Cubes and Cube Roots

Exercise 7.1

(1) Which of the following number are not perfect cubes?

(i) 216

Ans: Here, we find cube root of given number.

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

By prime factorization

$216 = \underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3}$

We make group of 3 factor.

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

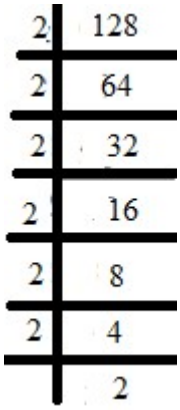
$= (2 \times 3)^3$

$= 6^3$ which is perfect cube.

216 is a perfect cube of 6.

(ii) 128

Ans: Here, we find cube root of given number.



128 = 2 x 2 x 2 x 2 x 2 x 2 x 2

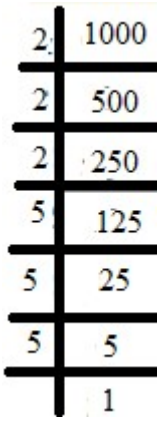
We make group of 3 factor.

In above factorization one triplet group of 2 is not form.

128 is not a perfect cube.

(iii) 1000

ANS:



We make group of 3 factor.

1000 = 5 x 5 x 5 x 2x 2 x 2

We make group of 3 factor.

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

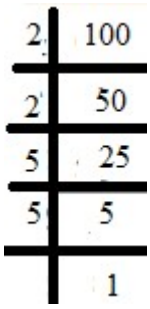
$= (5 \times 2)^3$

$= 10^3$ which is a perfect cube

1000 is a perfect cube of 10.

(iv) 100

ANS:



By prime factorization

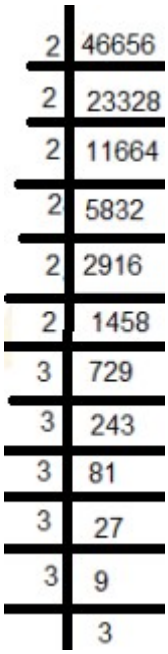
100 = 5 x 5 x 2 x 2

Here each factor repeated only twice. We required 3 times.

100 is not a perfect cube.

(v) 46656

ANS:



By prime factorization

We make group of 3 factor.

46656 = 3 x 3 x 3 x 3 x 3 x 3 x 4 x 4 x 4

Here each factor appear 3 time

$46656 = 3^3 \times 3^3 \times 4^3$

$= (3 \times 3 \times 4)^3$

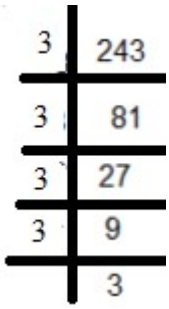
$= (36)^3$ which is a perfect cube.

46656 is a perfect cube of 36.

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

ANS:

By using smallest multiple method,



243 = **3 x 3 x 3** x 3 x 3

Here, the prime factor 3 does not appear in a group of three.

For getting a perfect cube, we multiply by one more 3.

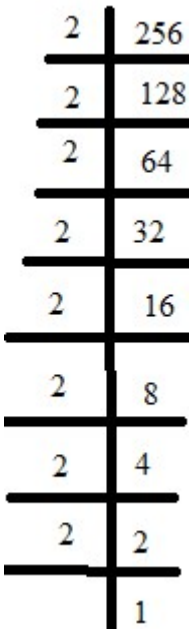
243 x 3 = 3 x 3 x 3 x 3 x 3 x 3

= 729 which is a perfect cube.

The smallest natural number by which 243 should be multiplied to make a perfect cube is 3.

(ii) 256

ANS:



Here,

256 = 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2

The prime factor 2 does not appear in a group of there.

For getting a perfect cube, we multiply by one more 2.

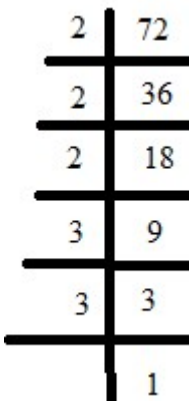
256 x 2 = 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2

= 512 which is a perfect cube.

