CBSE NCERT Solutions for Class 8 Mathematics Chapter 7

Back of Chapter Questions

Exercise 7.1

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

(i) 216

(ii) 128

(iii) 1000

(iv) 100

(v) 46656

Solution:

(i) Given number is 216

216 can be factorised as follows.

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

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

$= (2 \times 3)^3 = 6^3$

Here, in factorization of 216, each factor appears 3 times.

Therefore, 216 is a perfect cube.

(ii) Given number is 128

128 can be factorised a s follows

$$\begin{array}{r|l} 2 & 128 \\ \hline 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

$218 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^6 \times 2 = 2^{2\times 3} \times 2 = 4^3 \times 2$

Here, One 2 is remaining after grouping the triplets of 2.

Therefore, 128 is not a perfect cube.

(iii) Given number is 1000.

1000 can be factorised as follows

$$\begin{array}{r|l} 2 & 1000 \\ \hline 2 & 500 \\ \hline 2 & 250 \\ \hline 5 & 125 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5 = 2^3 \times 5^3$

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

Here, in factorisation of 1000, each factor appears 3 times.

Therefore, 1000 is a perfect cube.

(iv) Given number is 100.

100 can be factorised as follows

$$\begin{array}{r|l} 2 & 100 \\ \hline 5 & 50 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

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

Here, Two 2 and two 5 are remaining after grouping the triples.

Therefore, 100 is not a perfect

(v) Given number is 46656

46656 can be factorised as follows.

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

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

$= 2^3 \times 2^3 \times 3^3 \times 3^3$

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

$= (36)^3$

Here, in factorisation of 46656, each prime factor is appearing as many times as a perfect multiple of 3.

Therefore, 46656 is a perfect cube.

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

(i) 243

(ii) 256

(iii) 72

(iv) 675

(v) 100

Solution:

(i) Given number is 243

243 can be factorised as follows

$$\begin{array}{r|l} 3 & 243 \\ \hline 3 & 81 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

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

Here, two $3'$s are not in triplet. To make 243 a cube, one more 3 is required.

In this case, $243 \times 3 = 929$ is a perfect cube.

Hence the smallest number by which 243 should be multiplied to obtain a perfect cube is 3.

(ii) Given number is 256

256 can be factorised as follows

$$\begin{array}{r|l} 2 & 256 \\ \hline 2 & 128 \\ \hline 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

So, $256 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2)$

Here, two $2'$s are not in triplet. To make 256 a cube, one more 2 is required.

In this case, $256 \times 2 = 512$ is a perfect cube.

Hence, the smallest number by which 256 should be multiplied to obtain a perfect cube is 2.

(iii) Given number is 72.

72 can be factorised as follows.

$$\begin{array}{r|l} 2 & 72 \\ \hline 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

So, $72 = (2 \times 2 \times 2) \times (3 \times 3)$

Here, two $3's$ are not in triplet. To make 72 a cube, one more 3 is required.

In this case, $72 \times 3 = 216$ is a perfect cube.

Hence, the smallest number by which 72 must be multiplied to obtain a perfect cube is 3

(iv) Given number is 675.

675 can be factorised as follows

$$\begin{array}{r|l} 3 & 675 \\ \hline 3 & 225 \\ \hline 3 & 75 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

So, $675 = (3 \times 3 \times 3) \times (5 \times 5)$

Here, two $5's$ are not in triplet. To make 675 a cube, one more 5 is required.

In this case, $675 \times 5 = 3375$ is a perfect cube.

Hence, the smallest number by which 675 should be multiplied to obtain a perfect cube is 5.

(v) 100 can be factorised as follows

$$\begin{array}{r|l} 2 & 100 \\ \hline 2 & 50 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

So, $100 = (2 \times 2) \times (5 \times 5)$

Here, two $2's$ and two $5's$ are not in triplet. To make 100 a cube, one more 2 and one more 5 is required.

In this case, $100 \times 2 \times 5 = 1000$ is a perfect cube.

Hence, the smallest number by which 100 should be multiplied to obtain a perfect cube is 10.

