

Exercise 7.1

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

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

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 with one factor 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,

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

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.

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$\therefore$  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,

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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 cube

(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 cube

(iii) 72

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**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 cube

**(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.

$\therefore$  We will multiply 675 by 5 to get perfect cube

**(v) 100**

**Solution:**

By resolving 100 into prime factor,

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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  $(2 \times 5)$  10 to get perfect cube

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 cube

(ii) 128

Solution:

By resolving 128 into prime factor,

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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.

$\therefore$  We will divide 128 by 2 to get perfect cube

**(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 cube

**(iv) 192**

**Solution:**

By resolving 192 into prime factor,

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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 cube

**(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.

$\therefore$  We will divide 704 by 11 to get perfect cube



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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.

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

Exercise 7.2

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,

$$\therefore 512 = 2 \times 2 \times 2 = 8$$

Hence, 8 is cube root of 512.

(iii) 10648

Solution:

$$10648 = 2 \times 2 \times 2 \times 11 \times 11 \times 11$$

By grouping the factors in triplets of equal factors,

$$10648 = (2 \times 2 \times 2) \times (11 \times 11 \times 11)$$

Here, 10648 can be grouped into triplets of equal factors,

$$\therefore 10648 = 2 \times 11 = 22$$

Hence, 22 is cube root of 10648.

(iv) 27000

Solution:

$$27000 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$$

By grouping the factors in triplets of equal factors,

$$27000 = (2 \times 2 \times 2) \times (3 \times 3 \times 3) \times (5 \times 5 \times 5)$$

Here, 27000 can be grouped into triplets of equal factors,

$$\therefore 27000 = (2 \times 3 \times 5) = 30$$

Hence, 30 is cube root of 27000.

(v) 15625

Solution:

$$15625 = 5 \times 5 \times 5 \times 5 \times 5 \times 5$$

By grouping the factors in triplets of equal factors,

$$15625 = (5 \times 5 \times 5) \times (5 \times 5 \times 5)$$

Here, 15625 can be grouped into triplets of equal factors,

$$\therefore 15625 = (5 \times 5) = 25$$

Hence, 25 is cube root of 15625.

(vi) 13824

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**Solution:**

$13824 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$   
By grouping the factors in triplets of equal factors,  
 $13824 = (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (3 \times 3 \times 3)$   
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:**

$110592 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$   
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:**

$46656 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$   
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:**

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

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(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  $3^3 = 27$ ,  $8 > 12 > 27$ .

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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.

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