The smallest natural number by which 256 should be multiplied to make perfect cube is 2.

(iii) 72

ANS:



72 = **2 x 2 x 2**x 3 x 3

Here,

The prime factor 3 does not appear in a group of three.

For getting a perfect cube, we multiply by one more 3.

72 x 3 = 2 x 2 x 2 x 3 x 3 x 3

= 216 which is a perfect cube.

The smallest natural number by which 72 should be multiplied to make a perfect cube is 3.

(iv) 675

ANS:

5	675
5	135
3	27
3	9
3	3

675 = 3 x 3 x 3 x 5 x 5

Here,

The prime factor 5 does not appear in a group of three.

For getting a perfect cube, we multiply by one more 5.

675 x 5 = 3 x 3 x 3 x 5 x 5 x 5

= 3375 which is a perfect cube.

The smallest natural number by which 675 should be multiplied to make a perfect cube is 5.

(v) 100

ANS:

2	100
2	50
5	25
5	5
	1

100 = 5 x 5 x 2 x 2

Here both the prime factor does not form a group of three.

For getting a perfect cube, we multiply by 5 and 2

Then, 100 x 5 x 2 = 5 x 5 x 5 x 2 x 2 x 2

= 1000 which is a perfect cube.

The smallest natural number by which 100 should be multiplied to make a perfect cube is 5 x 2

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

(i) 81

ANS:

3	81
3	27
3	9
3	3
	1

81 = 3 x 3 x 3 x 3

Factor 3 does not form a group of three.

If we divide 81 by 3, then the prime factorization of the quotient will not contain 3.

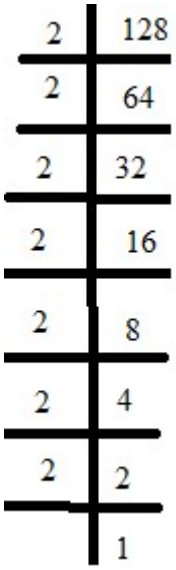
81 ÷ 3 = 3 x 3 x 3

= 27 = 3^3 is perfect cube.

The smallest number by which 81 should be divided to make it perfect cube is 3.

(ii) 128

ANS:



128 = 2 x 2 x 2 x 2 x 2 x 2 x 2

Factor 2 does not form a group of three,

if we divide 128 by 2, then the prime factorization of the quotients will not contain 2.

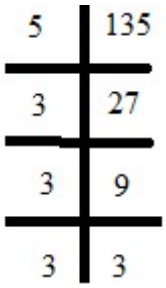
128 ÷ 2 = 2 x 2 x 2 x 2 x 2 x 2

= 64 = 4^3 is perfect cube.

The smallest number by which 128 should be divided to make it perfect cube is 2.

(iii) 135

ANS:



135 = 3 x 3 x 3 x 5

Factor 5 does not form a group of three

If we divide 135 by 5, then the prime factorization of the quotient will not contain 5.

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

$= 27 = 3^3$ is perfect cube.

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

(iv) 192

ANS:

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

$192 = \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2} \times 3$

Factor 3 does not form a group of there

If we divide 192 by 3 then the prime factorization of the quotients will not contain 3.

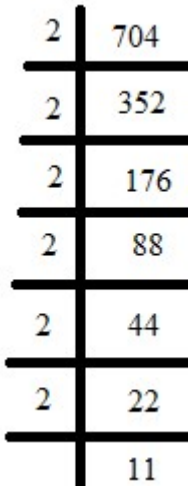
$192 \div 3 = \underline{2 \times 2 \times 2} \times \underline{2 \times 2 \times 2}$

$= 64 = 4^3$ is perfect cube.

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

(v) 704

ANS:



704 = 2 x 2 x 2 x 2 x 2 x 2 x 11

Factor 11 does not form a group of three

If we divide 704 by 11 then the prime factorization of the quotient will not contain 11.

704 ÷ 11 = 2 x 2 x 2 x 2 x 2 x 2

= 64 = 4^3 is perfect cube.