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

(i) 81

(ii) 128

(iii) 135

(iv) 192

(v) 704

Solution:

(i) 81 can be factorised as follows

$81 = (3 \times 3 \times 3) \times 3$

Here, one 3 is left which is not in triplet.

If we divided 81 by 3, then it will become a perfect cube.

Thus, $81 \div 3 = 27 = 3 \times 3 \times 3$ is a perfect cube

Hence, the smallest number by which 81 should be divided to make it a perfect cube is 3.

(ii) 128 can be factorised as follows

$128 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 2$

Here, one 2 is left which is not in triplet.

If we divided 128 by 2, then it will become a perfect cube.

Thus, $128 \div 2 = 64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$ is a perfect cube.

Here, the smallest number by which 128 must be divided to make it a perfect cube is 2.

(iii) 135 can be factorised as follows

$135 = (3 \times 3 \times 3) \times 5$

Here, one 5 is left which is not in triplet.

If we divided 135 by 5, then it will become a perfect cube.

Thus, $135 \div 5 = 27 = 3 \times 3 \times 3$ is a perfect cube.

Hence, smallest number by which 135 should be divided to make it a perfect cube is 5.

(iv) 192 can be factorised as follows

$192 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 3$

Here, one 3 is left which is not in triplet.

If we divided 192 by 3, then it will become a perfect cube.

Thus, $192 \div 3 = 64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$ is a perfect cube.

Hence, smallest number by which 192 should be divided to make it a perfect cube is 3.

(v) 704 can be factorised as follows

$704 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 11$

Here, one 11 is left which is not in a triplet.

If we divided 704 by 11, then it will become a perfect cube.

Thus $704 \div 11 = 64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$ is a perfect cube.

Hence, smallest number by which 704 should be divided to make it a perfect cube is 11.

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:

Volume of the cuboid of sides $5 \text{ cm}, 2 \text{ cm}, 5 \text{ cm} = 5 \text{ cm} \times 2 \text{ cm} \times 5 \text{ cm} = 50 \text{ cm}^3$

Now, $50 = 2 \times 5 \times 5$

Here, two $5'$s and one $2'$s are left which are not in triplet.

If we multiply this expression by $2 \times 2 \times 5 = 20$, then it will become a perfect cube.

Thus, $2 \times 5 \times 5 \times 2 \times 2 \times 5 = 5 \times 5 \times 5 \times 2 \times 2 \times 2 = 1000$ is a perfect cube.

Hence, 20 cuboids of $5 \text{ cm}, 2 \text{ cm}, 5 \text{ cm}$ are required to form a cube.

Exercise 7.2

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

(i) 64

(ii) 512

(iii) 10648

(iv) 27000

(v) 15625

(vi) 13824

(vii) 110592

(viii) 46656

(ix) 175616

(x) 91125

Solution:

(i) 64 can be factorised as follows.

$$\begin{array}{r|l} 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

Prime factorization of $64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$\therefore \sqrt[3]{64} = \sqrt[3]{4^3} = 4$

(ii) 512 can be factorized as follows.

$$\begin{array}{r|l} 2 & 512 \\ \hline 2 & 256 \\ \hline 2 & 128 \\ \hline 2 & 64 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline & 1 \end{array}$$

Prime factorization of $512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$\therefore \sqrt[3]{512} = 2 \times 2 \times 2 = 8$

(iii) 10648 can be factorised as follows

$$\begin{array}{r|l} 2 & 10648 \\ \hline 2 & 5324 \\ \hline 2 & 2662 \\ \hline 11 & 1331 \\ \hline 11 & 121 \\ \hline 11 & 11 \\ \hline & 1 \end{array}$$

Prime factorization of $10648 = 2 \times 2 \times 2 \times 11 \times 11 \times 11$

$\therefore \sqrt[3]{10648} = 2 \times 11 = 22$

(iv) 27000 can be follows as follows

2	27000
2	13500
2	6750
3	3375
3	1125
3	375
5	125
5	25
5	5
	1

Prime factorization of $27000 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$

$\therefore \sqrt[3]{27000} = 2 \times 3 \times 5 = 30$

(v) 15625 can be factorised as follows.

