 3 \times 3) = 36$$

Hence, 36 is cube root of 46656.

(ix) 175616

Solution:

$$175616 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 7 \times 7 \times 7$$

By grouping the factors in triplets of equal factors,

$$175616 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (7 \times 7 \times 7)$$

Here, 175616 can be grouped into triplets of equal factors,

$$\therefore 175616 = (2 \times 2 \times 2 \times 7) = 56$$

Hence, 56 is cube root of 175616.

(x) 91125

Solution:

$$91125 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$$

By grouping the factors in triplets of equal factors, $91125 = (3 \times 3 \times 3) \times (3 \times 3 \times 3) \times (5 \times 5 \times 5)$

Here, 91125 can be grouped into triplets of equal factors,

$$\therefore 91125 = (3 \times 3 \times 5) = 45$$

Hence, 45 is cube root of 91125.

2. State true or false.

(i) Cube of any odd number is even.

Solution:

False

(ii) A perfect cube does not end with two zeros.

Solution:

True

(iii) If square of a number ends with 5, then its cube ends with 25.

Solution:

False

(iv) There is no perfect cube which ends with 8.

Solution:

False

(v) The cube of a two digit number may be a three digit number.

Solution:

False

(vi) The cube of a two digit number may have seven or more digits.

Solution:

False

(vii) The cube of a single digit number may be a single digit number.

Solution:

True

3. You are told that 1,331 is a perfect cube. Can you guess without factorisation what is its cube root? Similarly, guess the cube roots of 4913, 12167, 32768.

Solution:

(i) By grouping the digits, we get 1 and 331

We know that, since, the unit digit of cube is 1, the unit digit of cube root is 1.

∴ We get 1 as unit digit of the cube root of 1331.

The cube of 1 matches with the number of second group.

∴ The ten's digit of our cube root is taken as the unit place of smallest number.

We know that, the unit's digit of the cube of a number having digit as unit's place 1 is 1.

$$\therefore \sqrt[3]{1331} = 11$$

(ii) By grouping the digits, we get 4 and 913

We know that, since, the unit digit of cube is 3, the unit digit of cube root is 7.

∴ we get 7 as unit digit of the cube root of 4913. We know $1^3 = 1$ and $2^3 = 8$, $1 > 4 > 8$.

Thus, 1 is taken as ten digit of cube root.

$$\therefore \sqrt[3]{4913} = 17$$

(iii) By grouping the digits, we get 12 and 167.

We know that, since, the unit digit of cube is 7, the unit digit of cube root is 3.

∴ 3 is the unit digit of the cube root of 12167 We know $2^3 = 8$ and $3^3 = 27$, $8 > 12 > 27$.

Thus, 2 is taken as ten digit of cube root.

$$\therefore \sqrt[3]{12167} = 23$$

(iv) By grouping the digits, we get 32 and 768.

We know that, since, the unit digit of cube is 8, the unit digit of cube root is 2.

\therefore 2 is the unit digit of the cube root of 32768. We know $3^3 = 27$ and $4^3 = 64$,
 $27 > 32 > 64$.

Thus, 3 is taken as ten digit of cube root.

$$\therefore \sqrt[3]{32768} = 32$$