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

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

ANS:

Given that,

Parikshit have plasticine of sides 5cm, 2cm and 5cm

We know,

Number of cuboids required = Volume of cube / Volume of cuboid

Now, Volume of cuboid = length x breadth x height

Volume of cuboid = 5 x 5 x 2 cm^3

To make the volume of cuboid as a cube number we need to multiply it by (5 x 2 x 2)

Number of cuboids required = 5^3 x 2^3 / 5^2 x 2

Number of cuboids required = 20

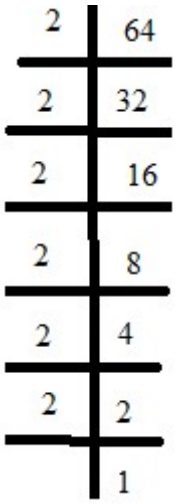
Exercise 1.2

(1) Find the cube root of each of the following numbers by prime factories method.

(i) 64

ANS:

By prime factor method,



64 = 2 x 2 x 2 x 2 x 2 x 2

We make group of 3 factor.

$= 2^3 \times 2^3$

$= (2 \times 2)^3$

The cube root of 64 is 4

(ii) 512

ANS:

By prime factor method

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2

512 = 2 x 2 x 2 x 2 x 2 x 2 x2 x 2 x 2

We make group of 3 factor.

$= 2^3 \times 4^3$

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

The cube root of 512 is 8.

(iii) 10648

ANS:

By prime factor method

2	10648
2	5324
2	2662
11	1331
11	121
11	11
	1

We make group of 3 factor.

10648 = $\underline{2 \times 2 \times 2} \times \underline{11 \times 11 \times 11}$

$= 2^3 \times 11^3$

$= (2 \times 11)^3$

The cube root of 10648 is 22

(iv) 27000

ANS:

By prime factor method,

3	27000
3	9000
3	3000
10	1000
10	100
10	10
	1

We make group of 3 factor.

27000 = $\underline{3 \times 3 \times 3} \times \underline{10 \times 10 \times 10}$

$= 3^3 \times 10^3$

$= (3 \times 10)^3$

The cube root of 27000 is 30.

(v) 15625

ANS:

By prime factor method,

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

We make group of 3 factor.

15625 = 5 x 5 x 5 x 5 x 5 x 5

$= 5^3 \times 5^3$

= (5 x 5)3

The cube root of 15625 is 25.

(vi) 13824

ANS:

By prime factor method

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

We make group of 3 factor.

13824 = 2 x 2 x 2 x2 x 2 x 2 x2 x 2 x 2x3 x 3 x 3

= 2^3 x2^3x 2^3x 3^3

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

The cube root of 13824 is 24.

(vii) 110592

ANS:

By prime factorization method,

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

We make group of 3 factor.

110592 = 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2x 3 x 3 x 3

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

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

The cube root of 110592 is 48.

(viii) 46656

ANS:

By prime factorization method

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

We make group of 3 factor.

46656 = 2 x 2 x 2 x 2 x 2 x 2x 3 x 3 x 3 x 3 x 3 x 3

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

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

The cube root of 46656 is 36.

(ix) 175616

ANS:

By prime factorization method

2	175616
2	87808
2	43904
2	21952
2	10976
2	5488
2	2744
2	1372
2	686
7	343
7	49
7	7
	1

We make group of 3 factor.

175616 = 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 2 x 7 x 7 x 7

175616 = $2^3 \times 2^3 \times 2^3 \times 7^3$

= $(2 \times 2 \times 2 \times 7)^3$

The cube root of 175616 is 56.

(x) 91125

ANS:

By prime factorization method,

5	91125
5	18225
5	3645
3	729
3	243
3	81
3	27
3	9
3	3

We make group of 3 factor.

91125 = 5 x 5 x 5x 3 x 3 x 3 x 3 x 3 x 3

$= 5^3 \times 3^3 \times 3^3$

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

The cube root of 91125 is 45.

(2) State true or false

(i) Cube of any odd number is even.

ANS:False.

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

ANS:True.

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

ANS:False.

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

ANS:False.

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

Answer: False.

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

ANS:False.

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

ANS:True.