5	15625
5	3125
5	625
5	125
5	25
5	5
	1

Prime factorisation of $15625 = 5 \times 5 \times 5 \times 5 \times 5 \times 5$

$\therefore \sqrt[3]{15625} = 5 \times 5 = 25$

(vi) 13824 can be factorised as follows

2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

Prime factorization of $13824 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$\therefore \sqrt[3]{13824} = 2 \times 2 \times 2 \times 3 = 24$

(vii) 110592 can be factorised as follows

2	110592
2	55296
2	27648
2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

Prime factorization of $110592 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$\therefore \sqrt[3]{110592} = 2 \times 2 \times 2 \times 2 \times 3 = 48$

(viii) 46656 can be factorised as follows

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

Prime factorisation of $46656 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

$\therefore \sqrt[3]{46656} = 2 \times 2 \times 3 \times 3 = 36$

(ix) 175616 can be factorised as follows

$$\begin{array}{r|l} 2 & 175616 \\ \hline 2 & 87808 \\ \hline 2 & 43904 \\ \hline 2 & 21952 \\ \hline 2 & 10976 \\ \hline 2 & 5488 \\ \hline 2 & 2744 \\ \hline 2 & 1372 \\ \hline 2 & 686 \\ \hline 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

Prime factorisation of $175616 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 7 \times 7 \times 7$

$\therefore \sqrt[3]{175616} = 2 \times 2 \times 2 \times 7 = 56$

(x) 91125 can be factorised as follows

$$\begin{array}{r|l} 3 & 91125 \\ \hline 3 & 30375 \\ \hline 3 & 10125 \\ \hline 3 & 3375 \\ \hline 3 & 1125 \\ \hline 3 & 375 \\ \hline 5 & 125 \\ \hline 5 & 25 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

Prime factorisation of $91125 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$

$\therefore \sqrt[3]{91125} = 3 \times 3 \times 5 = 45$

2. State true or false.

(i) Cube of any odd number is even.

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

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

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

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

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

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

Solution:

(i) False

Explanation:

The unit place digit of an odd number (say, a) is odd and the unit place digit of the cube is the unit place digit of $a \times a \times a$.

If a is odd, then $a \times a \times a$ is also odd.

So unit place digit of $a \times a \times a$ is odd.

Hence, unit place digit of the cube is odd.

Therefore, cube of any odd number is an odd number.

(ii) True

Explanation:

Perfect cube will end with a certain number of zeroes that are always a perfect multiple of 3.

(iii) False

Explanation:

It is not always necessary that if the square of a number ends with 5, then its cube will end with 25.

For example, the square of 35 is 1225 and also has its unit place digit as 5 but the cube of 35 is 42875 which doesnot end with 25.

(iv) False

Explanation:

The cubes of all the numbers having their unit place digit as 2 will ends with 8. In this way, There are many perfect cubes which ends with 8.

(v) True

Explanation:

The smallest two digit natural number is 10 and its cube is 1000 which is a four digit number.

(vi) False

Explanation:

The largest two digit natural is 99 and its cube is 970299 which is a 6 digit number. Therefore, the cube of any two digit number cannot have 7 or more digits in it.

(vii) True

Explanation:

The cube of 1 and 2 are 1 and 8 respectively.

Hence, the given statement is 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:

1331 :

We know that $10^3 = 1000$

Possible cube of $11 = 1331$

Since, cube of unit digit is $= 1$

Therefore, cube root of 1331 is 11.

4913:

We know that $7^3 = 343$

Next number comes with 7 as unit place digit is 17.

So possible cube of $17 = 4913$.

Therefore, cube root of 4913 is 17.

12167:

We know that $3^3 = 27$

Here in cube, unit digit is 7

Now next number with 3 as its unit digit is 13

Also, $13^3 = 2197$

and next number with 3 as its unit digit is 23 and $23^3 = 12167$

Hence cube root of 12167 is 23.

32768 :

We know that $2^3 = 8$

Here in cube, unit's digit is 8

Now next number with 2 at its unit place digit is 12 and $12^3 = 1728$

And next number with 2 as its unit's place digit is 22

$22^3 = 10648$

And next number with 2 at its unit's place digit is 32

Also, $32^3 = 32768$

Hence cube root of 32768 is 32.